

**AMENDING AGREEMENT  
For CD0501-001 and CD0502-001**

**THIS AMENDING AGREEMENT NUMBER 5** for CD0501-001

**THIS AMENDING AGREEMENT NUMBER 2** for CD0502-001

**AND** each Amending Agreement noted above is made as of the 13<sup>th</sup> day of April 2017.

**BETWEEN:**

**LABRADOR TRANSMISSION CORPORATION**, a body corporate constituted pursuant to the *Corporations Act*, RSNL 1990, c. C-36, as amended, and having its head office at the City of St. John's, Province of Newfoundland and Labrador, Canada (hereinafter referred to as "**LTC**") and **LABRADOR-ISLAND LINK LIMITED PARTNERSHIP**, a limited partnership formed pursuant to the laws of the Province of Newfoundland and Labrador, Canada, represented by its general partner, Labrador-Island Link General Partner Corporation (hereinafter referred to as "**LIL**") of the first part;

- and -

**GRID SOLUTIONS CANADA ULC**, a body incorporated under the laws of the Province of British Columbia, and having its head office in the City of La Prairie, in the Province of Quebec (hereinafter referred to as "**Contractor**") of the second part.

**WHEREAS**, LTC and LIL may collectively be referred to as "Company" and LTC, LIL and Contractor may be referred to herein together as the "Parties" and separately as a "Party", as context dictates;

**WHEREAS** an Agreement Number CD0501-001 entitled Supply and Install Agreement - Converter Stations and Transition Compounds (hereinafter called the "CD0501") dated March 31, 2014, was entered into between LIL and Contractor;

**AND WHEREAS** an Agreement Number CD0502-001 entitled Engineer, Procure and Construct Agreement – Construction of AC Substations (hereinafter called the "CD0502") dated August 15, 2014, was entered into between LIL, LTC and Contractor;

**AND WHEREAS** the Parties wish to amend CD0501 and CD0502 as hereinafter set forth in this Amending Agreement;

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2

**AND WHEREAS** the Parties agree that, unless specifically delineated below, the changes reflected herein apply to both CD0501 and CD0502.

**NOW THEREFORE THIS AMENDING AGREEMENT WITNESSES** that, in consideration of the premises and mutual covenants and agreements hereinafter set forth and contained, the Parties hereto agree that CD0501 and CD0502 each be amended as follows:

### **Interpretation**

The above WHEREAS clauses are expressly incorporated herein as contractual clauses.

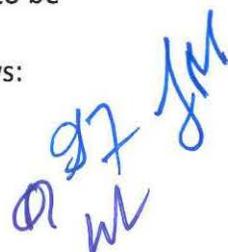
### **Definitions**

- a) Unless otherwise defined in this Amending Agreement, including Attachments A and H hereto, all capitalized terms and expressions used herein shall have the meaning respectively ascribed thereto in CD0501 and CD0502.
- b) "Bipole" is defined as two (2) Converter Stations, each consisting of two (2) twelve (12) pulse Valve Groups, and each one (1) connected to the other station by a HVdc transmission line.
- c) "Monopole or Pole 1" is defined as two (2) Converter Stations, each consisting of two-(2) twelve-(12) pulse Valve Groups, and each one (1) connected to the other station by a HVdc transmission line where (unlike Bipole) only one set of valve groups (poles) in each Converter Station is operated (hence 'monopole' instead of 'bipole'), and the second transmission line normally used in Bipole mode is used as a return path for this monopole scheme.
- d) "Phased Approach" means the methodology of delivery of the balance of the Work remaining to be completed on CD0501 whereby Pole 1 will be delivered and then Bipole will be delivered, and as further described in this Amending Agreement.

### **Phased Approach Completion**

1. Contractor shall satisfy the Substantial Completion requirements set out in Article 25 on CD0502 on or before November 30, 2017.
2. As of the date of this Amending Agreement the balance of the Work remaining to be completed on CD0501 shall be executed using a phased approach whereby the remaining Work will be broken down to Monopole (Pole 1) and Bipole as follows:

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2



- (a) Commissioning Static Checks and Dynamic Commissioning of Pole 1 shall be completed in accordance with the Technical Requirements identified in Attachment H by December 31, 2017; and
- (b) Dynamic Commissioning at Low Power of the Bipole shall be completed in accordance with the Technical Requirements of CD0501 by January 31, 2019.

The scope of work for the Phased Approach is detailed in Attachment A to this Amending Agreement.

### **CD0501 Amendments**

3. The following amendments are made to CD0501:

- (a) A new Article 10.10 is added, as follows:

10.10 At the commencement of Dynamic Commissioning for Pole1 and provided that Contractor has successfully completed commissioning and energized all necessary equipment at the Churchill Falls site that is required to enable the transfer of up to 225 MW power from the Churchill Falls generating facility, Company shall provide Contractor with:

- (a) Minimum of 45MW at the AC terminals of Muskrat Falls Converter Station; and
  - (b) All equipment or means outside of Contractor's Scope of Work of CD0501 and CD0502 during the commissioning program necessary for transmission of power in Pole 1 operating mode.
- (b) Article 17.1(a), as amended by Amending Agreement No. 4, is deleted in its entirety and replaced with the following:

17.1(a) Contractor shall provide a general warranty for the Work as follows:

- (i) The Warranty Period for Work necessary for Pole 1 operation, including equipment listed in Attachment B, shall commence on the date that Trial Operation at Low Power of Pole 1 is completed and continue for a period of thirty-six (36) months therefrom;
- (ii) Except for equipment listed in Attachment B and Work necessary for Pole 1 operation, the Warranty Period for all Work supplied for Bipole operation shall commence on the date that Trial Operation at

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Low Power of Bipole is completed and continue for a period of thirty-six (36) months;

(iii) Notwithstanding the periods described by subparagraphs (a) and (b) above, in no event shall a Warranty Period extend later than forty-eight (48) months from the date of final delivery of the last major material identified in the Terms of Payment, Main Equipment List, set out in Exhibit 2 – Compensation;

(iv) Contractor agrees that during the Warranty Period it shall at its own expense promptly:

- i. correct any Work applicable to that Warranty Period which is not in accordance with this Agreement;
- ii. rectify and make good or cause to be rectified and made good all Defects in the Work applicable to that Warranty Period which are detected and discovered; and
- iii. have available at the Worksites or at a proximate location to the Worksites all necessary equipment, spare parts and labour to comply with the foregoing obligations.

(c) Article 37.1 is deleted in its entirety and replaced with:

- a. If Commissioning Static Checks and Dynamic Commissioning of Pole 1 have not been completed by January 31, 2018 Contractor will pay Company liquidated damages on CD0501 at the rate of two hundred fifty thousand dollars (\$250,000.00) per day for each day of delay commencing on March 1, 2018, to a maximum of twenty- five million dollars (\$25,000,000.00);
- b. If Commissioning Static Checks and Dynamic Commissioning at Low Power for Bipole have not been completed by April 1, 2019, Contractor will pay Company liquidated damages on CD0501 at the rate of two hundred fifty thousand dollars (\$250,000.00) per day for each day of delay commencing on April 2, 2019, to a maximum of fifteen million dollars (\$15,000,000.00).

(d) Articles 37.3(a), (b) and (d) are deleted in their entirety and each replaced with “not used”;

(e) Exhibit 2, Section 10.1 is deleted in its entirety and replaced with “not used”; and

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- (f) Exhibit 9 is deleted in its entirety and replaced with Attachment C to this Amending Agreement.

#### **CD0502 Amendments**

4. The following amendments are made to CD0502:
- (a) Article 24.2 is deleted in its entirety and replaced with:
- “If Contractor fails to execute the Work in a manner wherein the applicable dates in the Milestone Schedule will be exceeded then provisions of Article 32.2 shall apply.”
- (b) Article 36.1 is deleted in its entirety and replaced with “not used”;
- (c) Articles 36.2 is deleted in its entirety and replaced with “not used”;
- (d) Exhibit 2, Section 11.0 is deleted in its entirety and replaced with “not used”; and
- (e) Exhibit 9 is deleted in its entirety and replaced with Attachment D to this Amending Agreement.

#### **Completion Compensation**

5. Provided Contractor completes Pole 1 Commissioning Static Checks and Dynamic Commissioning in accordance with the dates below, Contractor shall be entitled to a completion compensation on CD0501 as follows:
- If Commissioning Static Checks and Dynamic Commissioning are completed on or before December 31, 2017, the completion compensation shall be ten million dollars (\$10,000,000.00).
  - If Commissioning Static Checks and Dynamic Commissioning are not completed on or before December 31, 2017, the completion compensation shall decline at the rate of one hundred thousand dollars (\$100,000.00) per day up to and including January 20, 2018.
  - If Commissioning Static Checks and Dynamic Commissioning are completed after January 20, 2018, and up to and including January 31, 2018, the completion compensation shall be five million dollars (\$5,000,000.00).
  - If Commissioning Static Checks and Dynamic Commissioning is not completed before January 31, 2018, Contractor shall not be entitled to any completion compensation and liquidated damages shall apply in accordance with Article

37.1, as revised in this Amending Agreement.

6. Provided Contractor completes Bipole Static and Dynamic Commissioning at Low Power in accordance with the dates below, Contractor shall be entitled to a completion compensation as follows:
- If Commissioning Static Checks and Dynamic Commissioning at Low Power is completed on or before January 31, 2019, the completion compensation will be seven million five hundred thousand dollars (\$7,500,000.00).
  - If Commissioning Static Checks and Dynamic Commissioning at Low Power are not completed on or before January 31, 2019, the completion compensation will decline each day in equal increments of two hundred fifty thousand dollars (\$250,000.00) commencing on February 1, 2019.
  - If Commissioning Static Checks and Dynamic Commissioning at Low Power are not completed before March 2, 2019, Contractor shall not be entitled to completion compensation and liquidated damages shall apply in accordance with Article 37.1, as revised in this Amending Agreement.
7. Upon becoming entitled to completion compensation in accordance with paragraphs 5 and/or 6 above, Contractor shall be deemed to have achieved a Payment Milestone for the purposes of Article 12.8 of CD0501 and be entitled to issue a Payment Certificate on CD0501. All invoicing and payment procedures set out in Article 12 for CD0501 shall apply to the completion compensation payment.

#### **Outstanding Change Requests and Claims**

8. LIL and LTC shall pay Contractor eighteen million dollars (\$18,000,000.00) as full and final compensation for all costs, including without limiting the foregoing all direct, impact and indirect costs, incurred or claimed by Contractor for the Change Requests and Claims on CD0501 and CD0502 listed in the form of Change Orders in Attachment E to this Amending Agreement.
9. Upon execution of this Amending Agreement:
- (a) LIL shall issue a Change Order on CD0501 in the form in Attachment E to this Amending Agreement in the amount of twelve million one hundred sixty-six thousand five hundred forty-one dollars (\$12,166,541.10) and Contractor shall be entitled to issue a Payment Certificate in respect of that Change Order; and

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(b) LIL and LTC shall issue a Change Order on CD0502 in the form in Attachment E to this Amending Agreement for five million eight hundred thirty-three thousand four hundred fifty-nine dollars (\$5,833,458.90) and Contractor shall be entitled to issue a Payment Certificate in respect of that Change Order

10. All invoicing and payment procedures set out in Article 12 for CD0501 and CD0502 shall apply to the payment contemplated by paragraphs 8 and 9.

#### **Phased Approach Engineering & Compensation**

11. Contractor shall perform all engineering and optimization for CD0501 necessary for completing the Phased Approach described in paragraph 2 above, inclusive of Pole 1 and revised Bipole design, equipment lists, Single Line Diagrams, and the revised Phased Approach schedules.
12. Contractor shall be paid five million dollars (\$5,000,000.00) for the engineering services payable upon Company Approval of the deliverables specified in Attachment E to this Amending Agreement. LIL will issue a Change Order on CD0501 for such engineering services.
13. All invoicing and payment procedures set out in Article 12 for CD0501, including Contractor's preparation and issuance of a Payment Certificate, shall apply to the payment of the Change Orders referenced in paragraphs 11 and 12

#### **Mutual Release and Waiver of Claims**

14. Except as noted in paragraph 16 below, each Party hereto irrevocably and unconditionally releases and forever discharges the other Party and its Affiliates and each of their respective directors, officers, employees, agents, representatives, insurers, consultants, successors and assigns (collectively, the "Releasees") from any and all manner of actions, causes of action, claims, demands, costs, damages, expenses, losses, liabilities and obligations, whether express, implied or otherwise, known or unknown or ought to have known, which a Party now has or may hereafter have against a Releasee respecting or arising out of the performance or non-performance, up to and including February 2, 2017, of a Party's obligations under CD0501 and CD0502 including, without limiting the generality of the foregoing, claims arising from or relating to :

- (a) Change Requests;
- (b) Extensions of time;
- (c) Back charges;

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- (d) Credits associated with concessions;
  - (e) Damages for delay; and
  - (f) Liquidated damages.
15. Except for any claim or proceeding arising out of or related to a Civil Works Contractor's acts or omissions, a Party will not make any claim or take any proceedings against any individual, partnership, corporation, insurer, financing entity or any other incorporated or unincorporated entity or association (each a "Third Party") for any act or omission up to and including February 2, 2017, relating to CD0501 and CD0502 which Third Party might claim contribution, indemnity or other relief from or against a Releasee under any provisions of any statute, at law or otherwise regarding the subject matter of this Release.
16. Paragraph 14 and 15 do not apply to:
- (a) any Claims LIL and/or LTC may have for Defects in Work on CD0501 and CD0502;
  - (b) any Claims Contractor may have for accommodations after February 2, 2017;
  - (c) LIL/LTC back charges for concrete supply at Muskrat Falls in CHO-CD0501001-0023 and CHO-CD0502001-0022; and
  - (d) as set out in Exhibit 17 in each of CD0501 and CD0502, a Party's responsibility for any amounts payable to a civil works contractor in respect of civil works contractor Claims.

#### **Holdback for Civil Works Contractor Claims**

17. LIL and LTC had withheld a total of fifty-six million seven hundred fifteen thousand eight-four dollars (\$56,715,084.00) pursuant to provision in Articles 12 and Exhibit 17 on CD0501 and CD0502 in respect of liens and claims by Civil Works contractors on contracts CD0504-001 and C0504-002. Contractor contests Company's right to withhold. Upon receipt of security from Contractor satisfactory to LIL and LTC to replace the withholding LIL and LTC shall release an amount withheld equal to the value of the security. If any arbitration on the claims by Civil Works contractors on contracts CD0504-001 and C0504-002 remains outstanding as of the "final expiry date" of any security then Contractor shall obtain an extension or a replacement of the security.

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18. In respect of any current or future liens and claims by Civil Works contractors on contracts CD0504-001 and C0504-002 LIL and LTC shall not withhold any future payments to Contractor regardless of any release of the withheld amounts referred to in paragraph 17.
19. LIL, LTC and Contractor will work together to negotiate a mutually acceptable resolution of the Civil Works contractors' current claims and any future claims.
20. Paragraphs 17 and 18 shall only apply to liens and claims by the Civil Works contractors on contracts CD0504-001 and C0504-002, and if any of Contractor's Subcontractors or any of Subcontractor's sub-subcontractors or any Person claiming through Contractor's Subcontractor or Subcontractor's sub-subcontractor registers a lien in connection with the Work under CD0501 and CD0502 against property owned or leased by LIL or LTC then the holdback, setoff and indemnity provisions relevant to liens set out in CD0501 or CD0502, as the case may be, shall continue to apply.

#### **Transformer Delivery**

21. LIL shall pay Contractor seven million dollars (\$7,000,000.00) upon Delivery to the Muskrat Falls site of all seven (7) converter transformers specified in document ILK-SN-CD-8000-EL-TS-0022-01 in Exhibit 1 of CD0501.
22. LIL shall pay Contractor five million dollars (\$5,000,000.00) upon completion of installation of three (3) converter transformers on pads at the Muskrat Falls site.
23. All invoicing and payment procedures set out in Article 12 for CD0501 shall apply to the payments contemplated by paragraphs 21 and 22.

#### **Cubicles**

24. Contractor shall design, supply and install twelve (12) duplicate control cubicles, with installation to be completed prior to completion of Pole 1 Dynamic Commissioning in accordance with the specification in Attachment G.
25. LIL shall pay Contractor five million dollars (\$5,000,000.00) for the twelve (12) duplicate control cubicles, inclusive of all associated engineering and installation costs.
26. All invoicing and payment procedures set out in Article 12 for CD0501 shall apply to the payment contemplated by paragraph 25.

#### **Testing and Commissioning**

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2

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27. Contractor shall perform testing and commissioning for Pole 1 as set out in Attachment H.

**Pole 1 Trial Operation**

28. Contractor shall perform a Trial Operation of Pole 1 as set out in Attachment H.
29. If Contractor fails to complete the Trial Operation at Low Power of Pole 1 in accordance with Section 12 of Attachment H:
- (a) then Contractor shall pay Company one hundred sixty-six thousand six hundred sixty-six dollars and sixty-six cents (\$166,666.66) for each day in excess of the seventy (70) day Trial Operation period specified in Attachment H for successful completion of Trial Operation at Low Power of Pole 1 for a maximum of thirty (30) days; and
  - (b) if Contractor fails to complete the Trial Operation at Low Power of Pole 1 within a one hundred (100) day period, then Contractor shall pay Company one hundred thirty-three thousand three hundred thirty-three dollars and thirty-three cents (\$133,333.33) for each day in excess of the one hundred (100) day period for a maximum of thirty (30) days; and
  - (c) if Contractor fails to complete the Trial Operation at Low Power of Pole 1 within a one hundred thirty (130) day period Contractor shall not be in default for the purposes of Article 32 of CD0501 and of CD0502 however Contractor shall:
    - (i) cease attempts to complete Trial Operation at Low Power of Pole 1;
    - (ii) proceed to complete all Work necessary to complete Dynamic Commissioning at Low Power of the Bipole system.

**Pole 1 Performance Standards**

30. Following completion of Trial Operation at Low Power of Pole 1, operation of Pole 1 shall satisfy the guarantees for Pole Forced Outage and Forced Energy Unavailability as set out in Attachment I.
31. Contractor shall pay the following liquidated damages to Company for a failure to satisfy a guarantee set out in Attachment I:
- (a) For each Pole Forced Outage in excess of eight (8), two hundred fifty thousand dollars (\$250,000.00) to a maximum of four million dollars (\$4,000,000.00);

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(b) For Forced Energy Unavailability during Pole 1 operation:

Less than or equal to 2.25%	nil
Greater than 2.25 % but less than or equal to 3% (\$1,000,000.00)	one million dollars
Greater than 3% but less than or equal to 4%	two million dollars (\$2,000,000.00)
Greater than 4% but less than or equal to 5%	three million dollars (\$3,000,000.00)
Greater than 5%	five million dollars (\$5,000,000.00)

- 32. The performance requirements of Article 36.1 and liquidated damages described in Article 37.2 of CD0501 shall only apply to the performance of the Bipole system.
- 33. The liability cap in Article 37.3(c) is not changed by anything in this Amending Agreement, and any liquidated damages payable Contractor pursuant to paragraph 31 shall be included for the purposes of the liability cap in Article 37.3(c).

**Title and Risk of Loss**

- 34. Upon successful completion of Trial Operation at Low Power of Pole 1, title, care, custody, control and risk of loss of Pole 1 equipment shall pass to Company. Notwithstanding the foregoing, if any loss or damage to Pole 1 equipment is:
  - (a) caused by a Defect, then the warranty provisions of CD0501 and CD0502, as may have been amended, shall apply;
  - (b) caused by Contractor in the course of construction of the Bipole then Contractor, at its cost, shall carry out all necessary remedial work and supply any necessary parts and equipment to repair the damage or replace the loss.
- 35. Following successful completion of Trial Operation at Low Power of Pole 1, Contractor shall provide technical support to Company or to its designate for the operation of Pole 1 until such time as Pole 1 operation ceases for integration into the Bipole system as set out in Section 2.8 of the Scope of Work Specification, document ILK-SN-CD-8000-EL-SP-0001-01, in Exhibit 1.
- 36. Company shall cease operation of Pole 1 for such times as is required for integration of Pole 1 into the Bipole system, and Contractor shall:
  - (a) accept Pole 1 at that time for the purpose of integration into the Bipole system; and
  - (b) work with Company to schedule and minimize the number, frequency and duration of Pole 1 outages during the integration of Pole 1 in to the Bipole system.

37. Subject to paragraph 38 and except for any damage to or defect in equipment caused by Company's operation of Pole 1 (but not any Defect to which the Warranty provisions of Article 17 apply) which adversely affects Contractor's integration of Pole 1 into the Bipole system, Company's operation of Pole 1 shall not in any way be grounds for or basis of any claim by Contractor for an extension of time or for additional compensation, and Contractor waives any right to claim an extension of time or for additional compensation arising from Company's operation of Pole 1.
38. Contractor shall give Company thirty (30) days prior Notice of the date Contractor plans to commence the integration of Pole 1 into the Bipole system, and if Company delays Contractor's commencement of the integration then Contractor shall be entitled to issue a Change Request for an extension of time and/or additional compensation.

#### **Amendments to Exhibit 2**

39. Appendix A2 (Milestone Payment Schedule) in Exhibit 2 – Compensation of CD0501 is deleted and replaced by the payment schedule set out in Attachment J.

#### **Substantial and Final Completion**

40. Article 25 in CD0501 shall only apply to completion of the Bipole system.

#### **Schedules and Reporting**

41. Upon execution of this Amending Agreement Contractor shall deliver to Engineer a control schedule for the Phased Approach, inclusive of activities necessary for completion of Pole 1 and Bipole, that satisfies the requirements for a control schedule as set out in Exhibit 3 – Coordination Procedures.
42. Contractor shall deliver to Engineer, each week, an updated three (3) week look ahead construction schedule with resource loading.
43. If Contractor experiences any material delay to the critical path on the control schedule for the Phased Approach Contractor shall make best efforts to recover the schedule to meet the dates set out in Exhibit 9 as that Exhibit is revised by this Amending Agreement. If Contractor experiences any material delay to the critical path on the control schedule for the Phased Approach, caused by anyone other than Contractor, Contractor's Subcontractor, or anyone over whom Contractor has control, Contractor shall be entitled to submit a Change Request to Company for an equitable adjustment to the price and the schedule.
44. Contractor shall deliver weekly and monthly reports, including an updated control schedule, in accordance with Exhibit 3 – Coordination Procedures.

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45. If Contractor fails to deliver the monthly reports described in paragraph 44 that satisfy the requirements of Exhibit 3, Contractor shall have ten (10) Business Days to rectify the deficiency following Notice from Company of such failure and if the deficiency has not been rectified within that time then Company shall be entitled to withhold twenty-five percent (25%) of Payment Milestones due Contractor from Company until such time as the monthly reports are delivered.

#### **Spare parts for Phased Approach**

46. Notwithstanding anything to the contrary in the Attachments and for greater of clarity, during the execution of Pole 1, if spare parts are necessary for the Pole 1, Contractor may, at its election, use spare parts requested and available for Bipole. Thereafter, Contractor shall replace and supply the spare parts for Bipole as per the Agreement.

#### **General**

47. This Amending Agreement shall be effective from the date hereof and shall remain in full force and effect from such date.
48. Unless otherwise stated, references to a paragraph number are references to that numbered paragraph in this Amending Agreement.
49. This Amending Agreement includes Attachment A through J, inclusive.
50. This Amending Agreement is supplementary to CD0501 and CD0502 and is read with and construed in accordance with CD0501 and CD0502, as the case may be, as if this Amending Agreement and each of CD0501 and CD0502, as amended, constitute one (1) agreement.
51. Except as this Amending Agreement otherwise provides, each of CD0501 and CD0502 are in all respects ratified and confirmed and all terms, provisions and covenants thereof shall remain in full force and effect.
52. This Amending Agreement shall be binding upon and enure to the benefit of each of the parties hereto and their respective successors and assigns.
53. Notwithstanding execution of this Amending Agreement by the Parties, this Amending Agreement shall be subject to and conditional upon:
- (a) all written consents from parties to the LCP financing agreements that are required by the terms of those agreements;

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(b) written confirmation by the surety, that it has had notice of the terms and conditions of this Amending Agreement and that the performance bond, number 6341859/948-073/BDTO-100103-014, and all riders thereto currently held by LIL as security pursuant to Article 7 of CD0501, retain their full and unimpaired validity, force and effect.

IN WITNESS WHEREOF the Parties hereto have executed and delivered this Amending Agreement as of the day and year first above written.

LABRADOR TRANSMISSION CORPORATION

Per:

Title:

*John McFarlane*  
*Env Power Supply*

Per:

Title:

*John Flay*  
*Project Director - Transmission*

LABRADOR-ISLAND LINK LIMITED PARTNERSHIP

Per:

Title:

*John McFarlane*  
*Env Power Supply*

Per:

Title:

*John Flay*  
*Project Director - Transmission*

GRID SOLUTIONS CANADA ULC

Per:

Title:

*Olivier Ruiz*  
*Director*

Execution Page to an Amending Agreement between Labrador-Island Link Limited Partnership, Labrador Transmission Corporation and Grid Solutions Canada ULC and dated as of the 13<sup>th</sup> day of April, 2017.

*John Flay*  
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**Attachment A**  
**Phased Approach**  
**Scope of Work**

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

**LOWER CHURCHILL PROJECT**

**CD0501-001**

**Phased Approach**

**SCOPE OF WORK**

**Prepared by:**

Geoff Power

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(Sr. Integration Engineer)

**Approved by:**

Barry K. Boland

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(HVdc Specialities Integration Manager)

**Approved by:**

Stephen Follett

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(HVdc Specialities Project Manager)

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

REVISION LIST

Revision						Remarks
N°	By	Verif.	Appr.	Appr.	Date DD-MMM-YYYY	
D1	GP	BB	SF			

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

**1 PHASED APPROACH - GENERAL DESCRIPTION**

Contractor shall complete Dynamic Commissioning of Pole 1, transmitting up to 225MW of the HVdc link as indicated in Exhibit 9, followed by completion of Dynamic Commissioning of Bipole as indicated in Exhibit 9. Delivery of Pole 1 in a reduced capacity shall be referred to as the "Phased Approach." The Phased Approach strategy will allow the transmission of up to 225MW of power from Churchill Falls to Soldiers Pond via Pole 1 (Figure 1) of the HVdc link, until such time when the Muskrat Falls Generating Station is in operation.

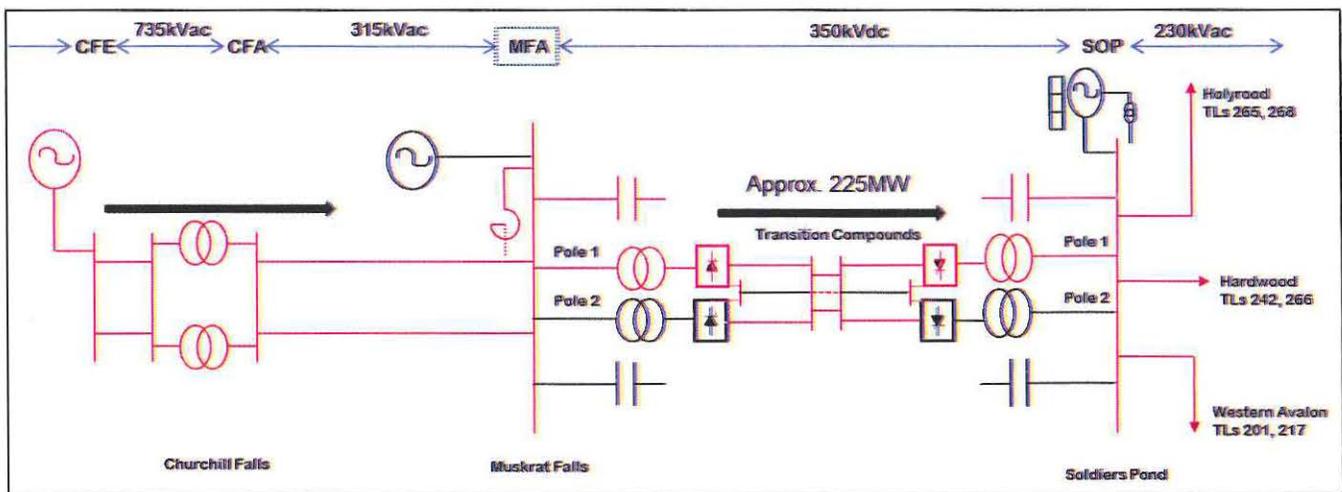


Figure 1 – Overall Single Line Diagram (SLD) , Pole 1

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

**2 PURPOSE**

The purpose of this document is to define the Phased Approach scope of work.

**3 SCOPE**

The scope of this document includes the re-prioritization of the Work defined in CD0501 and CD0502.

**4 DEFINITIONS**

The definitions for this scope shall remain as per definitions in the CD0501 agreement with the following additional terms tabled below.

Term	Definition
Monopole or Pole 1	Two (2) Converter Stations, each consisting of two-(2) twelve-(12) pulse Valve Groups, and each one (1) connected to the other station by a HVdc transmission line where (unlike Bipole) only one set of valve groups (poles) in each Converter Station is operated (hence 'monopole' instead of 'bipole'), and the second transmission line normally used in Bipole mode is used as a return path for this monopole scheme.

Table 1 - Definitions

**5 ACRONYMS**

Shall remain as per definitions in the CD0501 agreement.

**6 SCOPE OF WORK**

**6.1 Basis of 'Phased Approach'**

The following key assumptions frame the scope of the 'Phased Approach', Pole 1:

- Transmission of up to 225 MW from Muskrat Falls (measured at Muskrat Falls dc transmission line terminals) to Soldiers Pond;
- Zero Synchronous Condensers required (Company supplied);
- AC Filter requirement:

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- o MFACS - 2 'A' type required (Priority 1),
- o SOPCS - 1'A' and 1'B' type filters required (Priority 1);
- Ground Return:
  - o Priority 1: Metallic Return only for Pole 1 operation
  - o Priority 2: Progression of Electrodes by Fall 2017 to permit Earth Return for redundancy
- The Contractor will continue design, testing and construction based on Priority 1.

**6.2 Work Included**

The Work included in the scope of the Phased Approach includes the attached Single Line Diagrams and Site Layouts of the current Scope Of Work (ILK-SN-CD-8000-EL-SP-0001-01) for CD0501. However, this work is to be re-sequenced and re-prioritized as mutually agreed by Company and Contractor to ensure the installation, completion, commissioning and operation of Pole 1 of the HVDC link, and subsequently Bipole of the HVDC link. Table 2 below summarizes the impact on the various C3 HVdc Specialities Contracts.

Package/Contract	Effect on Current Scope
CD0501 (HVDC Converter Stations and Transition Compounds)	Re-sequencing of current scope to complete Dynamic Commissioning of Pole 1 and Dynamic Commissioning of Pole 2 according to Exhibit 9
CD0502 (AC Switchyards)	None

Table 2 - Phased Approach Impact on C3 Packages

Accordingly, by mutual agreement of Company and Contractor, all Work under the existing CD0501 Agreement shall be assigned one of the following Priorities:

- **Priority 1:** Any Work which is critically required for Pole 1 operation (Monopole) (i.e., Pole 1 operation cannot be achieved without the Work);
- **Priority 2:** Any Work which is not critically required for Pole 1 operation, but provides increased system redundancy, efficiency, performance, etc., or any Work which presents a concurrent construction opportunity with Work associated with Pole 2. Concurrent construction opportunities may exist where it is more feasible to complete non-Priority 1 Work at the same time as Priority 2 Work due to constructability issues, logistic opportunities, safety concerns, etc.

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
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- **Priority 3:** Any Work which is not required for Pole 1 (Monopole) Operation, but is required for Pole 2 and subsequent Bipole operation.

All high-level Single Line Diagrams Site Layouts have been scoped to identify the Priorities of all major equipment for Priority 1 (and the associated Works) for Pole 1 and Pole 2. Refer to Appendices A-D - Single Line Diagrams and Layouts Scoped for Phased Approach. The colours are red for Priority 1, blue for Priority 2, and no colouring for Priority 3. The Single Line Diagrams Site Layouts can be rationalized upon mutual agreement of the Company and Contractor.

**6.2.1 Pole 1 Design Requirements**

The protection systems shall be properly coordinated with protections in the connected ac systems

**6.2.1.1 Redundancy**

Any redundant equipment and associated works covered under the existing Agreement and included in that Scope of Work, and which would normally be required to ensure continuous operation of the Monopole system under a single contingency, shall be furnished as part of the Monopole scope.

**6.2.1.2 Reverse Power**

Pole 1 shall be based on power flow from the Muskrat Falls Converter Station to the Soldiers Pond Converter Station only. Reverse power is not a requirement for Pole 1 operation.

**6.2.1.3 Reliability**

The HVdc Converter Stations and Transition Compounds shall be designed for reliable operation in the Pole 1 operation with Metallic Return operating mode. While operating in this mode, the neutral ground switch in the Soldiers Pond Converter Station shall be utilized as the ground reference point.

Pole 1 with Shoreline Pond Electrode Return operating mode shall be provided as a Priority 2 operating mode. This shall include a connection to a single overhead electrode line conductor at each Converter Station. During Pole 1 operation, there is no specific requirement for the electrode fault locator (ELFL) systems to be functional.

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Priority 2 supplementary equipment or operating modes shall be designed, procured, constructed, commissioned and placed into commercial operation by Contractor at a date sometime between the completion of Pole 1 Dynamic Commissioning at Low Power and the completion of Bipole Dynamic Commissioning at low Power. To meet this requirement, Contractor shall place a priority on the delivery of all Priority 1 equipment and operating modes and once these Priority 1 requirements are delivered, Contractor shall then deliver Priority 2 equipment and operating modes.

**6.2.1.4 Submarine Cables**

During Pole 1 operation, all the three HVdc submarine cables shall be energized and connected so that the spare cable is always being paired with one of the pole cables. During this phase, only manual, offline, submarine cable switching is required and does not count as outage activity.

**6.2.1.5 Future Consideration for Bipole Integration**

The equipment necessary to allow the reliable and safe future integration of any Bipole required equipment shall be installed as part of the Pole 1. This shall include any equipment, including specifically disconnect and ground switches, necessary to ensure that future connections can be safely made to a de-energized, isolated and grounded bus system, without requiring an outage to the monopole. Any modifications to the scope shall be mutually agreed by Company and Contractor.

**6.3 Work Excluded**

Not applicable.

**7 SPECIAL REQUIREMENTS**

**7.1 Cubicles**

To facilitate the Monopole Phased Approach, a second set of Series V control and protection cabinets shall be furnished by Contractor. These mirror platform cabinets shall be identical to the original hardware being supplied and will serve as a means to allow Bipole testing to proceed in Stafford while the control and protection cabinets have already been shipped to Site. During detailed design, Contractor shall submit, for Company review

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and acceptance, a detailed plan that describes how this mirror platform hardware will integrate into the existing testing plan.

**7.2 Shoal Cove Breaker**

Should the breaker be unavailable, the option outline in Appendix D-1 can be implemented by Contractor.

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
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**APPENDIX A – [Single Line Diagrams and Layouts Scoped for Phased Approach –  
Muskrat Falls]**

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

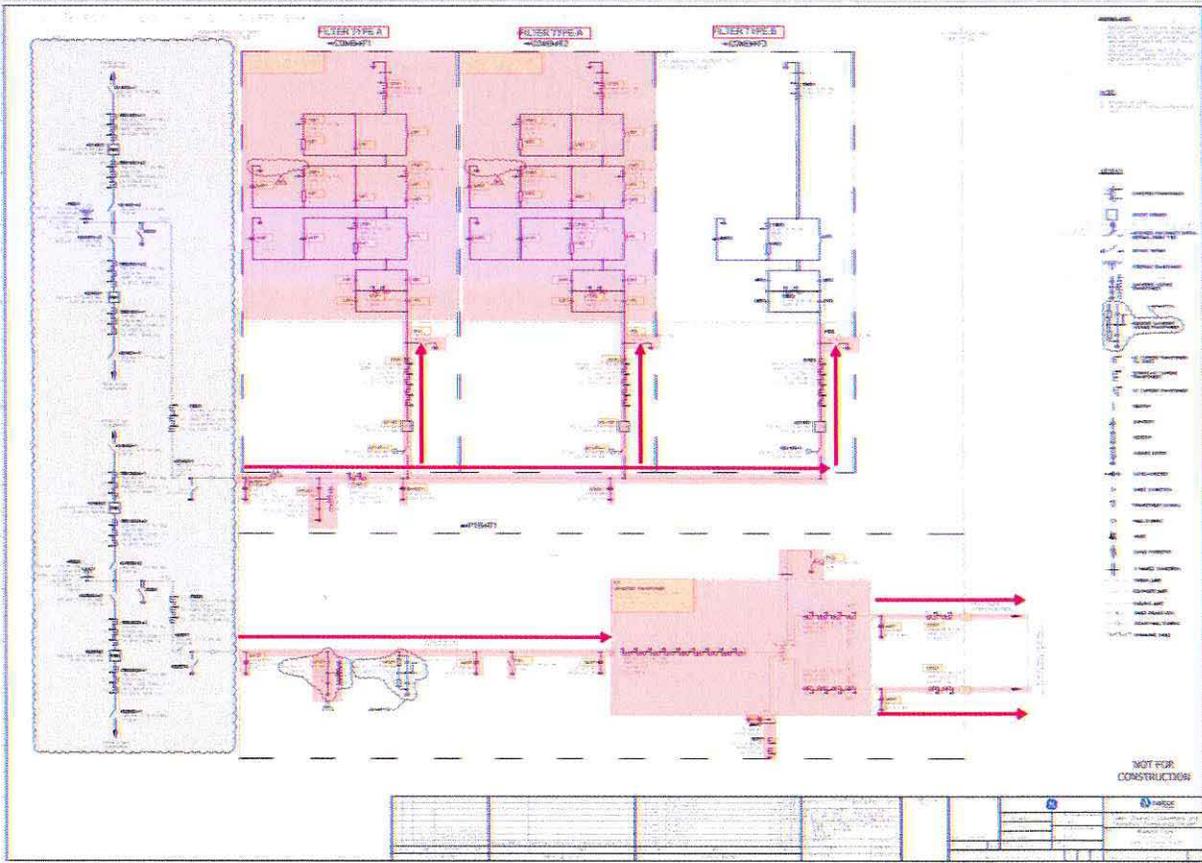


Diagram A.1. Muskrat Falls Converter Station AC Yard Pole 1

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

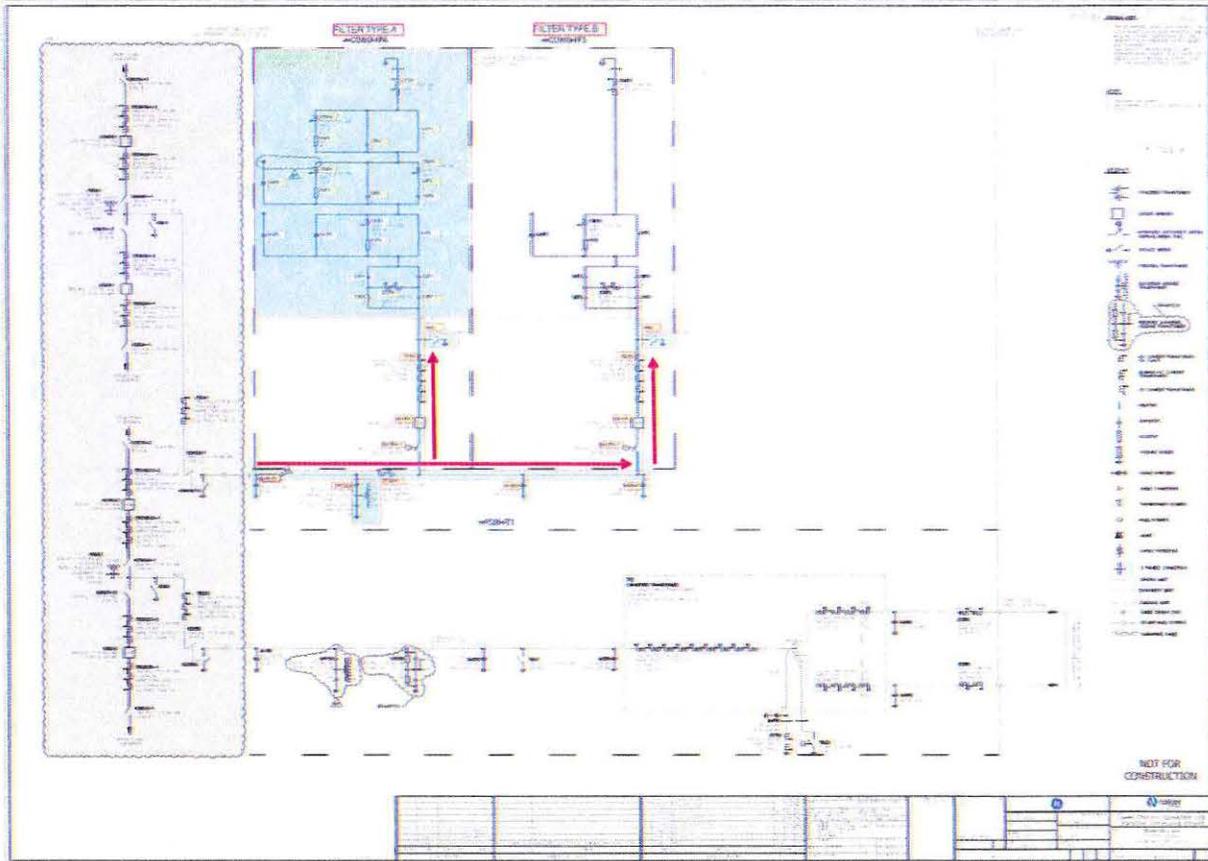


Diagram A.2. Muskrat Falls Converter Station AC Yard Pole 2

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

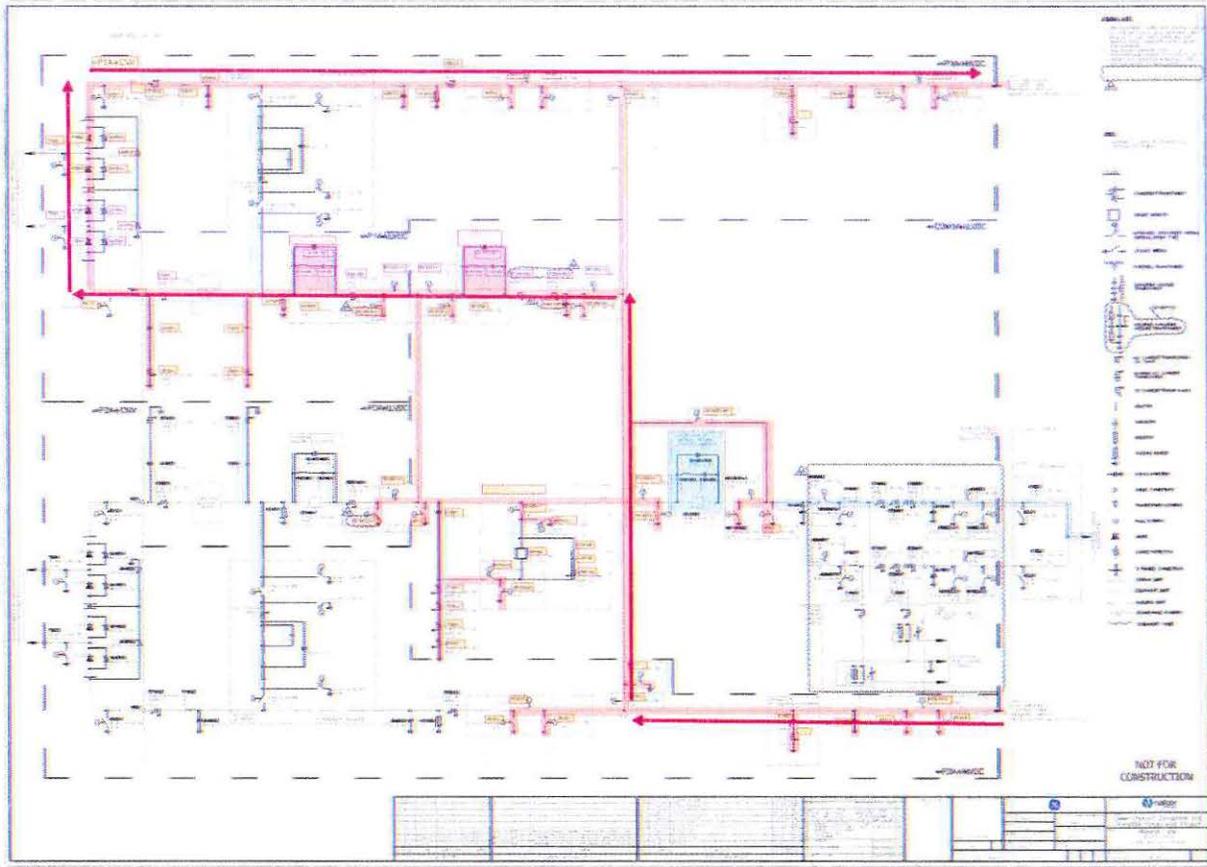


Diagram A.3. Muskrat Falls Converter Station DC Yard

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

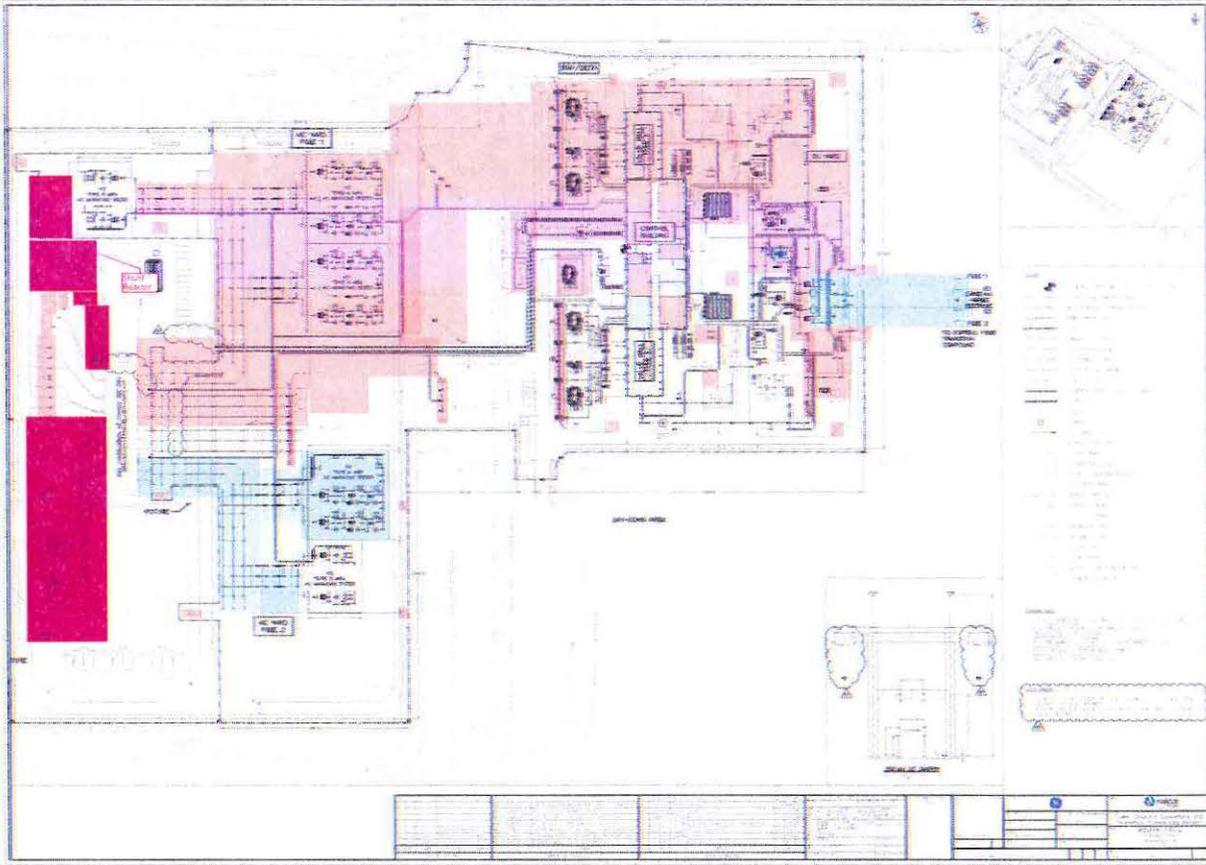


Diagram A.4. Muskrat Falls Converter Station Plan View

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

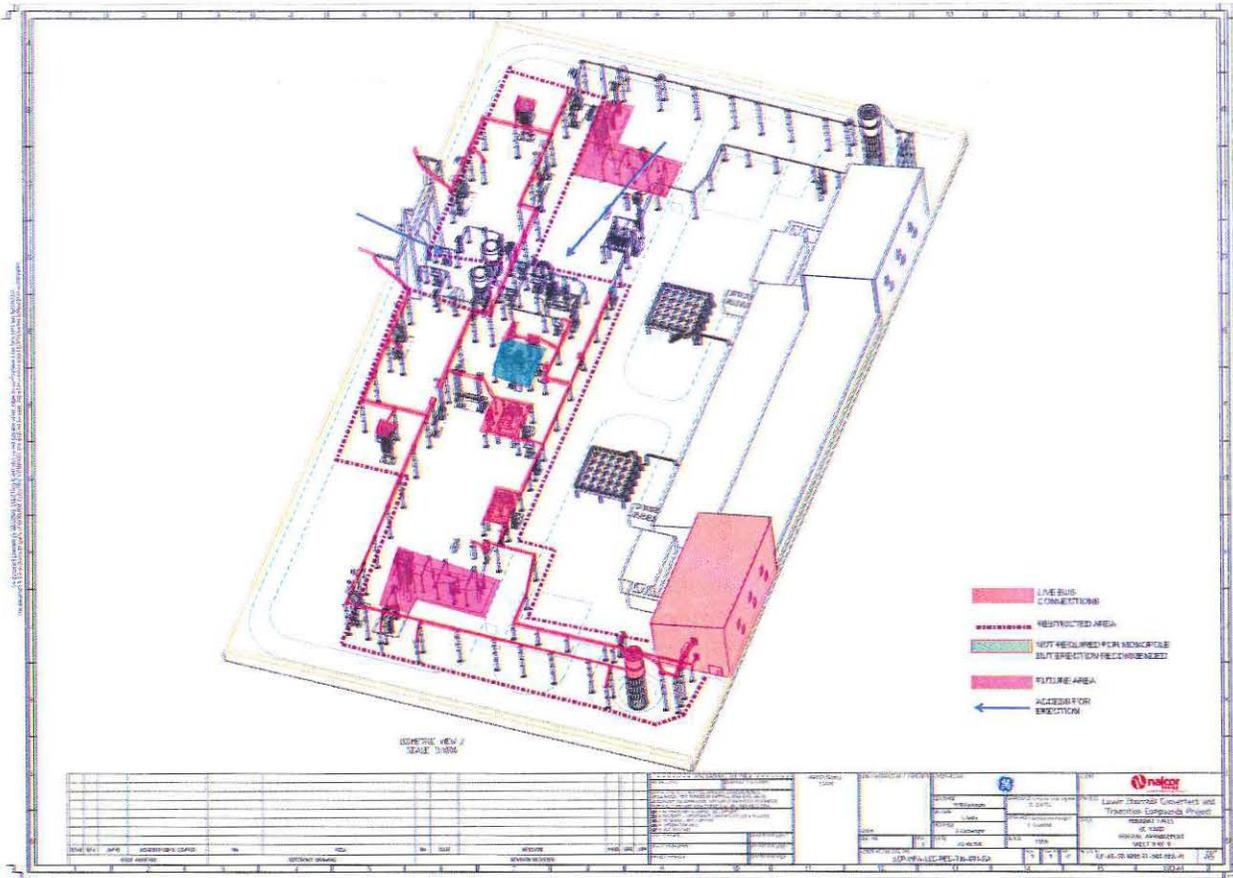


Diagram A.6. Muskrat Falls Converter Station Plan View Detail #2

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

**APPENDIX B – [Single Line Diagrams and Layouts Scoped for Phased Approach –  
Soldiers Pond]**

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

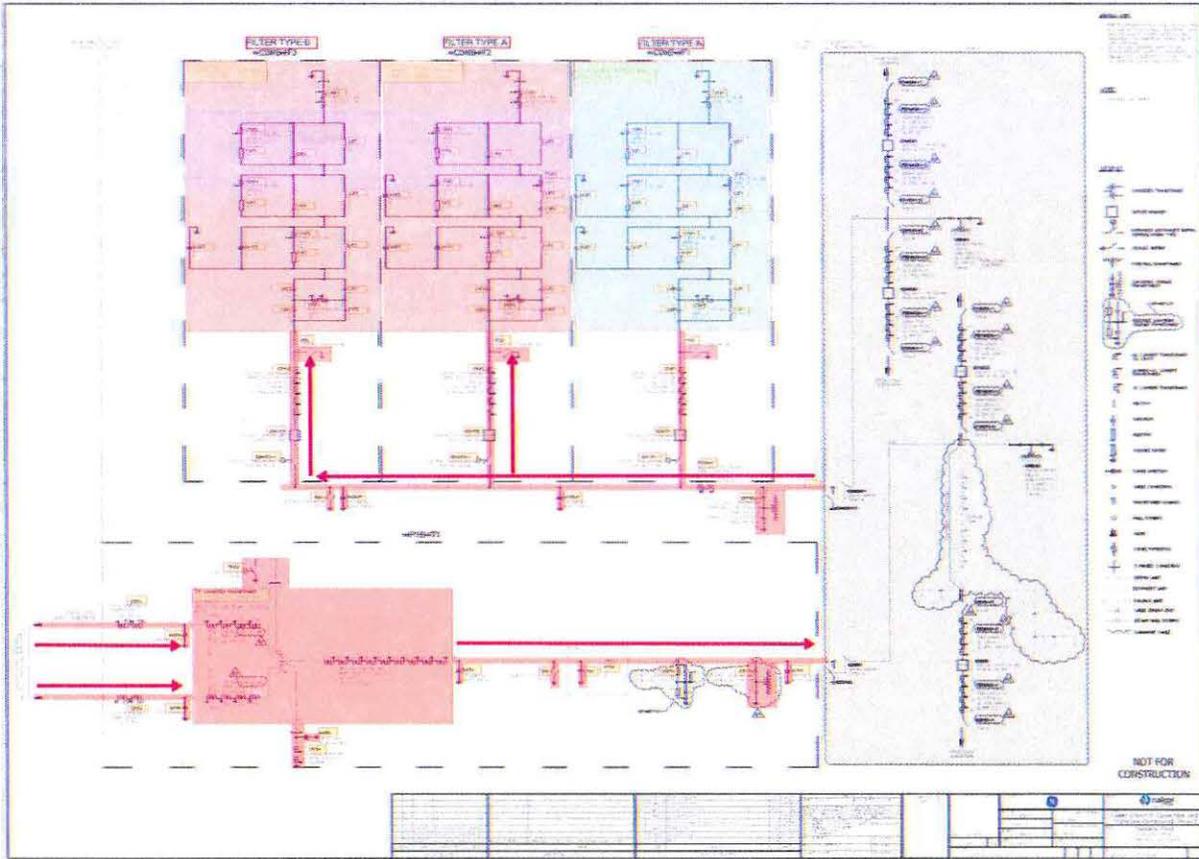


Diagram B.1. Soldiers Pond Converter Station AC Yard Pole 1

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

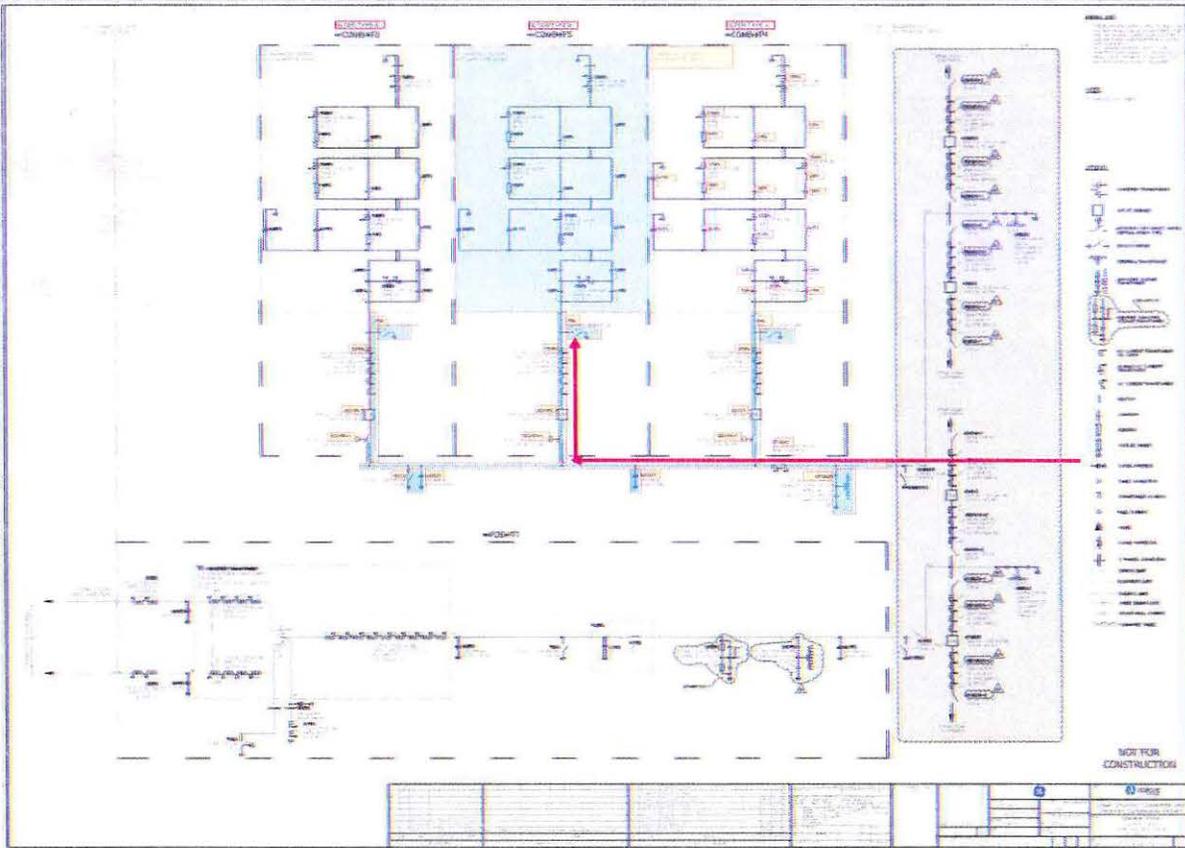


Diagram B.2. Soldiers Pond Converter Station AC Yard Pole 2

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<b>LOWER CHURCHILL PROJECT</b>	<b>Phased Approach Scope of Work</b>	<b>Rev</b>	<b>Date</b>
	<b>LCP-PT-MD-0000-EN-SP-0001-01</b>	<b>D1</b>	<b>12-Apr-2017</b>

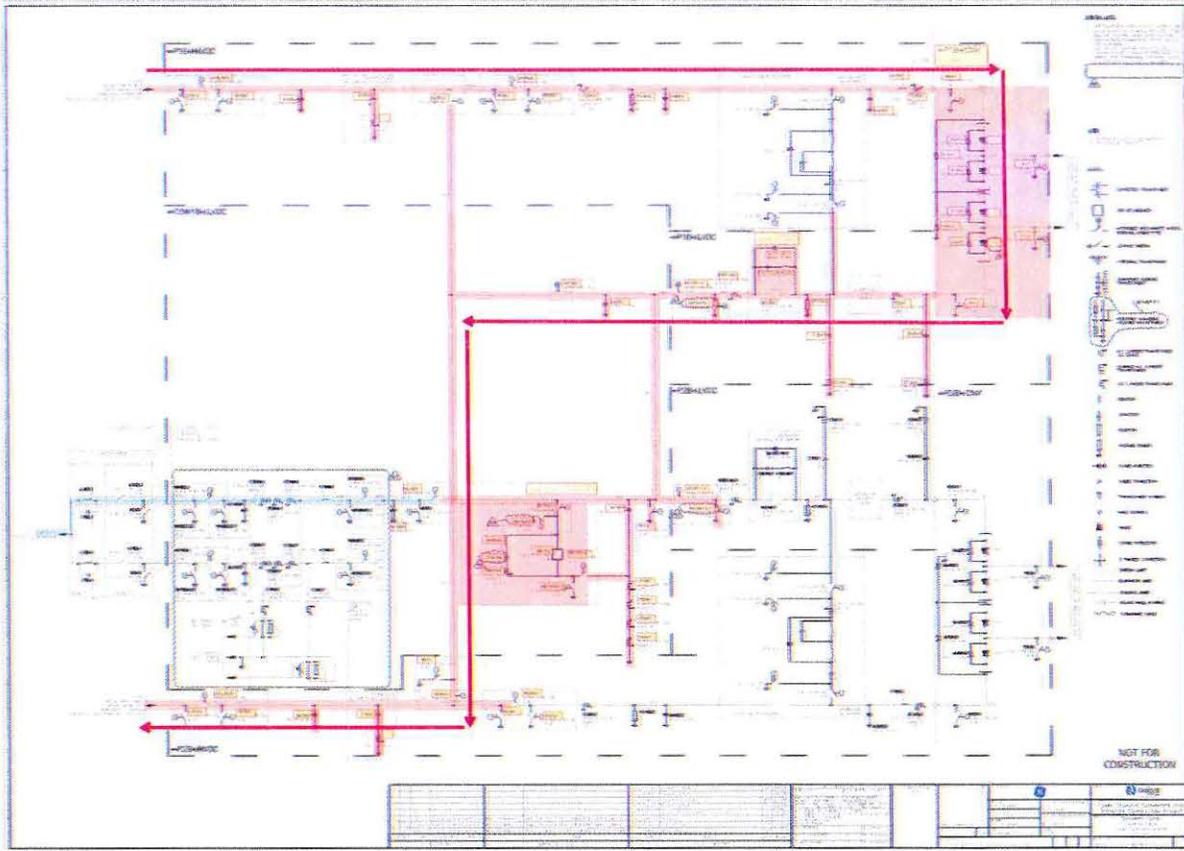


Diagram B.3. Soldiers Pond Converter Station DC Yard

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<p><b>LOWER CHURCHILL PROJECT</b></p>	<p>Phased Approach Scope of Work</p>	<p>Rev</p>	<p>Date</p>
	<p>LCP-PT-MD-0000-EN-SP-0001-01</p>	<p>D1</p>	<p>12-Apr-2017</p>

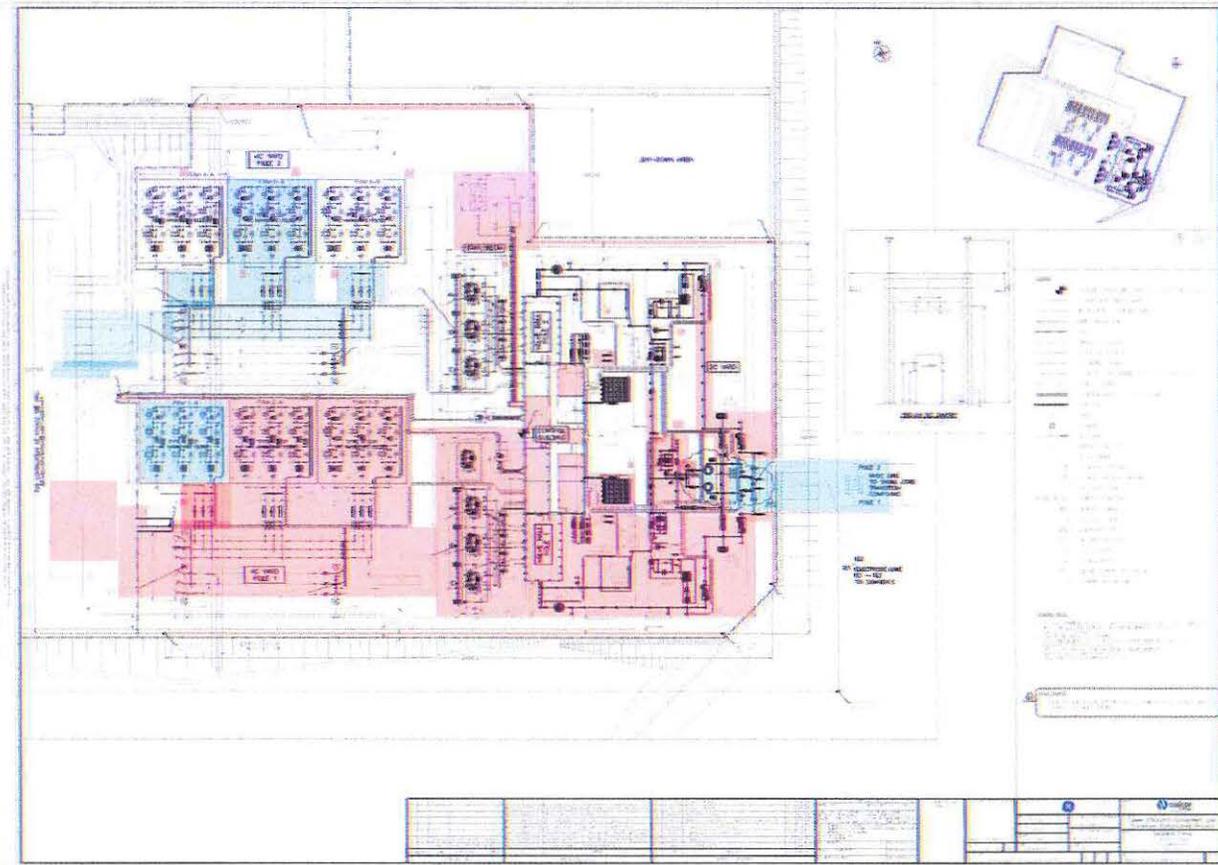


Diagram B.4. Soldiers Pond Converter Station Plan View

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

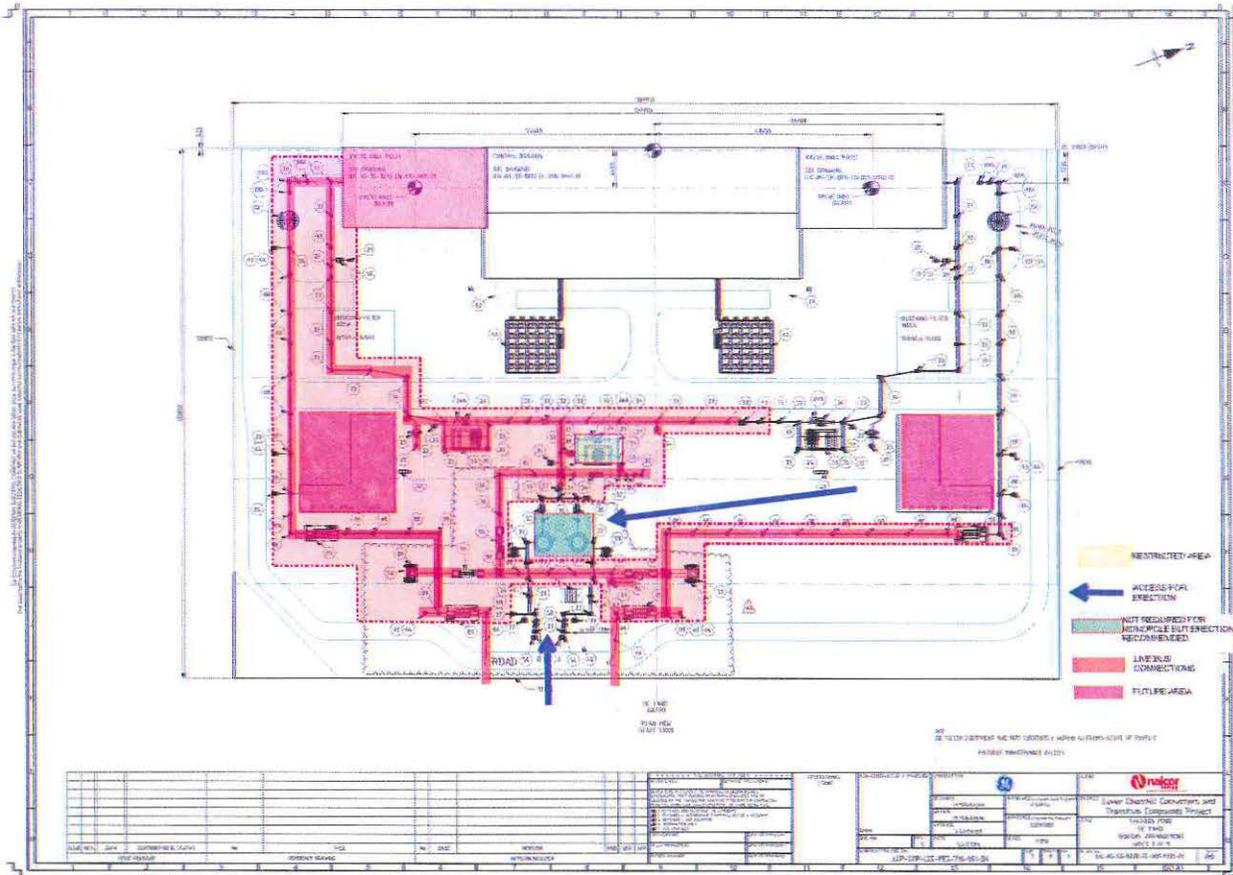


Diagram B.5. Soldiers Pond Converter Station Plan View Detail #1

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

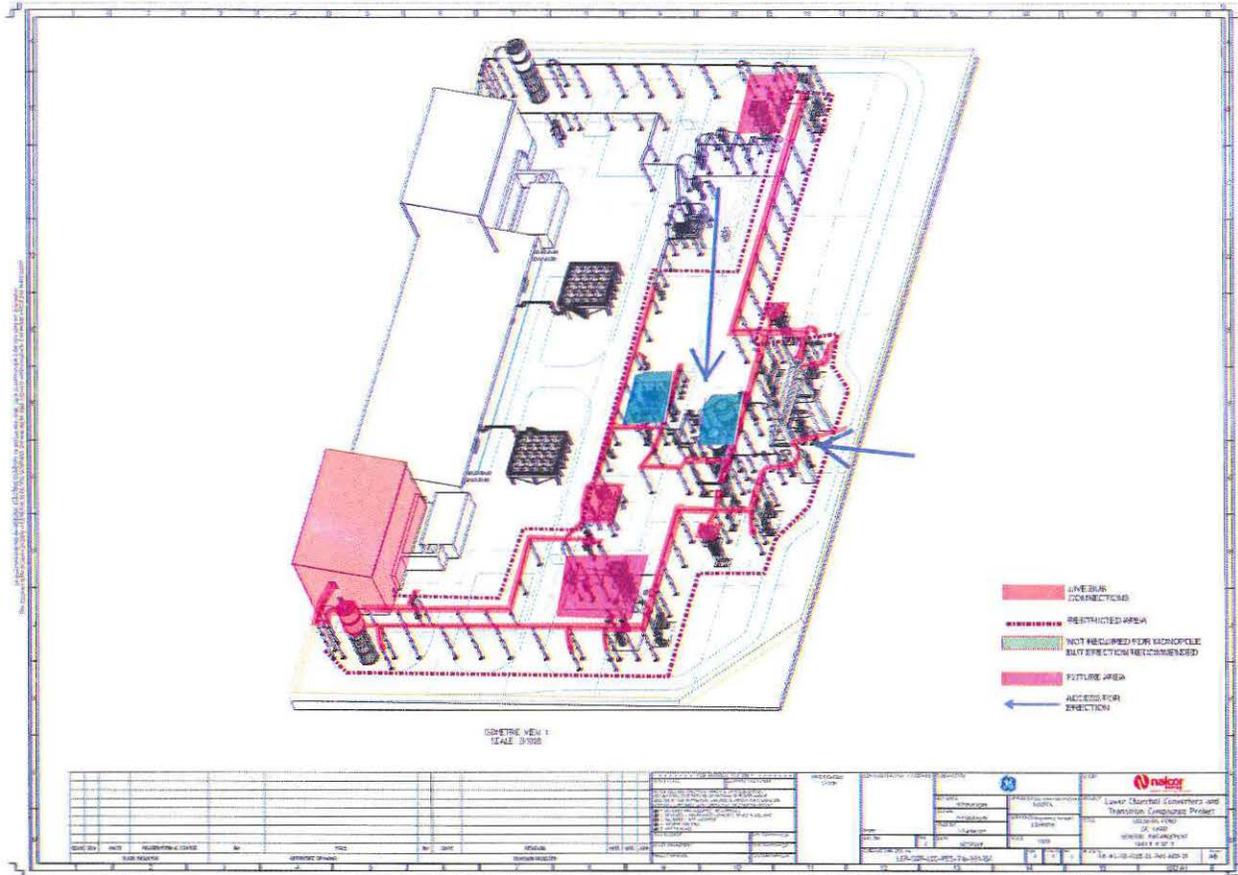


Diagram B.6. Soldiers Pond Converter Station Plan View Detail #2

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

**APPENDIX C – [Single Line Diagrams Scoped for Phased Approach – Forteau]**

LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

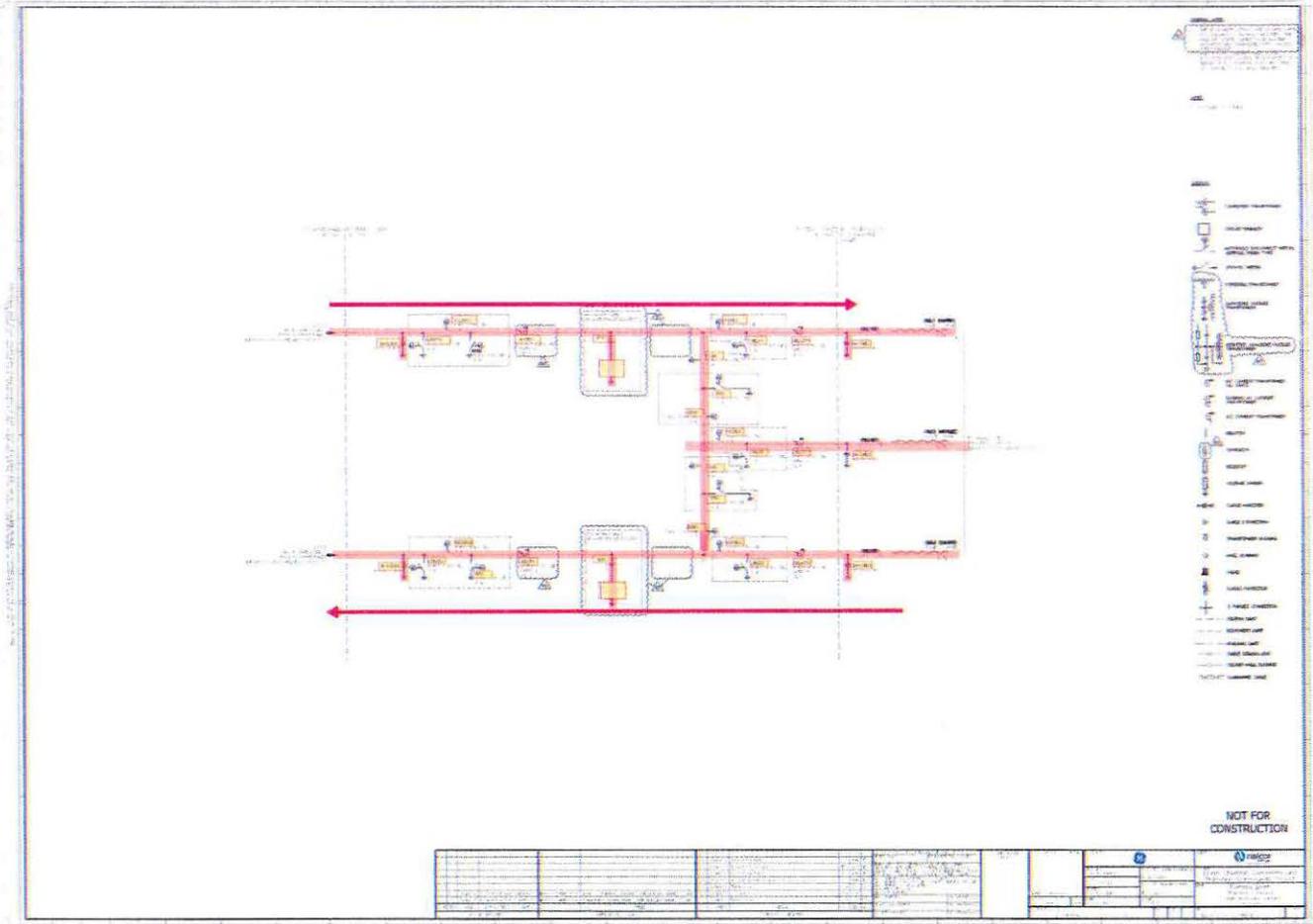


Diagram C.1. Forteau Single Line Diagram

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

**APPENDIX D – [Single Line Diagrams Scoped for Phased Approach – Shoal Cove]**

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LOWER CHURCHILL PROJECT	Phased Approach Scope of Work	Rev	Date
	LCP-PT-MD-0000-EN-SP-0001-01	D1	12-Apr-2017

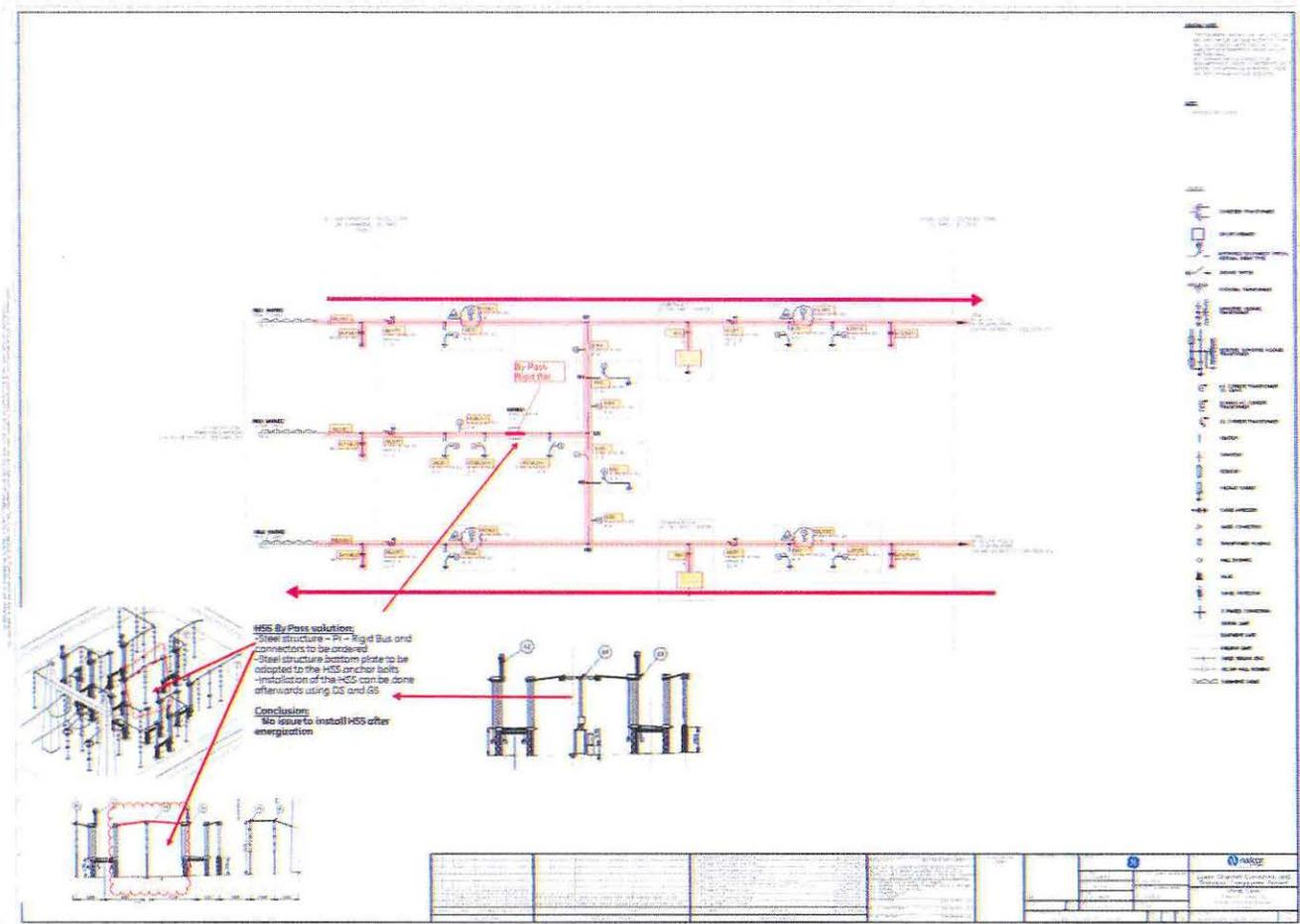


Diagram D.1. Shoal Cove Single Line

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**Attachment B**

**Pole 1 Equipment List**

**Attached Documents Lists are subject to change.  
The final Pole 1 Equipment List shall be the Pole 1 "as built" version of the  
Master Equipment List.**

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Document Front Sheet		 <small>LOWER CHURCHILL PROJECT</small>		
<b>NE-LCP Contractor/Supplier</b>	Contract or Purchase Number and Description: CD0501-001 Lower Churchill Converters and Transition Compounds		Contractor/Supplier Name: Alstom Grid Canada ULC.	
	Document Title: Forteau Point Transition Compound Bill of Material - High Voltage Equipments		Total Number of Pages Incl. Front Sheet 24	
	Contractor Document Number: LCP-FPT-000-BOP-401-004-ML		Revision Number: 05	
	Supplier Document Number:		Revision Number:	
	NE-LCP Document Number: ILK-AS-SD-8510-EL-G01-0001-01		NE-LCP Issue Number: B4	
	Approver's Signature:	Date (17-Jan-2017):	Review Class:	
	Comments:		Equipment Tag or Model Number:	
	<b>NE-LCP</b>	<small>REVIEW DOES NOT CONSTITUTE APPROVAL OF DESIGN DETAILS, CALCULATIONS, TEST METHODS OR MATERIAL DEVELOPED AND/OR SELECTED BY THE CONTRACTOR, NOR DOES IT RELIEVE THE CONTRACTOR FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS.</small>		
<small>01 - REVIEWED AND ACCEPTED - NO COMMENTS                      02 - REVIEWED - INCORPORATE COMMENTS, REVISE AND RESUBMIT                      03 - REVIEWED - NOT ACCEPTED                      04 - INFORMATION ONLY                      05 - NOT REVIEWED</small>				
Lead Reviewer:		Date (dd-mmm-yyyy):	Project Manager:	Date (dd-mmm-yyyy):
NE-LCP Management:		Date (dd-mmm-yyyy):		
General Comments:				

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Labrador-Island Link Limited Partnership  
Contract CD0501-001

Lower Churchill Converters and Transition Compounds Project

**FORTEAU POINT TRANSITION COMPOUND  
BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS**

PHA-ILK-AS-SD-8510-EL-G01-0001-01	REV
PHA-LCP-FPT-000-BOP-401-004-ML	02
ASSUMPTION: Refer to SLD signed on 02/03/2017	

							
PREPARED	17-Jan-17	Ivo Georgiev	I.G.	PROJECT Lower Churchill Converters and Transition Compounds Project			
VERIFIED	17-Jan-17	Asbed Kojakian	A.K.	TITLE Forteau Point Transition Compound Bill of Material - High Voltage Equipments			
APPROVED	17-Jan-17	Eric Guimond	E.G.				
	DATE	NAME	SIGNATURE				
Alstom document number <b>LCP-FPT-000-BOP-401-004-ML</b>			Alstom Revision 05	Nalcor document number <b>ILK-AS-SD-8510-EL-G01-0001-01</b>		LCP Status B4	
Internal document number (when applicable)			Internal Revision	Page 02	TOTAL Sheets 23		

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SCHEDULE OF MODIFICATIONS

COMPANY REV	CONTRACTOR REV	DATE	PREP.	VER.	APP.	MODIFICATION CONTENTS	PAGE / SECTION
A1	01	8-Sep-15	IG	AK	EG	Original issue	
B1	02	27-May-16	IG	AK	EG	Issued for Bid	
B2	03	27-Oct-16	IG	AK	EG	Issued for implementation and use	
B3	04	17-Jan-17	IG	AK	EG	Issued for implementation and use	
B4	05	17-Jan-17	IG	AK	EG	Issued for implementation and use	

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Reference documents

ILK-AS-SD-8511-EL-G01-0001-01	Forteau Point Transition compound - Grounding Materials – Bill of Materials
ILK-AS-SD-8517-EL-B04-0001-01	Forteau Point Transition compound - DC Yard – Plan View and Sections
ILK-AS-SD-8511-EL-B99-0002-01	Forteau Point Transition compound - General Grounding – Grid Layout
ILK-AS-SD-8511-CV-D99-0002-01	Forteau Point Transition compound - Trenches-Road crossing earthing pit CWGD – Typical and details
ILK-AS-SD-8511-EL-B99-0003-01	Forteau Point Transition compound - Control Building – Grounding Plan
ILK-AS-SD-8000-EL-B99-0002-01	Common - Grounding Details
ILK-AS-SD-8510-EL-B06-0001-01	Forteau Point Transition compound - Building and outdoor cable trays and trenches – General arrangement layout and sections
ILK-AS-SD-8000-EL-D03-0006-01	COMMON - BUILDING CABLE TRAY - EQUIPMENT DETAILS

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**BILL OF MATERIAL (BOM)**

LCP-NALCOR

FORTEAU POINT TRANSITION COMPOUND BOM - HIGH VOLTAGE EQUIPMENT

Legend	Description	Examples	Seal(s)
10XX	Control room	Control and P&C rooms equipment	
20XX	Cable Trays	Cable trays	
40XX	Major Equipment	Transformers, Breakers, Disconnect switches, CVT, CT, Surge arresters	
46XX	Insulators	Post insulators, String insulators	
50XX	Cables & Bus Bars	Tubular bus bars, Aluminum conductors, Cables, Shield wires	
52XX	Compression Connectors & Strain Relief Connectors	Compression connectors, Strain relief connectors	
53XX	Grounding	Grounding conductors, Rods, Grounding connectors (welded, compression, bolted) and braids, Grounding mats, Fence grounding material	
54XX	Cable Trenches	Prefabricated cable trenches and fittings	
55XX	Hardware & Conduits	Overhead line hardware, Shield wire hardware, PVC conduits and fittings, Steel conduits and fittings, Flexible conduits and fittings	
56XX	SSTR Hardware	SSTR Hardware	
57XX	Bolts, Nuts and Washers	Bolts, Nuts, Lock washers, Flat washers, Belleville washers, Threaded rods, Threaded studs	
67XX	Connectors	Bolted connectors, Welded connectors, Conductor spacers, Bus supports, Flexible braids,	

NE Document no	Rev	Document no	Rev	Sheet	Following Sheet	Last Sheet
ILK-AS-SD-8510-EL-G01-0001-01	B4	LCP-FTP-000-BOP-401-004-ML	05	5	6	23

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b> <b>AC/DC &amp; BATTERY ROOMS EQUIPMENT</b>											NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01 ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : <b>B4</b> Rev No. : <b>05</b>								
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
0030	501	LCP	FPT	000	BOP	401	004	ML	0030	unit(s)	8515-BAT-84-1001 8515-BAT-84-2001	2	125 VDC BATTERY		GE (SBC)	Batteries de la Capitale		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0031	501	LCP	FPT	000	BOP	401	004	ML	0031	unit(s)	8515-BAT-85-1002 8515-BAT-85-2002	2	48 VDC BATTERY		GE (SBC)	Batteries de la Capitale		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Spare part included in P.O.
0035	501	LCP	FPT	000	BOP	401	004	ML	0035	unit(s)	8515-DPB-83-0001 8515-DPB-83-0002	2	SWITCHBOARD		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0040	501	LCP	FPT	000	BOP	401	004	ML	0040	unit(s)	8515-CHR-84-1001 8515-CHR-84-1002 8515-CHR-84-2001 8515-CHR-84-2002	4	125 VDC BATTERY CHARGER		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0041	501	LCP	FPT	000	BOP	401	004	ML	0041	unit(s)	8515-CHR-85-1001 8515-CHR-85-1002 8515-CHR-85-2001 8515-CHR-85-2002	4	48 VDC BATTERY CHARGER		GE (SBC)	Batteries de la Capitale		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Spare part included in P.O.
0042	501	LCP	FPT	000	BOP	401	004	ML	0042	unit(s)	8515-FU-84-1001 8515-FU-84-2001	2	125 VDC FUSE BOX		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0043	501	LCP	FPT	000	BOP	401	004	ML	0043	unit(s)	8515-FU-85-1001 8515-FU-85-2001	2	48 VDC FUSE BOX		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0044	501	LCP	FPT	000	BOP	401	004	ML	0044	unit(s)	8515-CP-84-1001 8515-CP-84-2001	4	125 VDC MAIN PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0045	501	LCP	FPT	000	BOP	401	004	ML	0045	unit(s)	8515-CP-85-1001 8515-CP-85-2001	4	48 VDC MAIN PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0046	501	LCP	FPT	000	BOP	401	004	ML	0046	unit(s)	8515-DPB-84-1003 8515-DPB-84-2003	2	125 VDC OUTDOOR EQUIPMENT DISTRIBUTION PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0047	501	LCP	FPT	000	BOP	401	004	ML	0047	unit(s)	8513-DPB-83-0013 8513-DPB-83-0012	1	BUILDING SERVICES DISTRIBUTION PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0048	501	LCP	FPT	000	BOP	401	004	ML	0048	unit(s)	8515-DPB-83-0005	1	OUTDOOR EQUIPMENT DISTRIBUTION PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0061	501	LCP	FPT	000	BOP	401	004	ML	0061	unit(s)	8515-UPS-83-0001	1	UPS Panel		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0062	501	LCP	FPT	000	BOP	401	004	ML	0062	unit(s)	8515-DPB-83-0009	1	EXTERIOR SECURITY LIGHTING DISCRIBUTION PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0063	501	LCP	FPT	000	BOP	401	004	ML	0063	unit(s)	8515-ATS-83-0001	1	MANUAL ATS EXTERIOR SECURITY LIGHTING		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0064	501	LCP	FPT	000	BOP	401	004	ML	0064	unit(s)	8515-CP-83-0001	1	EXTERIOR SECURITY LIGHTING CONTROL PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0066	501	LCP	FPT	000	BOP	401	004	ML	0066	unit(s)	8515-DPB-83-0003	1	PROTECTION AND CONTROL DISCRIBUTION PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0342	501	LCP	FPT	000	BOP	401	004	ML	0342	unit(s)	Battery Spill Containment system CRL Thermo Bonding Tool Kit	1			GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0343	501	LCP	FPT	000	BOP	401	004	ML	0343	unit(s)	Battery Spill Containment system EAGLE-28-172 Eagle, Floor Anchor, Deluxe NabPills & SOCs	4			GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																				
FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS AC/DC & BATTERY ROOMS EQUIPMENT										NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01 Rev No. : <b>B4</b>										
										ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML Rev No. : <b>05</b>										
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
0344	501	LCP	FPT	000	BOP	401	004	ML	0344	unit(s)		2	Battery Spill Containment system EAGLE-54-137 Eagle, Floor Anchor, Deluxe NabPills & SOCs		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b>													NALCOR Document No. : ILK-AS-SD-8510-EL-G81-0001-01		Rev No. : <b>D4</b>						
<b>CONTROL AND P&amp;C ROOMS EQUIPMENTS</b>													ALSTOM Document No. : LCP-FPT-005-BOP-401-004-ML		Rev No. : <b>06</b>						
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
1000	501	LCP	FPT	000	BOP	401	004	ML	1000	unit(s)	8512-CP-87-1003 8512-CP-87-2003 8512-CP-87-1004 8512-CP-87-2004 8512-CP-87-1005 8512-CP-87-2005	6	HMI Panel Type 1 Panel 600x900x750 (mm)		GE (SBC)	Kellour		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Forteau Point Transition Compound - HMI 1 and Dalaserver 1 Panel Forteau Point Transition Compound - HMI 2 and Dalaserver 2 Panel
1001	501	LCP	FPT	000	BOP	401	004	ML	1001	unit(s)	8512-CP-87-1001 8512-CP-87-2001	2	Communication Interface Panel Type 2 Panel, 915x1050x220(mm)		GE (SBC)	Kellour		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Forteau Point Transition Compound - Communication Interface A Panel Forteau Point Transition Compound - Communication Interface B Panel
1002	501	LCP	FPT	000	BOP	401	004	ML	1002	unit(s)	8512-CP-87-1002 8512-CP-87-2002	2	Common Control and Monitoring dc Cable Panel Type 3 Panel, 915x1050x220(mm)		GE (SBC)	Kellour		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Forteau Point Transition Compound - Common Control 1 and Monitoring dc Cable Panel Forteau Point Transition Compound - Common Control 2 and Monitoring dc Cable Panel
1003	501	LCP	FPT	000	BOP	401	004	ML	1003	unit(s)	8512-CP-87-0001	1	acdc Auxiliary service Control Panel Type 4 Panel, 915x1050x220(mm)		GE (SBC)	Kellour		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Forteau Point Transition Compound - acdc Auxiliary service Control Panel
1023	501	LCP	FPT	000	BOP	401	004	ML	1023	unit(s)	8512-TP-89-0001 8512-TP-89-0002	2	ODF INTERFACE PANEL ODF Interface Panel NEMA 12 Enclosure plate gauge 14 steel. Piano-type hinges. Padiocable device. Removable mounting plate Dimensions: L=782 mm, H=762 mm, D=600 mm Provided with terminal blocks and internal wiring. Components: Fiber optical board		GE (SBC)	Envitech		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1024	501	LCP	FPT	000	BOP	401	004	ML	1024	unit(s)	851E-MR-00-1101 851E-MR-00-2101	2	DC YARD MARSHALLING PANEL DC Yard marshalling panel NEMA 12 Enclosure plate gauge 12 steel. Piano-type hinges. Padiocable device. Removable mounting plate Dimensions: L=916 mm, H=1830 mm, D=611 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1030	501	LCP	FPT	000	BOP	401	004	ML	1030	unit(s)	8515-DPB-84-1002 8515-DPB-84-2002	2	P&C Distribution Panel 900x1050x2375 (mm)		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
1038	501	LCP	FPT	000	BOP	401	004	ML	1038	unit(s)	8515-MR-00-0001	1	Marshalling Panel 1526x611x1830 (mm)		GE(SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
1040	501	LCP	FPT	000	BOP	401	004	ML	1040	unit(s)	8515-DPB-83-0008	1	Essential Loads Distribution Panel 208/120 Vac, 3ph-4w, 100A, 10KA 610x305x1473 (mm)		GE(SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
1041	501	LCP	FPT	000	BOP	401	004	ML	1041	unit(s)	8512-CP-87-1101 8512-CP-87-2101	2	DCCT Meas & RTU Panel 900x1050x2300 (mm)		GE(SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS													NALCOR Document No. : ILK-AS-SD-2510-EL-001-001-01	Rev No. : 04									
Cable Trays													ALSTOM Document No. : LCP-FPT-000-BOP-401-004-ML	Rev No. : 05									
Item No.	Contractor Tag Number						PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Revisiting the item	Comments		
	PO Number	PO Line Item	PO Country																				
2000	501	LCP	FPT	000	BOP	401	004	ML	2000				UNIT(S)	Batch	CABLE TRAY, LADDER TYPE, STRAIGHT (Solid Trough), 600mm WIDE, ALUM. CLASS "D", 150mm SIDE RAIL HEIGHT AND 300mm RUND SPACING, 3M LENGTH, T & B #ANF-6-24-L12-S-3 or Equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building and SSTH wooden structure
2001	501	LCP	FPT	000	BOP	401	004	ML	2001				UNIT(S)	Batch	Aluminium Cover for Cable Tray "2000", W=600mm (24in) L=3m, T & B #ANF-6-24-SFC-3 or Equivalent	ILK-SN-CD-8000-EL-TS-0009-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building and SSTH wooden structure
2012	501	LCP	FPT	000	BOP	401	004	ML	2012				UNIT(S)	Batch	ALUMINUM CABLE TRAY 450 mm Galvanized steel ladder cable tray Width: 450 mm Depth: 150 mm Rung spacing: 300 mm Length: 4 m Clew splice plates and hardware and mounting strap	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building
2219	501	LCP	FPT	000	BOP	401	004	ML	2219				UNIT(S)	Batch	Aluminium Cover for 80° Horizontal Vertical Outside Bond (Solid Flanged cover) - R=400mm (24in), W= 600mm (24in), T & B #ANF-6-24-SFC-3096-24 or Equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building and SSTH wooden structure
2221	501	LCP	FPT	000	BOP	401	004	ML	2221				UNIT(S)	Batch	Aluminium 30° Vertical bond "V2" W=600mm (24in), H=150mm (6in) R=150mm (24in), T & B #ANF-6-24-S-V090-24 or Equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building and SSTH wooden structure
2288	501	LCP	FPT	000	BOP	401	004	ML	2288				UNIT(S)	Batch	GALVANIZED STEEL SUPERSTRUT BRACKET TYPE, TAB #S249-2RDGC or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building and SSTH wooden structure

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Lower Churchill Converters and Transition Compounds Project												NALCOR Document No.: ILK-AS-SD-4915-EL-Q91-0991-01		Rev No.: 03							
FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS												ALSTOM Document No.: LCP-PPT-000-BOP-461-04-ML		Rev No.: 03							
Item No.	Contractor Tag Number						PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / AL's Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
							PO Number	PO Line Item	PO Quantity												
4048	501	LCP	FPT	000	BOP	401	004	ML	4048	4100097338				GE (PES) / MCT	SIEMENS	3EX3 030-0	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	3 Surge counters supplied and installed by MCT	
4049	501	LCP	FPT	000	BOP	401	004	ML	4049	4100097339				GE (PES)	SIEMENS	3EQ3 314-025	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4060	501	LCP	FPT	000	BOP	401	004	ML	4060	4100097338				GE (PES) / MCT	SIEMENS	3EQ3 314-025	CD0501	MCT	03		
4070	501	LCP	FPT	000	BOP	401	004	ML	4070					GE (PES)	ALSTOM	SPOL	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4071	501	LCP	FPT	000	BOP	401	004	ML	4071					GE (PES)	ALSTOM	SPOLT	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
4072	501	LCP	FPT	000	BOP	401	004	ML	4072					GE (PES)	ALSTOM	SPOLT	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4080	501	LCP	FPT	000	BOP	401	004	ML	4080	4100064205				GE (PES)	DIT	JR107630 171456V01-03	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4080	501	LCP	FPT	000	BOP	401	004	ML	4080	4500039335	0010 0011			GE (SBC)	EATON		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4082	501	LCP	FPT	000	BOP	401	004	ML	4082					GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4192	501	LCP	FPT	000	BOP	401	004	ML	4192	4500047439	0012	1		GE (SBC)	WJMX		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4280	501	LCP	FPT	000	BOP	401	004	ML	4280	4500047574	0022	1		GE (SBC)	Plaweni		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																							
FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : LK-A5-50-4519-EL-031-001-01		Rev No. :											
Major Equipments										ALSTOM Document No. : LCP#PT-099-BOP-491-004-ML		Rev No. :											
Item No.	Contractor Tag Number							PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BCM Rev updating the Item	Comments	
								PO Number	PO Line Item	P.O. Quantity													
4292	591	LCP	PFT	000	BOP	401	004	ML	4292				enRES	1	25 KV POLE MOUNTED RECLOSURE O/w inboards and outboard surge arresters and surge arrester supports		GE (SBC)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	02	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b> Insulators															NALCOR Document No. : IK-AS-EP-2516-EL-G91-001-61 ALSTOM Document No. : LCP-FPT-000-BOP-45-K04-M6		Rev No. : 1.0 Rev No. : 1.0				
Item No.	Contractor Tag Number				PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
					PO Number	PO Line Item	P.O. Quantity														
4660	501	LCP	FPT	000	BOP	401	004	ML	4660		4100009162	unit(s)	18	<b>DC POST-TYPE INSULATOR</b> Post-Type Insulator Solid core porcelain insulator, semiconducting glazing. Bl. 2500 kV Creepage distance 27292 mm Cantilever strength 12.5 kN Caps Top section: ductile iron hot-dip galvanized, 8 holes 18 mm, 254 BC Base section - ductile iron hot-dip galvanized, 8 holes 18 mm diam, 308 mm BC, Height: 1500 mm Porcelain colour: grey light-grey - Munsell 5B0 7/00 1 (ANSI #70)	IK-SN-CD-8000-EL-TS-0012-01	GE (PES)	PPC	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4661	501	LCP	FPT	000	BOP	401	004	ML	4661		4100009162	unit(s)	2	<b>DC POST-TYPE UNDERHUNG INSULATOR</b> Caps Top section: ductile iron hot-dip galvanized, 8 holes 18 mm, 254 BC Base section - ductile iron hot-dip galvanized, 8 holes 18 mm diam, 306 mm BC, Height: 7500 mm, Lightning impulse withstand voltage > 2500 kV Switching impulse withstand voltage > 1650 kV Minimum falling load bending, upright: 12.5 kN Minimum falling load compression: 800 kN Minimum falling load tension: 6 kN Minimum creepage distance: 27292 mm Maximum angular deviation of the flang holes: 1° Porcelain colour: grey light-grey - Munsell 5B0 7/00 1 (ANSI #70) Weight of complete column: 1209 kg	IK-SN-CD-8000-EL-TS-0012-01	GE (PES)	PPC	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4680	501	LCP	FPT	000	BOP	401	004	ML	4680			unit(s)	Match	<b>EPOXY POST-TYPE INSULATOR 6 KV</b> 6 kV epoxy post insulator 60 kV BL For indoor application. Height: 69 mm approx Top insert: 1 hole 12.7 mm Bottom insert: 1 hole 19.7 mm		ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4690	501	LCP	FPT	000	BOP	401	004	ML	4690			unit(s)	3	<b>SILICONE LINE POST INSULATOR 35 KV</b> 35 kV Silicone post insulator 118kV Positive Critical Impulse Flashover For outdoor application Section Length: 424 mm (16.7in) approx. CSA Class LP2M K4 LINE INSULATOR # KL389 K Or Equivalent		ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																						
FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Grounding																						
NALCOR Document No. : IJK-AS-SD-8516-EL-01-10039-01 ALSTON Document No. : LCP-FPT-400-BOP-401-064-0L																						
Rev No. : 1.0 Rev No. : 1.0																						
Item No.	Contractor Tag Number							PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
	PO Number	PO Line Item	P.O. Quantity																			
5300	501	LCP	FPT	000	BOP	401	004	NL	5306	4500235690	0121	110	unit(s)	Batch	GROUND CONDUCTOR #2 AWG, Cu #2 AWG stranded copper conductor. Bare conductor. Lay stranded 7 strands.	IJK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5302	501	LCP	FPT	000	BOP	401	004	NL	5302				unit(s)	Batch	GROUND CONDUCTOR #6 AWG, Cu #6 AWG stranded copper conductor. Bare conductor. Lay stranded 19 strands.	IJK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5305	501	LCP	FPT	000	BOP	401	004	NL	5305				unit(s)	Batch	1 kV INSULATED GROUND CONDUCTOR #4 AWG, Cu, YELLOW / GREEN #4 AWG stranded copper conductor. 1 kV insulated yellow / green Lay stranded 19 strands.	IJK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5307	501	LCP	FPT	000	BOP	401	004	NL	5307				unit(s)	Batch	COPPER BUSBAR 50 mm x 5 mm Copper busbar Dimensions: 50 mm x 5 mm	IJK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5314	501	LCP	FPT	000	BOP	401	004	NL	5314				unit(s)	Batch	WELDED CONNECTION TYPE VS FOR #0 AWG CONDUCTOR TO FLAT STEEL Welded connection for vertical conductor to vertical flat steel surface type VS. Conductor down at 45° Conductor size: #0 AWG Welding cartridge # 115	IJK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5315	501	LCP	FPT	000	BOP	401	004	NL	5315				unit(s)	Batch	WELDED CONNECTION TYPE VS FOR #0 AWG CONDUCTOR TO VERTICAL PIPE 31,75 mm - 191,6 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VS. Conductor down at 45° Conductor size: #0 AWG Pipe size: 31,75 mm - 191,6 mm IPS Welding cartridge # 115	IJK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5316	501	LCP	FPT	000	BOP	401	004	NL	5316				unit(s)	Batch	WELDED CONNECTION TYPE VS FOR #0 AWG CONDUCTOR TO VERTICAL PIPE 101,6 mm - 192,4 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VS. Conductor down at 45° Conductor size: #0 AWG Pipe size: 101,6 mm - 192,4 mm IPS Welding cartridge # 115	IJK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5317	501	LCP	FPT	000	BOP	401	004	NL	5317				unit(s)	Batch	WELDED CONNECTION TYPE VF FOR #2 AWG CONDUCTOR TO VERTICAL PIPE 38,1 mm - 101,4 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VF. Conductor up to vertical steel pipe. Conductor size: #2 AWG	IJK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5318	501	LCP	FPT	000	BOP	401	004	NL	5318				unit(s)	Batch	WELDED CONNECTION TYPE VN FOR #2 AWG CONDUCTOR TO RIGHT HAND SIDE OF HORIZONTAL PIPE 31,75 mm IPS Welded connector type VN Conductor to the right hand side of the horizontal steel pipe. Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 45	IJK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5319	501	LCP	FPT	000	BOP	401	004	NL	5319				unit(s)	Batch	WELDED CONNECTION TYPE VN FOR #2 AWG CONDUCTOR TO LEFT HAND SIDE OF HORIZONTAL PIPE 31,75 mm IPS Welded connector type VN Conductor to the left hand side of the horizontal steel pipe. Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 45	IJK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Grounding															NALCOR Document No. : LK-AS-SD-4510-EL-001-0991-01		Rev No. : 1.0			
															ALSTOM Document No. : LCP-FPT-400-80P-401-004-0L		Rev No. : 1.0			
Item No.	Contractor Tag Number					PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
						PO Number	PO Line Item	P.O. Quantity												
5328	501	LCP	FPT	009	BOP	401	004	ML	un(s)	Batch	WELDED CONNECTION TYPE HC FOR 4R AWG HORIZONTAL CONDUCTOR TO SIDE OF HORIZONTAL PIPE 31.75 mm IPS Welded connection through horizontal conductor to side of horizontal steel pipe type HC. Conductor size: 4R AWG. Pipe size: 31.75 mm IPS. Welding cartridge # 45.	LK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5323	501	LCP	FPT	006	BOP	401	004	ML	un(s)	Batch	WELDED PARALLEL CONNECTION TYPE PT FOR TWO 4R AWG HORIZONTAL CONDUCTORS Horizontal parallel through connection for two horizontal cables. Cable size: 4R AWG. Cable top: 4R AWG. Welding cartridge # 200.	LK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5328	501	LCP	FPT	009	BOP	401	004	ML	un(s)	Batch	WELDED CONNECTION TYPE VS FOR 4R AWG CONDUCTOR TO VERTICAL PIPE 152.4 mm - 254 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VS. Conductor size: 4R AWG. Pipe size: 152.4 mm - 254 mm IPS. Welding cartridge # 115.	LK-SN-CD-6000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5330	501	LCP	FPT	000	BOP	401	004	ML	un(s)	Batch	COMPRESSION CONNECTOR TYPE CRMPIT TYPE YC3C4 C-shape compression connector for making top or parallel copper connections. Run: 2 Str - 2 Str. Tap: 8 Str - 4 Str.	LK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5331	501	LCP	FPT	006	BOP	401	004	ML	un(s)	Batch	COMPRESSION CONNECTOR TYPE C C-shape compression connector for making top or parallel copper connections. Run: 30 Str - 250 MCM. Tap: 30 Str - 250 MCM.	LK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5332	501	LCP	FPT	000	BOP	401	004	ML	un(s)	Batch	COMPRESSION CONNECTOR TYPE C C-shape compression connector for making top or parallel copper connections. Run: 30 Str - 250 MCM. Tap: 4R AWG - 20 AWG.	LK-SN-CD-6000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5350	501	LCP	FPT	000	BOP	401	004	ML	un(s)	Batch	COMPRESSION TERMINAL 1 HOLE Heavy duty tin plated copper compression terminal for 4R AWG str. copper conductor to 1 hole terminal pad.	LK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5351	501	LCP	FPT	000	BOP	401	004	ML	un(s)	Batch	COMPRESSION TERMINAL 2 HOLES Heavy duty tin plated copper compression terminal for 4R AWG str. copper conductor to 2 hole terminal pad.	LK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5354	501	LCP	FPT	000	BOP	401	004	ML	un(s)	Batch	COMPRESSION TERMINAL 1 HOLE Heavy duty tin plated copper compression terminal for 4R AWG str. copper conductor to 1 hole 90° terminal pad.	LK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5357	501	LCP	FPT	000	BOP	401	004	ML	un(s)	Batch	COMPRESSION TERMINAL 1 HOLE Heavy duty tin plated copper compression terminal for 4R AWG str. copper conductor to 1 hole 9 mm terminal pad.	LK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5358	501	LCP	FPT	000	BOP	401	004	ML	un(s)	Batch	COMPRESSION TERMINAL 1 HOLE Heavy duty tin plated copper compression terminal for 4R AWG str. copper conductor to 1 hole 10 mm terminal pad.	LK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5376	501	LCP	FPT	000	BOP	401	004	ML	un(s)	Batch	GROUND CONNECTOR FOR ONE COPPER CABLE TO BAR TYPE GB25W High copper alloy tin plated ground connector for joining one 20 Str - 250 MCM copper conductor to flat bar. Complete with bolts nuts and lock washers.	LK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-4518-EL-001-001-01		Rev No. :									
Cable Trenches										ALSTOM Document No. : LCP-FPT-050-BOP-001-004-M6		Rev No. :									
Item No.	Contractor Tag Number						PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
	SR1	ILCP	FPT	000	BOP	401	004	ML	5430												
5450										m	350	PLASTIBETON CABLE TRENCH SEPARATOR 300 mm	ILK-SN-CD-6000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																							
<b>FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b> Hardware & Conduits															NALCOR Document No.: ILK-AS-SD-8516-EL-001-0001-01		Rev No.: 04						
															ALSTOM Document No.: LCP-FPT-000-BOP-401-004-00L		Rev No.: 01						
Item No.	Contractor Tag Number							PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Revisiting the Item	Comments	
								PO Number	PO Line Item	P.O. Quantity													
5515	501	LCP	FPT	000	BOP	401	004	ML	5515	4500896169	0012	8	unit(s)	8	<b>DEAD END CLAMP TYPE BURNDY CUW30A-E OR EQUIVALENT</b> High strength aluminum dead end clamp. For dead end attachment of 12.4 mm aluminum wire.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5516	501	LCP	FPT	000	BOP	401	004	ML	5516	4500896169	0011	10	unit(s)	8	<b>HOT DIP GALVANIZED STEEL SHACKLE SIZE 15.9 mm (5/8")</b> Hot dip galvanized steel shackle size 15.9 mm (5/8") - 201268 Ultimate load 177.2 kN (40000 lbs) Opening 24 mm (3/4") Clearance length - 89 mm (3.5") C/w galvanized steel grade 5 bolt 15.9 mm (5/8"), nut (number 143039) and stainless steel cotter pin Reference drawing number 25823B	ILK-SN-CD-8000-EL-TS-0028-01	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5520	501	LCP	FPT	000	BOP	401	004	ML	5520				unit(s)	Batch	<b>SHIELD WIRE DEAD END ATTACHMENT</b> For dead end attachment of 12.4 mm aluminum wire including one dead end clamp (item 5515) one anchor shackle one ground clamp (item 5571) and one ground clamp (item 5572)	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC) / ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5521	501	LCP	FPT	000	BOP	401	004	ML	5521				unit(s)	Batch	<b>SHIELD WIRE ATTACHMENT SUBSTATION FEEDER</b> For attachment of 12.4 mm aluminum wire including one dead end clamp (item 5515) one anchor shackle one ground clamp (item 5572) and one ground clamp (item 5576)	ILK-SN-CD-8000-EL-TS-0028-01	GE (SBC) / ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5525	501	LCP	FPT	000	BOP	401	004	ML	5525				m	Batch	<b>50 mm FLEXIBLE CORRUGATED ORANGE CONDUIT FOR FO CABLE</b>	ILK-SN-CD-8000-EL-TS-0026-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
5526	501	LCP	FPT	000	BOP	401	004	ML	5526				unit(s)	Batch	<b>CONNECTOR FOR 50 mm CORRUGATED ORANGE CONDUIT</b> For connecting 50 mm liquid-tight conduit to a junction box.	ILK-SN-CD-8000-EL-TS-0026-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
5537	501	LCP	FPT	000	BOP	401	004	ML	5537				unit(s)	Batch	<b>PVC CONDUIT 50 mm DIAMETER</b> PVC conduit 50 mm (2") nominal diameter. Electrical type above ground installation.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5570	501	LCP	FPT	000	BOP	401	004	ML	5570				unit(s)	Batch	<b>TRANSITION COUPLER FOR 50 mm CONDUIT</b> Waterproof transition coupler. For joining 50 mm PVC conduit to 50 mm liquid-tight conduit.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5575	501	LCP	FPT	000	BOP	401	004	ML	5575				unit(s)	Batch	<b>LIQUID-TIGHT CONDUIT 50 mm DIAMETER</b> Liquid-tight flexible non metallic conduit. Diameter: 50 mm	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5580	501	LCP	FPT	000	BOP	401	004	ML	5580				unit(s)	Batch	<b>LIQUID-TIGHT CONNECTOR FOR 50 mm CONDUIT</b> Liquid-tight connector for connecting 50 mm liquid-tight conduit to a junction box.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5585	501	LCP	FPT	000	BOP	401	004	ML	5585				unit(s)	Batch	<b>STAINLESS STEEL STRAP</b> Stainless steel strap 20 mm large for being liquid-tight conduit and ground conductor on a steel structure. Complete with buckles.		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5590	501	LCP	FPT	000	BOP	401	004	ML	5590				unit(s)	Batch	<b>ALUMINUM SINGLE SUPERSTRUT CHANNEL</b> A1200 series single aluminum channel. Dimensions: 41.3 mm x 41.5 mm. Length: 8 m		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5595	501	LCP	FPT	000	BOP	401	004	ML	5595				unit(s)	Batch	<b>ALUMINUM SINGLE SUPERSTRUT PVC END COVER</b> PVC end cover for A1200 series single aluminum channel		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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<b>SSTR Hardware</b>														ALSTOM Document No. : LCP-FPT-006-BOP-491-004-ML		Rev No. : 01										
Item No.	Contractor Tag Number													Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
	PO Number	PO Line Item	P.O. Quantity																							
5650	501	LCP	FPT	000	BOP	401	004	ML	5650	unit(s)	Batch	<b>SHORT STUD FOR LINE POST INSULATOR</b> Size 3/4" - 10LUNC Length Long side 57 mm (2-1/4") Shrink side 25.7 mm (1") K-LINE INSULATOR #KLOP027 or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5651	501	LCP	FPT	000	BOP	401	004	ML	5651	unit(s)	Batch	<b>STANDARD EYENUTS, DROP-FORGED HOT DIP GALVANIZED STEEL</b> Bolt Diam: 19 mm (3/4") Size 12.7 mm (1/2") Opening: 38.1 mm (1-1/2") W = 53.6 mm (2-1/2") H = 76.2 mm (3") HUBBEL #6503 or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5652	501	LCP	FPT	000	BOP	401	004	ML	5652	unit(s)	Batch	<b>STANDARD MACHINE BOLT (CROSSARM BOLT OR THROUGH BOLT), HOT DIP GALVANIZED STEEL</b> Bolt Length = 304.8mm (12") Thread Length = 152.4mm (6") Dia: 19 mm (3/4") HUBBEL #6912 or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5653	501	LCP	FPT	000	BOP	401	004	ML	5653	unit(s)	Batch	<b>LAG SCREW, HOT DIP GALVANIZED</b> Length 127 mm (5") Dia: 12.7 mm (1/2") HUBBEL #508755 or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5654	501	LCP	FPT	000	BOP	401	004	ML	5654	unit(s)	Batch	<b>DOUBLE-ARMING FULL THREAD BOLT 19.05 mm (3/4"), HOT DIP GALVANIZED STEEL</b> Completed with 4 square nuts Bolt Length = 405.4 mm (16") HUBBEL #6886 or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5655	501	LCP	FPT	000	BOP	401	004	ML	5655	unit(s)	Batch	<b>DOUBLE-ARMING FULL THREAD BOLT 19.05 mm (3/4"), HOT DIP GALVANIZED STEEL</b> Completed with 4 square nuts Bolt Length = 609.6 mm (24") HUBBEL #6886 or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5656	501	LCP	FPT	000	BOP	401	004	ML	5656	unit(s)	Batch	<b>GALVANIZED STEEL SQUARE CURVED WASHER</b> Washer side: 102 x 102 x 4.8 mm (4" x 4" x 3/8") Hole Dia: 20.64 mm (13/16") Bolt Dia: 19 mm (3/4") HUBBEL #DF4W15 or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5657	501	LCP	FPT	000	BOP	401	004	ML	5657	unit(s)	Batch	<b>LAG SCREW, HOT DIP GALVANIZED</b> Length 51 mm (2") Dia: 6.4 mm (1/4") HUBBEL #72ZGF or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5658	501	LCP	FPT	000	BOP	401	004	ML	5658	unit(s)	Batch	<b>GALVANIZED STEEL ROUND WASHER</b> Washer side: 2" O.D. X 9 Ga Hole Dia: 20.64 mm (13/16") Bolt Dia: 19 mm (3/4") HUBBEL #6800 or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5659	501	LCP	FPT	000	BOP	401	004	ML	5659	unit(s)	Batch	<b>GALVANIZED STEEL SPRING LOCK WASHER</b> Stock 6 x 4.8 mm (1/4" x 3/16") Hole Dia: 20.64 mm (13/16") Bolt Dia: 19 mm (3/4") HUBBEL #4037 or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5660	501	LCP	FPT	000	BOP	401	004	ML	5660	unit(s)	Batch	<b>ROLLED STAPLE COPPER COATED (DIAMOND POINT)</b> Length = 50.8mm (2") Inside = 12.7mm (1/2") Width = 4mm (0.162") HUBBEL #9154 or equivalent										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5661	501	LCP	FPT	000	BOP	401	004	ML	5661	unit(s)	Batch	<b>EXTRA HEAVY DUTY ALUMINUM PLATFORM 5667 mm (42") WIDE</b> Inside joint face to face length 5182 mm (17 ft) Beam Length 6096 mm (20 ft) Uniform vertical load: 19813 lb Single center-vertical load: 9539 lb Three vertical loads: 3700 lb HUBBEL #CPEHD162										ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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SSTR Hardware												ALSTOM Document No. : LCP-FPT-093-BOP-01-054-ML	Rev No. : 03								
Item No.	Contractor Tag Number						PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
							PO Number	PO Line Item	P-O Quantity												
5662	501	LCP	FPT	000	BOP	461	004	ML	5662	unit(s)	Batch	ALUMINUM ALLOY STRAIGHT BOLTED TERMINAL 1 X 6/8 AAC TO NEMA 4 TERMINAL PAD For connecting 1 x AAC 4/0-266 MCM, ACSR 84-4/0 AWG conductor to NEMA 4 terminal pad Terminal pad width - 76 mm (3") Complete with stainless steel bolts, nuts and washers. SEPCOR 8AFNC-13-4A or equivalent		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5663	501	LCP	FPT	000	BOP	461	004	ML	5663	unit(s)	Batch	ALUMINUM ALLOY T-BOLTED CONNECTOR FOR ALUMINUM CABLE MAIN TO CABLE TAP For cable to cable connection Run: 1 x AAC 4/0-266 MCM, ACSR 84-4/0 AWG conductor Tap: 1 x AAC 4/0-266 MCM, ACSR 84-4/0 AWG conductor Complete with stainless steel bolts, nuts and washers. SEPCOR 8AFACT-1313 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5665	501	LCP	FPT	000	BOP	421	004	ML	5665	unit(s)	Batch	ALUMINUM ALLOY T-CONNECTOR FOR ALUMINUM AND COPPER CABLE TO CABLE Conductor Run or Tap: Aluminum or copper 1/0 Str-250 MCM ACSR 1000-13 - 4026-13 Width = 58.42 mm (2-3/4") Length = 129.7 mm (5-1/8") Complete with stainless steel bolts, nuts and washers BURNDY 8NTR29A29A or equivalent		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5666	501	LCP	FPT	000	BOP	451	004	ML	5666	unit(s)	Batch	TWO HOLE NYLON CODE CONDUCTOR LONG BARREL For 750 MCM conductor Shed Hole Side 12.7mm (1/2in) Shed hole spacing 46 mm (1-3/4in) Total Length = 174.5mm (6.7in) BURNDY 8Y4302N or equivalent		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5667	501	LCP	FPT	000	BOP	401	004	ML	5667	unit(s)	Batch	45 FT SOUTHERN YELLOW PINE POLE Pole length: 13716 mm (45 FT), Class 1 Minimum circumference at top 689 mm (27") Minimum circumference at 6 foot from bottom 1092 mm (43") STELLA-JONES model or equivalent		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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<b>Bolts, Nuts &amp; Washers</b>																					
NALCOR Document No. - ILC-AS-ED-8510-EL-C-0 ALSTOM Document No. - LCP-PPF-660-BOP-41-0																					
Rev No. : 01 Rev No. : 01																					
Item No.	Contractor Tag Number						PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specifications Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Initiated by	BOC Rev updating the Item	Comments
	PO Number	PO Line Item	PO Quantity																		
5702	501	LCP	FPT	000	BOP	401	004	ML	5702	unit(s)	Batch	STAINLESS STEEL BOLT 12.7 mm DIAMETER, L=40 mm Hexagonal stainless steel bolt SS316 Diameter: 12.7 mm Length: 60 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5703	501	LCP	FPT	000	BOP	401	004	ML	5703	unit(s)	Batch	STAINLESS STEEL BOLT 12.7 mm DIAMETER, L=45 mm Hexagonal stainless steel bolt SS316 Diameter: 12.7 mm Length: 45 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5707	501	LCP	FPT	000	BOP	401	004	ML	5707	unit(s)	Batch	STAINLESS STEEL BOLT 12.7 mm DIAMETER, L=40 mm Hexagonal stainless steel bolt SS316 Diameter: 12.7 mm Length: 40 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5710	501	LCP	FPT	000	BOP	401	004	ML	5710	unit(s)	Batch	SILICON BRONZE BOLT 12.7 mm DIAMETER, L=45 mm Hexagonal silicon bronze bolt Diameter: 12.7 mm Length: 45 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0601	ELECTRICAL INSTALLATION CONTRACTOR	03		
5727	501	LCP	FPT	000	BOP	401	004	ML	5727	unit(s)	Batch	GALVANIZED STEEL BOLT 12.7 mm DIAMETER, L=25 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 12.7 mm Length: 25 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0601	ELECTRICAL INSTALLATION CONTRACTOR	03		
5730	501	LCP	FPT	000	BOP	401	004	ML	5730	unit(s)	Batch	STAINLESS STEEL THREADED STUD 6 mm DIAMETER Stainless steel SS304 threaded stud for bolting to structural steel Thread: 6 mm x 20 mm long Shank: 9 mm long		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5732	501	LCP	FPT	000	BOP	401	004	ML	5732	unit(s)	Batch	GALVANIZED STEEL BOLT 16.9 mm DIAMETER, L=80 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 16.9 mm Length: 80 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5735	501	LCP	FPT	000	BOP	401	004	ML	5735	unit(s)	Batch	GALVANIZED STEEL THREADED ROD 12.7 mm DIAMETER Galvanized steel threaded rod Diameter: 12.7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5740	501	LCP	FPT	000	BOP	401	004	ML	5740	unit(s)	Batch	STAINLESS STEEL NUT 12.7 mm DIAMETER Hexagonal stainless steel nut SS304 Diameter: 12.7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5743	501	LCP	FPT	000	BOP	401	004	ML	5743	unit(s)	Batch	GALVANIZED STEEL NUT 16.9 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 16.9 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0601	ELECTRICAL INSTALLATION CONTRACTOR	03		
5745	501	LCP	FPT	000	BOP	401	004	ML	5745	unit(s)	Batch	SILICON BRONZE NUT 12.7 mm DIAMETER Hexagonal silicon bronze nut Diameter: 12.7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0601	ELECTRICAL INSTALLATION CONTRACTOR	03		
5747	501	LCP	FPT	000	BOP	401	004	ML	5747	unit(s)	Batch	GALVANIZED STEEL RECTANGULAR REGULAR SPRING NUT 12.7 mm DIAMETER Galvanized steel rectangular regular spring nut for use with single longitudinal channel Diameter: 12.7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5748	501	LCP	FPT	000	BOP	401	004	ML	5748	unit(s)	Batch	GALVANIZED STEEL NUT 12.7 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 12.7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5750	501	LCP	FPT	000	BOP	401	004	ML	5750	unit(s)	Batch	STAINLESS STEEL FLAT WASHER FOR 12.7 mm BOLT DIAMETER Stainless steel flat washer SS316 Flat washer diameter: 12.7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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<b>FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b>															NALCOR Document No.: LK-AS-SD-#1104EL-C-0 ALSTOM Document No.: LCP-FPT-420-BOP-4E-0		Rev No.: 1.3 Rev No.: 1.1			
Item No.	Contractor Tag Number					PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating this Item	Comments
						PO Reference	PO Line Item	PO Quantity												
5755	501	LCP	FPT	000	BOP	401	004	ML	5755		unit(s)	Batch	SILICON BRONZE FLAT WASHER FOR 12,7 mm BOLT DIAMETER Silicon bronze flat washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5758	501	LCP	FPT	000	BOP	401	004	ML	5758		unit(s)	Batch	GALVANIZED STEEL FLAT WASHER FOR 12,7 mm BOLT DIAMETER Galvanized steel flat washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5763	501	LCP	FPT	000	BOP	401	004	ML	5763		unit(s)	Batch	GALVANIZED STEEL FLAT WASHER FOR 15,9 mm BOLT DIAMETER Galvanized steel flat washer For bolt diameter 15,9 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5770	501	LCP	FPT	000	BOP	401	004	ML	5770		unit(s)	Batch	STAINLESS STEEL LOCK WASHER FOR 12,7 mm BOLT DIAMETER Stainless steel lock washer SS316 For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5775	501	LCP	FPT	000	BOP	401	004	ML	5775		unit(s)	Batch	SILICON BRONZE LOCK WASHER FOR 12,7 mm BOLT DIAMETER Silicon bronze lock washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5778	501	LCP	FPT	000	BOP	401	004	ML	5778		unit(s)	Batch	GALVANIZED STEEL LOCK WASHER FOR 12,7 mm BOLT DIAMETER Galvanized steel lock washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5782	501	LCP	FPT	000	BOP	401	004	ML	5782		unit(s)	Batch	GALVANIZED STEEL LOCK WASHER FOR 15,9 mm BOLT DIAMETER Galvanized steel lock washer For bolt diameter 15,9 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5790	501	LCP	FPT	000	BOP	401	004	ML	5790		unit(s)	Batch	STAINLESS STEEL BELLEVILLE WASHER FOR 12,7 mm BOLT DIAMETER Stainless steel bellville washer SS 17-7PH For bolt diameter 12,7 mm Flat load: 2957 kg (6600 lbf) approx		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5791	501	LCP	FPT	000	BOP	401	004	ML	5791		unit(s)	Batch	GALVANIZED STEEL BEVEL WASHER #15.9mm NOM Galvanized steel bevel washer For bolt diameter 15,9 mm Side dimension: 32 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5795	501	LCP	FPT	000	BOP	401	004	ML	5795		unit(s)	Batch	STAINLESS STEEL QUICK BOLT 8 mm DIAMETER Stainless steel quick bolt SS316 Diameter: 8 mm Length: 48 mm Threaded length: 18 mm Complete with nut, flat and lock washer		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5821	501	LCP	FPT	000	BOP	401	004	ML	5821		unit(s)	Batch	GALVANIZED STEEL BOLT 15,9 mm DIAMETER, L=50 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 15.9 mm Length: 50 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																				
FORTEAU POINT TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Connectors												NALCOR Document No. : ILC-AS-SG-8519-EL-001-001-01 Rev No. : (1)								
ALSTOM Document No. : LCP-FPT-600-BOP-491-004-01 Rev No. : (1)												Rev No. : (1)								
Item No.	Contractor Tag Number					PO Tracking			Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALB Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
	PO Number	PO Line Item	PO Quantity																	
6701	501	LCP	FPF	000	BOP	401	004	NL	6701		22	AL-Corona Ring	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6702	501	LCP	FPF	000	BOP	401	004	NL	6702		18	AL-Connector Tube for Disconnecter and Earth Switch	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6703	501	LCP	FPF	000	BOP	401	004	NL	6703		16	AL-Through Tube to Tube Straight	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6704	501	LCP	FPF	000	BOP	401	004	NL	6704		4	AL-Through Tube To Tube at 90 Deg	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6705	501	LCP	FPF	000	BOP	401	004	NL	6705		5	AL Tee Tube-Tube (Right)	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6706	501	LCP	FPF	000	BOP	401	004	NL	6706		4	AL-Connector 90 deg Palm Type Tripple Flexible for Disconnecter and ES	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6707	501	LCP	FPF	000	BOP	401	004	NL	6707		7	Al-Tee off connector Tube-Tripple Flexible	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6708	501	LCP	FPF	000	BOP	401	004	NL	6708		4	Al-Tee off connector Single Flexible to Tripple Flexible	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6709	501	LCP	FPF	000	BOP	401	004	NL	6709		18	Al-Spacer for Tripplex Flexible	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6711	501	LCP	FPF	000	BOP	401	004	NL	6711		4	AL-Palm Type straight Tripple Flexible Connector for MV LFL CAP	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6712	501	LCP	FPF	000	BOP	401	004	NL	6712		4	Brass - Palm Type Connector for LV LFL CAP	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6713	501	LCP	FPF	000	BOP	401	004	NL	6713		20	Brass-Connector for Earthing Cable Plus GY PVC Insulated Cable 12.4mm dia (ANSI 400) 5m length	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6714	501	LCP	FPF	000	BOP	401	004	NL	6714		19	AL-Palm Type straight Tripplex flexible Connector for SA	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6715	501	LCP	FPF	000	BOP	401	004	NL	6715		4	AL-Through and Tee off Tripplex Flexible to Tripplex Flexible (Underhang)	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6716	501	LCP	FPF	000	BOP	401	004	NL	6716		7	End Cap with provision for installation of 1X175MM <sup>2</sup> AAC (Ø 38.72mm) Conductor as Ganging cable	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6717	501	LCP	FPF	000	BOP	401	004	NL	6717		7	AL-Bar Support	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6718	501	LCP	FPF	000	BOP	401	004	NL	6718		7	AL-Straight-Tripplex-Connector	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01
6719	501	LCP	FPF	000	BOP	401	004	NL	6719		5	Connector for Cable Sealing End	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILC-AS-SG-4200-EL-F01-0023-01

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Document Front Sheet		 <small>LOWER CHURCHILL PROJECT</small>		
<b>NE-LCP Contractor/Supplier</b>	Contract or Purchase Number and Description:	Contractor/Supplier Name:		
	CD0501-001 Lower Churchill Converters and Transition Compounds	Alstom Grid Canada ULC.		
	Document Title:	Total Number of Pages Incl. Front Sheet		
	Muskrat Falls Converter Station Bill of Material - High Voltage Equipments	60		
	Contractor Document Number:	Revision Number:	05	
	LCP-MFA-000-BOP-401-002-ML			
	Supplier Document Number:	Revision Number:		
NE-LCP Document Number:	NE-LCP Issue Number:	B4		
ILK-AS-SD-8211-EL-G01-0001-01				
Approver's Signature:	Date (20-Jan-2017):	Review Class:		
<u>Comments:</u>		Equipment Tag or Model Number:		
<b>NE-LCP</b>	REVIEW DOES NOT CONSTITUTE APPROVAL OF DESIGN DETAILS, CALCULATIONS, TEST METHODS OR MATERIAL DEVELOPED AND/OR SELECTED BY THE CONTRACTOR, NOR DOES IT RELIEVE THE CONTRACTOR FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS.			
	01 - REVIEWED AND ACCEPTED - NO COMMENTS 02 - REVIEWED - INCORPORATE COMMENTS, REVISE AND RESUBMIT 03 - REVIEWED - NOT ACCEPTED 04 - INFORMATION ONLY 05 - NOT REVIEWED			
	Lead Reviewer:	Date (dd-mmm-yyyy):	Project Manager:	Date (dd-mmm-yyyy):
	NE-LCP Management:	Date (dd-mmm-yyyy):		
	<u>General Comments:</u>			

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Labrador-Island Link Limited Partnership  
Contract CD0501-001

Lower Churchill Converters and Transition Compounds Project

**MUSKRAT FALLS CONVERTER STATION  
BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS**

PHA-ILK-AS-SD-8211-EL-G01-0001-01	REV
PHA-LCP-MFA-000-BOP-401-002-ML	02
ASSUMPTION: PRIORITY 1 _ FEEDER1 _ AC FILTER F1 + F2 (Refer to SLD signed on 02/03/2017)	

							
PREPARED	20-Jan-17	Ivo Georgiev	IG	PROJECT Lower Churchill Converters and Transition Compounds Project			
VERIFIED	20-Jan-17	Asbed Kojakian	AK	TITLE Muskrat Falls Converter Station Bill of Material - High Voltage Equipments			
APPROVED	20-Jan-17	Eric Guimond	EG				
	DATE	NAME	SIGNATURE				
Alstom document number <b>LCP-MFA-000-BOP-401-002-ML</b>			Alstom Revision <b>05</b>	Nalcor document number		LCP Status <b>B4</b>	
Internal document number (when applicable)			Internal Revision	<b>ILK-AS-SD-8211-EL-G01-0001-01</b>		Page <b>02</b>	TOTAL Sheets <b>52</b>

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**CONFIDENTIAL**

*Handwritten signature and initials in blue ink.*

SCHEDULE OF MODIFICATIONS

COMPANY REV	CONTRACTOR REV	DATE	PREP.	VER.	APP.	MODIFICATION CONTENTS	PAGE / SECTION
A1	01	0/09/2015	IG	AK	EG	Original issue	
B1	02	3-Jun-16	IG	AK	EG	Issued for Implementation and Use	
B2	03	27-Oct-16	IG	AK	EG	Issued for Implementation and Use	
B3	04	20-Jan-17	IG	AK	EG	Issued for Implementation and Use	
B4	05	20-Jan-17	IG	AK	EG	Issued for Implementation and Use	

*Handwritten signature in blue ink, possibly reading "M. J. R."*

Reference drawings

ILK-AS-SD-821D-EL-B04-0001-01	MUSKRAT FALLS CONVERTER STATION/AC YARD POLE 1 SIDE/PLAN VIEW AND SECTIONS
ILK-AS-SD-821R-EL-B04-0001-01	MUSKRAT FALLS CONVERTER STATION/AC YARD POLE 2 SIDE/PLAN VIEW AND SECTIONS
ILK-AS-SD-8210-ST-D99-0001-01	MUSKRAT FALLS OUTDOOR HIGH VOLTAGE/EQUIPMENT MOUNTING DETAILS-AC YARDS
ILK-AS-SD-8210-EL-D99-0024-01	MUSKRAT FALLS OUTDOOR HIGH VOLTAGE/EQUIPMENT MOUNTING DETAILS-DC YARDS
ILK-AS-SD-8210-EL-D99-0025-01	MUSKRAT FALLS OUTDOOR HIGH VOLTAGE/EQUIPMENT MOUNTING DETAILS-AC FILTER
ILK-AS-SD-821B-EL-B04-0001-01	MUSKRAT FALLS CONVERTER STATION/CONVERTER TRANSFORMER & AC DELTA/STAR POLE 1/PLAN VIEW AND SECTIONS
ILK-AS-SD-821P-EL-B04-0001-01	MUSKRAT FALLS CONVERTER STATION/CONVERTER TRANSFORMER & AC DELTA/STAR POLE 2/PLAN VIEW AND SECTIONS
ILK-AS-SD-821G-EN-B01-0001-01	MUSKRAT FALLS /VALVE HALL POLE 1/GENERAL ARRANGEMENTS
ILK-AS-SD-821U-EN-B01-0001-01	MUSKRAT FALLS /VALVE HALL POLE 2/GENERAL ARRANGEMENTS
ILK-AS-SD-8210-EL-B01-0016-01	MUSKRAT FALLS /DC YARD /GENERAL ARRANGEMENT
ILK-AS-SD-8211-EL-B99-0002-01	MUSKRAT FALLS CONVERTER STATION/GENERAL GROUNDING GRID LAYOUT
ILK-AS-SD-8211-EL-B99-0003-01	MUSKRAT FALLS CONVERTER STATION/CONTROL BUILDING/GROUNDING PLAN
ILK-AS-SD-8210-EL-B06-0001-01	MUSKRAT FALLS BUILDING AND OUTDOOR CABLE TRAYS AND TRENCHES - GENERAL ARRANGEMENT LAYOUT AND SECTIONS

BPE-HP1153 - BBA Cable tray BOM reference number on hold

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Legend		Description	Examples	Seal(s)
00XX	AC-DC Room & Battery	AC-DC Room & Battery		
10XX	Control room	Control and P&C rooms equipment		
20XX	Cable Trays	Cable trays and accessories		
39XX	AC Filters Major Equipment	CT, Surge arresters, Reactors, Resistors, Capacitors		
40XX	DC Major Equipment	Breakers, Disconnect switches, CT, VD, SA, Reactors, Capacitors		
41XX	AC Major Equipment	Transformers, Breakers, Disconnect switches, CVT, CT, Surge arresters		
45XX	Cabinets & Junction boxes	Equipment cabinets, Junction Boxes		
46XX	Insulators	Post Insulators, String Insulators		
50XX	Cables & Bus Bars	Tubular bus bars, Aluminum conductors, Cables, Shield wires		
51XX	AC Yard Connectors	Bolted connectors, Welded connectors, Conductor spacers, Bus supports, Flexible braids,		
52XX	Compression Connectors & Strain Relief Connectors	Compression connectors, Strain relief connectors		
53XX	Grounding	Grounding conductors, Rods, Grounding connectors (welded, compression, bolted) and braids, Grounding mats, Fence grounding material		
54XX	Cable Trenches	Prefabricated cable trenches and fittings		
55XX	Hardware & Conduits	Overhead line hardware, Shield wire hardware, PVC conduits and fittings, Steel conduits and fittings, Flexible conduits and fittings		
57XX	Bolts, Nuts and Washers	Bolts, Nuts, Lock washers, Flat washers, Belleville washers, Threaded rods, Threaded studs		
61XX	Valve Hall Connectors	Bolted connectors, Conductor spacers, Bus supports		
62XX	DC Yard Connectors	Bolted connectors, Conductor spacers, Bus supports		
63XX	Star-Delta Connectors	Bolted connectors, Conductor spacers, Bus supports		
64XX	AC Filters Connectors	Bolted connectors, Conductor spacers, Bus supports		
Consolidated BOM List				

NE Document no	Rev	Document no	Rev	Sheet	Following Sheet	Last Sheet
ILK-AS-SD-8211-EL-G01-0001-01	B4	LCP-MFA-000-BOP-401-002-ML	05	5	6	52

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS AC/DC & BATTERY ROOMS EQUIPMENT																					
NALCOR Document No. : ILK-AS-SD-#211-EL-G01-0001-#1 ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML																					
Rev No. : 04 Rev No. : 05																					
Item No.	Contractor Tag Number									Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
0030	501	LCP	MFA	000	BOP	401	002	ML	0030	unit(s)	821J-BAT-84-1001 821J-BAT-84-2001 821X-BAT-84-1001 821X-BAT-84-2001	2	125 VDC BATTERY		GE (SBC)	Batteries de la Capitale		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0031	501	LCP	MFA	000	BOP	401	002	ML	0031	unit(s)	8216-BAT-85-1001 8216-BAT-85-2001	2	48 VDC BATTERY		GE (SBC)	Batteries de la Capitale		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0032	501	LCP	MFA	000	BOP	401	002	ML	0032	unit(s)	821J-CP-87-0004 821X-CP-87-0004	2	AUXILIARY AC-DC CONTROL PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0034	501	LCP	MFA	000	BOP	401	002	ML	0034	unit(s)	821J-SW-82-1002 821J-SW-82-2002	2	VALVE COOLING SYSTEM-LV DISCONNECT SWITCH		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0035	501	LCP	MFA	000	BOP	401	002	ML	0035	unit(s)	821J-DPB-81-1001 821J-DPB-81-2001 821X-DPB-81-1001 821X-DPB-81-2001	4	SWITCHBOARD		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0036	501	LCP	MFA	000	BOP	401	002	ML	0036	unit(s)	8215-SWG-82-0003	1	EMERGENCY SWITCHGEAR		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0037	501	LCP	MFA	000	BOP	401	002	ML	0037	unit(s)	8215-SWG-82-0001 8215-SWG-82-0002	2	MAIN SWITCHGEAR		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0038	501	LCP	MFA	000	BOP	401	002	ML	0038	unit(s)	821J-SW-82-1006 821J-SW-82-1007 821J-SW-82-1008 821J-SW-82-1009 821J-SW-82-2006 821J-SW-82-2007 821J-SW-82-2008 821X-SW-82-1006 821X-SW-82-1007 821X-SW-82-1008 821X-SW-82-1010 821X-SW-82-2006 821X-SW-82-2007 821X-SW-82-2008 821X-SW-82-2010	16	OUTDOOR LV CONV. TRANSFORMER DISCONNECT SWITCH		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0039	501	LCP	MFA	000	BOP	401	002	ML	0039	unit(s)	821X-SW-82-1009 821X-SW-82-2009	2	SPARE TRANSFORMER 60A DISCONNECT SWITCH		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0040	501	LCP	MFA	000	BOP	401	002	ML	0040	unit(s)	821J-CHR-84-1001 821J-CHR-84-1002 821J-CHR-84-2001 821J-CHR-84-2002	4	125 VDC BATTERY CHARGER		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0041	501	LCP	MFA	000	BOP	401	002	ML	0041	unit(s)	8215-CHR-85-1001 8215-CHR-85-1002 8215-CHR-85-2001 8215-CHR-85-2002	4	48 VDC BATTERY CHARGER		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0042	501	LCP	MFA	000	BOP	401	002	ML	0042	unit(s)	821J-FU-84-1001 821J-FU-84-2001	2	125 VDC FUSE BOX		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0043	501	LCP	MFA	000	BOP	401	002	ML	0043	unit(s)	8215-FU-85-1001 8215-FU-85-2001	2	48 VDC FUSE BOX		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0044	501	LCP	MFA	000	BOP	401	002	ML	0044	unit(s)	821J-CP-84-1001 821J-CP-84-2001	4	125 VDC MAIN PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0045	501	LCP	MFA	000	BOP	401	002	ML	0045	unit(s)	8215-CP-85-1001 8215-DPB-85-1001 8215-CP-85-2001	3	48 VDC MAIN PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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nalcor energy		Lower Churchill Converters and Transition Compounds Project											GE							
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS AC/DC & BATTERY ROOMS EQUIPMENT											NALCOR Document No. : ILK-AS-SD-8211-EL-G01-001-01		Rev No. : 04							
											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 05							
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
0046	501	LCP	MFA	000	BOP	401	002	ML	0046	unit(s)	821J-DPB-84-1004 821J-DPB-84-2004	4	125 VDC OUTDOOR EQUIPMENT distribution Panel		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0047	501	LCP	MFA	000	BOP	401	002	ML	0047	unit(s)	821J-DPB-83-0003 821X-DPB-83-0003	2	BUILDING SCE DISTRIBUTION PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0048	501	LCP	MFA	000	BOP	401	002	ML	0048	unit(s)	821J-DPB-83-0002 821X-DPB-83-0002	2	OUTDOOR EQUIPMENT DISTRIBUTION PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0049	501	LCP	MFA	000	BOP	401	002	ML	0049	unit(s)	821J-DPB-83-0004 821X-DPB-83-0004	2	INDOOR LIGHTING DISTRIBUTION PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0050	501	LCP	MFA	000	BOP	401	002	ML	0050	unit(s)	821J-T-83-0003 821X-T-83-0003	2	BUILDING SCE AUXILIARY TRANSFORMER		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0051	501	LCP	MFA	000	BOP	401	002	ML	0051	unit(s)	821J-T-83-0002 821X-T-83-0002	2	OUTDOOR EQUIPMENT AUXILIARY TRANSFORMER		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0052	501	LCP	MFA	000	BOP	401	002	ML	0052	unit(s)	821J-T-83-0004 821X-T-83-0004	2	INDOOR LIGHTING AUXILIARY TRANSFORMER		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0053	501	LCP	MFA	000	BOP	401	002	ML	0053	unit(s)	821J-T-83-0005 821X-T-83-0005	2	AC-DC YARD LIGHTING AUXILIARY TRANSFORMER		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0054	501	LCP	MFA	000	BOP	401	002	ML	0054	unit(s)	821J-DPB-83-0005 821X-DPB-83-0005	2	AC-DC YARD LIGHTING DISTRIBUTION PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0056	501	LCP	MFA	000	BOP	401	002	ML	0056	unit(s)	8215-CP-87-0001 8215-CP-87-0002	2	CONTROL PANEL HMI FOR AUXILIARY ROOM		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0057	501	LCP	MFA	000	BOP	401	002	ML	0057	unit(s)	821J-CP-83-0004 821X-CP-83-0004	2	INDOOR LIGHTING CONTROL PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0058	501	LCP	MFA	000	BOP	401	002	ML	0058	unit(s)	821J-CP-83-0005 821X-CP-83-0005	2	AC-DC YARD LIGHTING CONTROL PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0059	501	LCP	MFA	000	BOP	401	002	ML	0059	unit(s)	821J-T-83-0006 821X-T-83-0007	3	CONTROL AUXILIARY TRANSFORMER		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0060	501	LCP	MFA	000	BOP	401	002	ML	0060	unit(s)	8215-T-83-0001		ESSENTIAL LOAD AUXILIARY TRANSFORMER		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0061	501	LCP	MFA	000	BOP	401	002	ML	0061	unit(s)	8215-UPS-83-0001 8215-UPS-83-0002	2	UPS Panel		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0062	501	LCP	MFA	000	BOP	401	002	ML	0062	unit(s)	8215-OPB-83-0001	1	EXTERIOR SECURITY LIGHTING DISTRIBUTION PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0063	501	LCP	MFA	000	BOP	401	002	ML	0063	unit(s)	8215-ATS-82-0001	1	MANUAL ATS EXTERIOR SECURITY LIGHTING		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0064	501	LCP	MFA	000	BOP	401	002	ML	0064	unit(s)	8215-CP-82-0001	1	EXTERIOR SECURITY LIGHTING CONTROL PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0065	501	LCP	MFA	000	BOP	401	002	ML	0065	unit(s)	8215-CP-83-0001		DIESEL PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0066	501	LCP	MFA	000	BOP	401	002	ML	0066	unit(s)	8215-CP-83-0001		PROTECTION AND CONTROL DISCRIBUTION PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0067	501	LCP	MFA	000	BOP	401	002	ML	0067	unit(s)	821J-T-82-0001	1	EXTERIOR SECURITY LIGHTING AUXILIARY TRANSFORMER		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS AC/DC & BATTERY ROOMS EQUIPMENT											NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01	Rev No. : 04								
											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML	Rev No. : 06								
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
0068	501	LCP	MFA	000	BOP	401	002	ML	0068	unit(s)	821J-T-84-0001 821J-T-84-0002 821J-T-84-0003 821J-T-84-0004	4	125 Vdc BATTERY CHARGER TRANSFORMER	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0069	501	LCP	MFA	000	BOP	401	002	ML	0069	unit(s)	821J-SW-82-1003 821J-SW-82-1004 821J-SW-82-2003 821J-SW-82-2004	4	125 Vdc BATTERY CHARGER DISCONNECT SWITCH	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0070	501	LCP	MFA	000	BOP	401	002	ML	0070	unit(s)	821J-SW-82-1005 821J-SW-82-2005	4	48 Vdc BATTERY CHARGER DISCONNECT SWITCH	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0071	501	LCP	MFA	000	BOP	401	002	ML	0071	unit(s)	821J-SW-82-1010 821X-SW-82-1011	2	OUTDOOR EQUIPMENT AUXILIARY TRANSFORMER DISCONNECT SWITCH	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0072	501	LCP	MFA	000	BOP	401	002	ML	0072	unit(s)	821J-SW-82-1012 821X-SW-82-1012 821J-SW-82-2013	3	BUILDING SERVICES AUXILIARY TRANSFORMER DISCONNECT SWITCH	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0073	501	LCP	MFA	000	BOP	401	002	ML	0073	unit(s)	821J-SW-82-1013 821X-SW-82-2013	2	AC/DC YARD LIGHTING TRANSFORMER DISCONNECT SWITCH	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0074	501	LCP	MFA	000	BOP	401	002	ML	0074	unit(s)	821J-SW-82-2010 821X-SW-82-2011	2	PROTECTION AND CONTROL AUXILIARY TRANSFORMER DISCONNECT SWITCH	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0075	501	LCP	MFA	000	BOP	401	002	ML	0075	unit(s)	821J-SW-82-1011 821X-SW-82-2012	2	INDOOR LIGHTING TRANSFORMER DISCONNECT SWITCH	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0076	501	LCP	MFA	000	BOP	401	002	ML	0076	unit(s)	821J-SW-82-1014 821X-SW-82-2013	2	MANUAL ATS EXTERIOR SECURITY LIGHTING DISCONNECT SWITCH	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0077	501	LCP	MFA	000	BOP	401	002	ML	0077	unit(s)	821J-SW-82-1015 821X-SW-82-2014	2	UPS PANEL DISCONNECT SWITCH	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0081	002	LCP	MFA	001	BOP	402	003	ML	0081	unit(s)	821J-SW-82-1001 821J-SW-82-2001	2	MCC LV DISCONNECT SWITCH	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0082	503	LCP	MFA	002	BOP	403	004	ML	0082	unit(s)	821J-CP-83-0002 821J-CP-83-0007 821X-CP-83-0007 821X-CP-83-0002 8215-CP-83-0003	5	VOLTAGE DETECTOR CABINET FOR P&C DISTRIBUTION PANEL	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0343	501	LCP	MFA	000	BOP	401	002	ML	0343	unit(s)	Battery Spill Containment system EAGLE-28-172 Eagle, Floor Anchor, Deluxe NabPills & SOCs	2		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0345	501	LCP	MFA	000	BOP	401	002	ML	0345	unit(s)	Battery Spill Containment system EAGLE-28-172 Eagle, Floor Anchor, Deluxe NabPills & SOCs	1		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01		Rev No. :									
CONTROL AND P&C ROOMS EQUIPMENT										ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. :									
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments			
1000	501	LCP	MFA	000	BOP	401	002	ML	1000	unit(s)	8212-CP-87-1002 8212-CP-87-2002 8212-CP-87-0003	3	HMI Dataserver Panel Type 1 Panel 600x900x750 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - HMI 1 and Data server 1 Panel Muskirat Falls Converter Station - HMI 2 and Data server 2 Panel Muskirat Falls Converter Station - Training Operator Workstation Muskirat Falls Converter Station - Communication Interface A Panel Muskirat Falls Converter Station - Communication Interface B Panel
1001	501	LCP	MFA	000	BOP	401	002	ML	1001	unit(s)	8212-CP-87-1001 8212-CP-87-2001	2	Communication Interface Panel Type 2 Panel 916x1050x2200(mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - Communication Interface A Panel Muskirat Falls Converter Station - Communication Interface B Panel
1002	501	LCP	MFA	000	BOP	401	002	ML	1002	unit(s)	8212-CP-87-0001 8212-CP-87-0002	2	Common Control Panel Type 3 Panel 916x1050x2200(mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - Common Control Panel 1 Muskirat Falls Converter Station - Common Control Panel 2
1003	501	LCP	MFA	000	BOP	401	002	ML	1003	unit(s)	8212-CP-87-0004 8212-CP-87-0005	2	ac/dc Auxiliary service Control Panel Type 4 Panel 916x1050x2200(mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - Pole 1 ac/dc Auxiliary service Control Panel Muskirat Falls Converter Station - Pole 2 ac/dc Auxiliary service Control Panel
1004	501	LCP	MFA	000	BOP	401	002	ML	1004	unit(s)	821E-CP-87-0004	1	ac Converter Control Panel Type 5 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - Pole 1 ac Converter T7 I/O Control Panel Muskirat Falls Converter Station - Pole 2 ac Converter T8 I/O Control Panel
1005	501	LCP	MFA	000	BOP	401	002	ML	1005	unit(s)	821E-CP-87-0005 821E-CP-87-0006 821E-CP-87-0007	3	AC Filter Control Panel Type 6 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - AC Filter F1 Control Panel Muskirat Falls Converter Station - AC Filter F2 Control Panel Muskirat Falls Converter Station - AC Filter F3 Control Panel Muskirat Falls Converter Station - AC Filter F4 Control Panel Muskirat Falls Converter Station - AC Filter F5 Control Panel
1006	501	LCP	MFA	000	BOP	401	002	ML	1006	unit(s)	821E-CP-87-0003	1	AC Filter Feeder Control Panel Type 7 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - AC Filter Feeder B241 Control Panel Muskirat Falls Converter Station - AC Filter Feeder B311 Control Panel
1007	501	LCP	MFA	000	BOP	401	002	ML	1007	unit(s)	821F-PP-86-0001	1	AC Metering Panel Type 8 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - AC Converter T8 and Filters F4-F5 Feeders Metering Panel Muskirat Falls Converter Station - Pole 1 AC Converter T7 and Filters F1-F2-F3 Feeders Metering Panel
1008	501	LCP	MFA	000	BOP	401	002	ML	1008	unit(s)	821E-PP-86-1003	1	ac Converter Transformer Protection A Panel Type 9 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - Pole 1 ac Converter Transformer T7 & Feeder Protection A Panel Muskirat Falls Converter Station - Pole 2 ac Converter Transformer T8 & Feeder Protection A Panel
1009	501	LCP	MFA	000	BOP	401	002	ML	1009	unit(s)	821E-PP-86-2003	1	ac Converter Transformer Protection B Panel Type 10 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - Pole 1 ac Converter Transformer T7 & Feeder Protection B Panel Muskirat Falls Converter Station - Pole 2 ac Converter Transformer T8 & Feeder Protection B Panel
1010	501	LCP	MFA	000	BOP	401	002	ML	1010	unit(s)	821E-PP-86-1004	1	AC Filter Feeder Protection A Panel Type 11 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - AC Filter Feeder B241 Protection A Panel Muskirat Falls Converter Station - AC Filter Feeder B311 Protection A Panel
1011	501	LCP	MFA	000	BOP	401	002	ML	1011	unit(s)	821E-PP-86-2004	1	AC Filter Feeder Protection B Panel Type 12 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - AC Filter Feeder B241 Protection B Panel Muskirat Falls Converter Station - AC Filter Feeder B311 Protection B Panel
1012	501	LCP	MFA	000	BOP	401	002	ML	1012	unit(s)	821E-PP-86-1005 821E-PP-86-1006 821E-PP-86-1007	3	AC Filter Protection Panel A Type 13 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - AC Filter F1 Protection A Panel Muskirat Falls Converter Station - AC Filter F2 Protection A Panel Muskirat Falls Converter Station - AC Filter F3 Protection A Panel Muskirat Falls Converter Station - AC Filter F4 Protection A Panel Muskirat Falls Converter Station - AC Filter F5 Protection A Panel Muskirat Falls Converter Station - AC Filter F1 Protection B Panel Muskirat Falls Converter Station - AC Filter F2 Protection B Panel Muskirat Falls Converter Station - AC Filter F3 Protection B Panel Muskirat Falls Converter Station - AC Filter F4 Protection B Panel Muskirat Falls Converter Station - AC Filter F5 Protection B Panel
1013	501	LCP	MFA	000	BOP	401	002	ML	1013	unit(s)	821E-PP-86-2005 821E-PP-86-2006 821E-PP-86-2007	3	AC Filter Protection Panel B Type 14 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - AC Filter F2 Protection B Panel Muskirat Falls Converter Station - AC Filter F3 Protection B Panel Muskirat Falls Converter Station - AC Filter F4 Protection B Panel Muskirat Falls Converter Station - AC Filter F5 Protection B Panel
1014	501	LCP	MFA	000	BOP	401	002	ML	1014	unit(s)	821E-PP-86-1008	1	Bipole Rapid Filter Removal Panel 1 Type 15 Panel 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskirat Falls Converter Station - Bipole Rapid Filter Removal 1 Panel

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b> <b>CONTROL AND P&amp;C ROOMS EQUIPMENT</b>														NALCOR Document No.: ILK-AS-SD-8211-EL-G01-0001-01 Rev No.: 01							
														ALSTOM Document No.: LCP-MFA-000-BOP-401-002-ML Rev No.: 01							
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
1015	501	LCP	MFA	000	BOP	401	002	ML	1015	unit(s)	821S-PP-86-2008	1	<b>Bipole Rapid Filter Removal Panel 2</b> Type 16 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskrat Falls Converter Station - Bipole Rapid Filter Removal 2 Panel
1016	501	LCP	MFA	000	BOP	401	002	ML	1016	unit(s)	821E-PP-86-0001	1	<b>ac Filter 50BF Protection Panel</b> Type 17 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskrat Falls Converter Station - ac Filter F4-F5 50BF Protection Panel Muskrat Falls Converter Station - ac Filter F1-F2-F3 50BF Protection Panel
1017	501	LCP	MFA	000	BOP	401	002	ML	1017	unit(s)	4361-CP-87-0003 4361-CP-87-0050 4361-CP-87-0002 4361-CP-87-0049	4	<b>Interface HVDC Lane Panel</b> Type 18 Panel ,		GE (SBC)	Envitech		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Control Panel - Interface HVDC Pole 2 Lane 1 Panel Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Control Panel - Interface HVDC Pole 2 Lane 2 Panel Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Control Panel - Interface HVDC Pole 1 Lane 1 Panel Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Control Panel - Interface HVDC Pole 1 Lane 2 Panel
1018	501	LCP	MFA	000	BOP	401	002	ML	1018	unit(s)	4362-PP-86-0006 4362-PP-86-0034	2	<b>Protection Panel - HF system A Panel</b> Type 19 Panel ,		GE (SBC)	Envitech		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Protection Panel - HF Pole 1 - System A Panel Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Protection Panel - HF Pole 2 - System A Panel
1019	501	LCP	MFA	000	BOP	401	002	ML	1019	unit(s)	4362-PP-86-0038 4362-PP-86-0057	2	<b>Protection Panel - HF system B Panel</b> Type 20 Panel ,		GE (SBC)	Envitech		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Protection Panel - HF Pole 1 - System B Panel Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Protection Panel - HF Pole 2 - System B Panel
1020	501	LCP	MFA	000	BOP	401	002	ML	1020	unit(s)	4362-PP-86-0016 4362-PP-86-0024	2	<b>Protection Panel - CT - System A Panel</b> Type 21 Panel ,		GE (SBC)	Envitech		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Protection Panel - CT Pole 1 - System A Panel Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Protection Panel - CT Pole 2 - System A Panel
1021	501	LCP	MFA	000	BOP	401	002	ML	1021	unit(s)	4362-PP-86-0054 4362-PP-86-0047	2	<b>Protection Panel - CT - System B Panel</b> Type 22 Panel ,		GE (SBC)	Envitech		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Protection Panel - CT Pole 2 - System B Panel Muskrat Falls Terminal Station #2 (MFATS2) - Protection and Control - Protection Panel - CT Pole 1 - System B Panel
1022	501	LCP	MFA	000	BOP	401	002	ML	1022	unit(s)	8216-TP-89-0005	1	<b>ODF INTERFACE PANEL TYPE 1</b> ODF Interface Panel NEMA 12 Enclosure plate gauge 14 steel. Piano-type hinges. Padlockable device. Removable mounting plate Dimensions: L=762 mm, H=762 mm, D=600 mm Provided with terminal blocks and internal wiring. Components: Fiber optical board		GE (SBC)	Envitech		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-3D-8211-EL-G01-0001-01	Rev No. : 04									
CONTROL AND P&C ROOMS EQUIPMENT											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML	Rev No. : 06									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
1023	501	LCP	MFA	000	BOP	401	002	ML	1023	unit(s)	8216-TP-89-0003	1	ODF INTERFACE PANEL TYPE 2 ODF Interface Panel NEMA 12 Enclosure plate gauge 14 steel. Piano-type hinges. Padlockable device. Removable mounting plate Dimensions: L=1526 mm, H=1070 mm, D=600 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks DC/DC Converters Lighting controlled by door switch Heater with thermostat Fiber optical board Ethernet switches		GE (SBC)	Envitech		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1024	501	LCP	MFA	000	BOP	401	002	ML	1024	unit(s)	821E-CP-87-0101	1	Valve Base Electronics 900x1050x2375 (mm)		GE(PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1025	501	LCP	MFA	000	BOP	401	002	ML	1025	unit(s)	821E-PP-86-1101	1	CCPL1 Panels 900x1050x2375 (mm)		GE(PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Converter Control & Protection Pole 2 Side A Lane 1 Converter Control & Protection Pole 1 Side A Lane 1
1027	501	LCP	MFA	000	BOP	401	002	ML	1027	unit(s)	821E-PP-86-2101	1	CCPL2 Panels 900x1050x2375 (mm)		GE(PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Converter Control & Protection Pole 1 Side A Lane 2 Converter Control & Protection Pole 2 Side A Lane 2
1029	501	LCP	MFA	000	BOP	401	002	ML	1029	unit(s)	8212-CP-87-1103 8212-CP-87-2103	2	Bipole Control Panel 800x1050x2375 (mm)		GE(PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Bipole Control Side A Lane 1 Bipole Control Side A Lane 2
1030	501	LCP	MFA	000	BOP	401	002	ML	1030	unit(s)	8212-CP-87-1101	1	Measurement Panel 900x1050x2375 (mm)		GE(PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Measurement CC Pole 1 Measurement Pole 2
1031	501	LCP	MFA	000	BOP	401	002	ML	1031	unit(s)	8212-CP-87-1102	1	DAC Measurement Panel 900x1050x2375 (mm)		GE(PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	DAC Measurement Pole 1 DAC Measurement Pole 2
1032	501	LCP	MFA	000	BOP	401	002	ML	1032	unit(s)	8212-CP-87-1104 8212-CP-87-2104	2	DFR Panel 800x800x2375 (mm)		GE(PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Digital Fault Recorder Pole 1 Digital Fault Recorder Pole 2
1033	501	LCP	MFA	000	BOP	401	002	ML	1033	unit(s)	8212-CP-87-0101 8212-CP-87-0102 8212-CP-87-0103 8212-CP-87-0107 8212-CP-87-0108	5	Profibus Panels 1200x800x2300 (mm)		GE(PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Side A Profibus Cabinet A Side A Profibus Cabinet B Side A Profibus Cabinet C Side A Profibus Cabinet G Profibus Interface Cubicle D Profibus Interface Cubicle E Profibus Interface Cubicle F Profibus Interface Cubicle H
1034	501	LCP	MFA	000	BOP	401	002	ML	1034	unit(s)		1	Ground Fault Detector Panel 635x200x914 (mm)		GE(PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Pole 1 - Ground Fault Detector Pole 2 - Ground Fault detector
1035	501	LCP	MFA	000	BOP	401	002	ML	1035	unit(s)	8212-CP-87-0111	1	Archive Cubicle 800x1000x2100(mm)		GE(PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS CONTROL AND P&C ROOMS EQUIPMENT											NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01	Rev No. : 04									
											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML	Rev No. : 05									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
1036	501	LCP	MFA	000	BOP	401	002	ML	1036	unit(s)	8212-CP-87-1005	1	LFL1 Panel 916x1050x2200 (mm)		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1037	501	LCP	MFA	000	BOP	401	002	ML	1037	unit(s)	8212-CP-87-0114	1	Digital Fault Recorder WorkStation		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1038	501	LCP	MFA	000	BOP	401	002	ML	1038	unit(s)	8212-CP-87-0113 8212-CP-87-0120	2	Mechanical Interlocking Panel		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Pole 1 Mechanical Interlocking Panel Pole 2 Mechanical Interlocking Panel	
1040	501	LCP	MFA	000	BOP	401	002	ML	1040	unit(s)	8215-DPB-83-0001 8215-DPB-83-0002	2	Essential Loads Distribution Panel 208/120 Vac, 3ph-4w, 100A, 80kA		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1042	501	LCP	MFA	000	BOP	401	002	ML	1042	unit(s)	8212-CP-87-1104 8212-CP-87-0110	2	DIGITAL FAULT RECORDER PANEL		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1043	501	LCP	MFA	000	BOP	401	002	ML	1043	unit(s)	821E-GPS-87-0001 821E-GPS-87-0002 8215-GPS-87-0001 8215-GPS-87-0002 8215-GPS-87-0003 8215-GPS-87-0004	6	GPS		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1044	501	LCP	MFA	000	BOP	401	002	ML	1044	unit(s)	821J-DPB-84-1002 821J-DPB-84-2002 8215-DPB-84-1001 8215-DPB-84-2001	8	P&C PANEL FOR 125 Vdc		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1045	501	LCP	MFA	000	BOP	401	002	ML	1045	unit(s)	821J-DPB-83-0007 8215-DPB-83-0003	2	P&C PANEL FOR 208/120 Vac		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1046	501	LCP	MFA	000	BOP	401	002	ML	1046	unit(s)	8212-CP-87-0003 8212-CP-87-1003 8212-CP-87-1010 8212-CP-87-2003	4	Operator Workstation		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1047	501	LCP	MFA	000	BOP	401	002	ML	1047	unit(s)	821E-TS-87-0001 821E-TS-87-0002 821E-TS-87-0003	3	Temperature sensor for Ac filter control panel		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1048	501	LCP	MFA	000	BOP	401	002	ML	1048	unit(s)	8215-DPB-84-1005	1	Outdoor equipment 125 Vdc DC Yard common panel		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1049	501	LCP	MFA	000	BOP	401	002	ML	1049	unit(s)	8215-DPB-83-1005	1	Outdoor equipment 208/120 Vac DC Yard common panel		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1050	501	LCP	MFA	000	BOP	401	002	ML	1050	unit(s)				P&C 125 Vdc DISTRIBUTION PANEL		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1051	501	LCP	MFA	000	BOP	401	002	ML	1051	unit(s)				P&C 208/120 Vac DISTRIBUTION PANEL		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8211-EL-G01-001-01		Rev No. : 04							
CONTROL AND P&C ROOMS EQUIPMENT											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 05							
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
1052	501	LCP	MFA	000	BOP	401	002	ML	1052	unit(s)	8212-CP-87-0006 8212-CP-87-0008 821E-CP-87-0009 821E-CP-87-0010 821S-CP-87-0009 821S-CP-87-0010	6	LCP panel		LCP		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1055	501	LCP	MFA	000	BOP	401	002	ML	1055	unit(s)			Digital Fault recorder pole		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1056	501	LCP	MFA	000	BOP	401	002	ML	1056	unit(s)	8212-CP-87-1004 8212-CP-87-2004 8212-CP-87-100X	2	PRINTER SAS & PES		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
1057	501	LCP	MFA	000	BOP	401	002	ML	1057	unit(s)	8212-CP-87-0109	1	INTERFACE ENGINEER WORKSTATION		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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Lower Churchill Converters and Transition Compounds Project												NALCOR Document No. : ILK-AS-SD-0211-EL-001-001-01		Rev No. : 1/4				
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS												ALSTOM Document No. : LCP-MFA-000-BOP-401-002-EL		Rev No. : 0/5				
Cable Tray																		
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
2201	501	LCP	MFA	000	BOP	401	002	ML	2201	unit(s)	Batch	Galvanized steel cable tray straight section class D, W=300mm, H=100mm, L=3m, Rung spacing 300mm, #SH-1-4-12-L12-3 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2202	501	LCP	MFA	000	BOP	401	002	ML	2202	unit(s)	Batch	Galvanized steel cable tray straight section class D, W=450mm, H=100mm, L=3m, Rung spacing 300mm, #SH-1-4-18-L12-3 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2203	501	LCP	MFA	000	BOP	401	002	ML	2203	unit(s)	Batch	Galvanized steel cable tray straight section class D, W=600mm, H=100mm, L=3m, Rung spacing 300mm, #SH-1-4-24-L12-3 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2205	501	LCP	MFA	000	BOP	401	002	ML	2205	unit(s)	Batch	Galvanized steel cable tray straight section class G, W=900mm, H=100mm, L=3m, Rung spacing 300mm, #SH-1-4-36-L12-3 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2207	501	LCP	MFA	000	BOP	401	002	ML	2207	unit(s)	Batch	PERFORATED TRAY TYPE, STRAIGHT SECTION, 3 METERS LENGTH, STEEL HDGAF, 150mm WIDE, 25mm HEIGHT, B-Line by EATON #PF025VCG15SS-150-3000-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2208	501	LCP	MFA	000	BOP	401	002	ML	2208	unit(s)	Batch	PERFORATED TRAY TYPE, STRAIGHT SECTION, 3 METERS LENGTH, STEEL HDGAF, 400mm WIDE, 25mm HEIGHT, B-Line by EATON #PF025VCG15SS-400-3000-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2209	501	LCP	MFA	000	BOP	401	002	ML	2209	unit(s)	Batch	PERFORATED TRAY TYPE, STRAIGHT SECTION, 3 METERS LENGTH, STEEL HDGAF, 800mm WIDE, 25mm HEIGHT, B-Line by EATON #PF025VCG15SS-800-3000-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2222	501	LCP	MFA	000	BOP	401	002	ML	2222	unit(s)	Batch	Galvanized steel 90° horizontal bend, W=450mm, H=100mm, R=600mm, #SH-F-4-18-L-HB-24 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2223	501	LCP	MFA	000	BOP	401	002	ML	2223	unit(s)	Batch	Galvanized steel 90° horizontal bend, W=600mm, H=100mm, R=800mm, #SH-F-4-24-L-HB-24 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2224	501	LCP	MFA	000	BOP	401	002	ML	2224	unit(s)	Batch	Galvanized steel 45° horizontal bend, W=600mm, H=100mm, R=600mm, #SH-F-4-24-L-HB-45 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2227	501	LCP	MFA	000	BOP	401	002	ML	2227	unit(s)	Batch	90° HORIZONTAL BEND, RADIUS 300mm, STEEL HDGAF, 150mm WIDE, 25mm HEIGHT, B-Line by EATON #PF025VCG15H-150-90R300-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2228	501	LCP	MFA	000	BOP	401	002	ML	2228	unit(s)	Batch	90° HORIZONTAL BEND, RADIUS 300mm, STEEL HDGAF, 400mm WIDE, 25mm HEIGHT, B-Line by EATON #PF025VCG15H-400-90R300-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2229	501	LCP	MFA	000	BOP	401	002	ML	2229	unit(s)	Batch	90° HORIZONTAL BEND, RADIUS 300mm, STEEL HDGAF, 800mm WIDE, 25mm HEIGHT, B-Line by EATON #PF025VCG15H-800-90R300-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2232	501	LCP	MFA	000	BOP	401	002	ML	2232	unit(s)	Batch	Galvanized steel horizontal tee cross, W=600mm, H=100mm, R=600mm, #SH-F-4-18-L-HT-24 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2233	501	LCP	MFA	000	BOP	401	002	ML	2233	unit(s)	Batch	Galvanized steel horizontal tee cross, W=450mm, H=100mm, R=600mm, #SH-F-4-24-L-HT-24 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2234	501	LCP	MFA	000	BOP	401	002	ML	2234	unit(s)	Batch	Galvanized steel horizontal tee cross, W=600mm, H=100mm, R=600mm, #SH-F-4-30-L-HT-24 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2237	501	LCP	MFA	000	BOP	401	002	ML	2237	unit(s)	Batch	HORIZONTAL TEE STEEL HDGAF, RADIUS 300mm, 25mm HEIGHT, 400mm WIDE, B-Line by EATON #PF025VCG15HT-400-R300-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2238	501	LCP	MFA	000	BOP	401	002	ML	2238	unit(s)	Batch	Zinc Plated Steel Cover Clamp for Aluminum cable Ladder, H=100mm - with bolts, T & B #ABW-4 FCC or Equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2240	501	LCP	MFA	000	BOP	401	002	ML	2240	unit(s)	Batch	Galvanized steel right side reducer, W1=750mm, W2=600mm, H=100mm, #SH-F-4-30-24-L-HRR or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2241	501	LCP	MFA	000	BOP	401	002	ML	2241	unit(s)	Batch	Galvanized steel right side reducer, W1=600mm, W2=450mm, H=100mm, #SH-F-4-24-18-L-HRR or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2242	501	LCP	MFA	000	BOP	401	002	ML	2242	unit(s)	Batch	Galvanized steel left side reducer, W1=750mm, W2=600mm, H=100mm, #SH-F-4-30-24-L-HLR or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2243	501	LCP	MFA	000	BOP	401	002	ML	2243	unit(s)	Batch	Galvanized steel left side reducer, W1=600mm, W2=450mm, H=100mm, #SH-F-4-24-18-L-HLR or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2244	501	LCP	MFA	000	BOP	401	002	ML	2244	unit(s)	Batch	Galvanized steel right side reducer, W1=900mm, W2=600mm, H=100mm, #SH-F-4-30-24-L-HRR or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2245	501	LCP	MFA	000	BOP	401	002	ML	2245	unit(s)	Batch	Galvanized steel left side reducer, W1=900mm, W2=600mm, H=100mm, #SH-F-4-30-24-L-HRR or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2247	501	LCP	MFA	000	BOP	401	002	ML	2247	unit(s)	Batch	STRAIGHT REDUCER, STEEL HDGAF, 25mm HEIGHT, 400mm TO 150mm WIDE, B-Line by EATON #PM025VCG15-SR-400-150-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2248	501	LCP	MFA	000	BOP	401	002	ML	2248	unit(s)	Batch	RIGHT REDUCER, STEEL HDGAF, 25mm HEIGHT, 800mm TO 400mm WIDE, B-Line by EATON #PM025VCG15-RR-600-400-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2249	501	LCP	MFA	000	BOP	401	002	ML	2249	unit(s)	Batch	LEFT REDUCER, STEEL HDGAF, 25mm HEIGHT, 600mm TO 400mm WIDE, B-Line by EATON #PM025VCG15-LR-600-400-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2257	501	LCP	MFA	000	BOP	401	002	ML	2257	unit(s)	Batch	90° VERTICAL OUTSIDE BEND, RADIUS 300mm, STEEL HDGAF, 150mm WIDE, 25mm HEIGHT, B-Line by EATON #PF025VCG15-150-VC00R-300-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2261	501	LCP	MFA	000	BOP	401	002	ML	2261	unit(s)	Batch	Galvanized steel 90° vertical outside bend, W=300mm, H=100mm, R=600mm, #SH-F-4-12-L-VC00-24 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2262	501	LCP	MFA	000	BOP	401	002	ML	2262	unit(s)	Batch	Galvanized steel 90° vertical outside bend, W=450mm, H=100mm, R=600mm, #SH-F-4-18-L-VC00-24 or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																			
<b>MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b>												NALCOR Document No. : ILK-AS-SD-0211-EL-001-0001-01		Rev No. : 04					
<b>Cable Tray</b>												ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 05					
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
2283	501	LCP	MFA	000	BOP	401	002	ML	2283	unit[s]	Batch	Galvanized steel 90° vertical outside bend, W=600mm, H=100mm, R=500mm, #SHF-4-24-L-VC90-24 or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2284	501	LCP	MFA	000	BOP	401	002	ML	2284	unit[s]	Batch	Galvanized steel 90° vertical outside bend, W=900mm, H=100mm, R=600mm, #SHF-4-36-L-VC90-24 or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2287	501	LCP	MFA	000	BOP	401	002	ML	2287	unit[s]	Batch	90° VERTICAL INSIDE BEND RADIUS 300mm; STEEL HDGAF 150mm WIDE, 25mm HEIGHT, B-Line by EATON #PFO25VCG15-150-VBR0R-300-SA or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2288	501	LCP	MFA	000	BOP	401	002	ML	2288	unit[s]	Batch	Hop Dip Galva "D" Support for superstrut, T & B #A210 HDGC or Equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2271	501	LCP	MFA	000	BOP	401	002	ML	2271	unit[s]	Batch	HORIZONTAL CROSS SECTION, 600 WIDE, T&B, #SHF-4-24-L-HX-24 or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2272	501	LCP	MFA	000	BOP	401	002	ML	2272	unit[s]	Batch	HORIZONTAL CROSS SECTION, 800 WIDE, T&B, #SHF-4-36-L-HX-24 or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2280	501	LCP	MFA	000	BOP	401	002	ML	2280	unit[s]	Batch	Galvanized steel straight section cover, W=450 mm, #SHW-16-SFC-3 or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2281	501	LCP	MFA	000	BOP	401	002	ML	2281	unit[s]	Batch	Galvanized steel straight section cover, W=600 mm, #SHW-24-SFC-3 or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2282	501	LCP	MFA	000	BOP	401	002	ML	2282	unit[s]	Batch	GALVANIZED STEEL HORIZONTAL ADJUSTABLE PLATE, H=100mm T&B #SHW-4-12-HAP or Equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2283	501	LCP	MFA	000	BOP	401	002	ML	2283	unit[s]	Batch	GALVANIZED STEEL HORIZONTAL ADJUSTABLE PLATE, H=100mm T&B #SHW-4-18-HAP or Equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2284	501	LCP	MFA	000	BOP	401	002	ML	2284	unit[s]	Batch	GALVANIZED STEEL HORIZONTAL ADJUSTABLE PLATE, H=100mm T&B #SHW-4-24-HAP or Equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2286	501	LCP	MFA	000	BOP	401	002	ML	2286	unit[s]	Batch	GALVANIZED STEEL HORIZONTAL ADJUSTABLE PLATE, H=100mm T&B #SHW-4-36-HAP or Equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2290	501	LCP	MFA	000	BOP	401	002	ML	2290	unit[s]	Batch	Barrier #16 galvanized steel, for cable trays (2202 & 2203 with H=100mm), L=3m, #SHW-3-SB-3 or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2298	501	LCP	MFA	000	BOP	401	002	ML	2298	unit[s]	Batch	END FIXING PLATE FOR 300mm TRAY WALL PENETRATION, #SHW-4-12-CEP or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2300	501	LCP	MFA	000	BOP	401	002	ML	2300	unit[s]	Batch	GALVANIZED STEEL BARRIER STRIP CLAMP, #SPW-BSC or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2301	501	LCP	MFA	000	BOP	401	002	ML	2301	unit[s]	Batch	GALVANIZED STEEL CABLE TRAY VERTICAL ADJUSTABLE PLATE, H=100MM, #SHW-4-VSP or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2302	501	LCP	MFA	000	BOP	401	002	ML	2302	unit[s]	Batch	GALVANIZED STEEL CABLE TRAY COMBINATION HOLD DOWN / EXPANSION CLAMP WITH HARDWARE, #SHW-HEC-HDW or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2305	501	LCP	MFA	000	BOP	401	002	ML	2305	unit[s]	Batch	GALVANIZED STEEL SUPERSTRUT BRACKET TYPE, T&B #S256-29HDGC or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2306	501	LCP	MFA	000	BOP	401	002	ML	2306	unit[s]	Batch	GALVANIZED STEEL SUPERSTRUT BRACKET TYPE, T&B #S256-29HDGC or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2307	501	LCP	MFA	000	BOP	401	002	ML	2307	unit[s]	Batch	Hop Dip Galva Head plate for superstrut Channel T&B #AP230 HDGC or Equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2308	501	LCP	MFA	000	BOP	401	002	ML	2308	unit[s]	Batch	Hop Dip Galva Head plate for superstrut Channel Back to Back, T&B #AP235SQ HDGC or Equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2310	501	LCP	MFA	000	BOP	401	002	ML	2310	unit[s]	Batch	GALVANIZED STEEL SPLICE PLATE H=103mm (4in) T&B #SHW-4-SSP or Equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2317	501	LCP	MFA	000	BOP	401	002	ML	2317	unit[s]	Batch	END FIXING PLATE FOR 600mm TRAY WALL PENETRATION, #SHW-6-24-CEP or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2318	501	LCP	MFA	000	BOP	401	002	ML	2318	unit[s]	Batch	END FIXING PLATE FOR 750mm TRAY WALL PENETRATION, #SHW-6-30-CEP or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2319	501	LCP	MFA	000	BOP	401	002	ML	2319	unit[s]	Batch	END FIXING PLATE FOR 900mm TRAY WALL PENETRATION, #SHW-6-36-CEP or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2321	501	LCP	MFA	000	BOP	401	002	ML	2321	unit[s]	Batch	SOLID STRAIGHT SECTION COVER, STEEL HDGAF, 1.5 METER LENGTH, 150 WIDE, B-Line by EATON #PCFSG15S5-150-1500-SA or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2322	501	LCP	MFA	000	BOP	401	002	ML	2322	unit[s]	Batch	SOLID STRAIGHT SECTION COVER, STEEL HDGAF, 1.5 METER LENGTH, 400 WIDE, B-Line by EATON #PCFSG15S5-400-1500-SA or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2323	501	LCP	MFA	000	BOP	401	002	ML	2323	unit[s]	Batch	SOLID STRAIGHT SECTION COVER, STEEL HDGAF, 1.5 METER LENGTH, 600 WIDE, B-Line by EATON #PCFSG15S5-600-1500-SA or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2325	501	LCP	MFA	000	BOP	401	002	ML	2325	unit[s]	Batch	90° HORIZONTAL BEND SECTION COVER, STEEL HDGAF, 400mm WIDE, B-Line by EATON #PCFSG15-HB-400-R300-025-SA or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2326	501	LCP	MFA	000	BOP	401	002	ML	2326	unit[s]	Batch	90° HORIZONTAL BEND SECTION COVER, STEEL HDGAF, 600mm WIDE, B-Line by EATON #PCFSG15-HB-600-R300-025-SA or equivalent.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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Cable Tray										ALSTOM Document No. : LCP-MFA-000-BOP-011-002-01		Rev No. : 1.0								
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
2327	501	LCP	MFA	000	BOP	401	002	ML	2327	unit(s)		Batch	HORIZONTAL TEE SECTION COVER, STEEL HDGAF, 400mm WIDE, B-Line by EATON #PCFSG15-HT-400-R300-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2328	501	LCP	MFA	000	BOP	401	002	ML	2328	unit(s)		Batch	STRAIGHT REDUCER, SECTION COVER STEEL HDGAF, 400mm TO 150mm WIDE, B-Line by EATON #PCFSG15-SR-400-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2329	501	LCP	MFA	000	BOP	401	002	ML	2329	unit(s)		Batch	LEFT REDUCER, SECTION COVER STEEL HDGAF, 600mm TO 400mm WIDE, B-Line by EATON #PCFSG15-LR-600-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2330	501	LCP	MFA	000	BOP	401	002	ML	2330	unit(s)		Batch	RIGHT REDUCER, SECTION COVER STEEL HDGAF, 600mm TO 400mm WIDE, B-Line by EATON #PCFSG15-RR-600-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2331	501	LCP	MFA	000	BOP	401	002	ML	2331	unit(s)		Batch	90° VERTICAL OUTSIDE BEND, SECTION COVER, RADIUS 300mm, STEEL HDGAF, 25mm HEIGHT, 150mm WIDE, B-Line by EATON #PCFSG15-VO-150-R300-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2332	501	LCP	MFA	000	BOP	401	002	ML	2332	unit(s)		Batch	90° VERTICAL INSIDE BEND, SECTION COVER, RADIUS 300mm, STEEL HDGAF, 25mm HEIGHT, 150mm WIDE, B-Line by EATON #PCFSG15-VI-150-R300-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2340	501	LCP	MFA	000	BOP	401	002	ML	2340	unit(s)		Batch	TRAPEZE KIT FOR 450 mm CABLE TRAY	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2341	501	LCP	MFA	000	BOP	401	002	ML	2341	unit(s)		Batch	TRAPEZE KIT FOR 600 mm CABLE TRAY	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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AC Filters Major Equipment

NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01  
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Rev No. : 04  
Rev No. : 03

Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
3901	501	LCP	MFA	000	BOP	401	002	ML	3901	unit(s)	UT9F1 UT9F2	6	UNBALANCE CT (Type A MFA) UNBALANCE CT (Type B MFA)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	ARTECHE	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	UNBALANCE CT (Type A MFA) UNBALANCE CT (Type B MFA)
3903	501	LCP	MFA	000	BOP	401	002	ML	3903	unit(s)	CT9F1 CT9F2 CT4F1 CT4F2 CT6F1 CT6F2	24	CT FOR RESISTOR (R1) PROTECTION (Type A MFA) CT FOR RESISTOR (L3) PROTECTION (Type A MFA) CT FOR RESISTOR (R2) PROTECTION (Type A MFA) CT FOR RESISTOR (R3) PROTECTION (Type A MFA) CT FOR RESISTOR (R1) PROTECTION (Type B MFA)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	ARTECHE	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	CT FOR RESISTOR (R1) PROTECTION (Type A MFA) CT FOR RESISTOR (L3) PROTECTION (Type A MFA) CT FOR RESISTOR (R2) PROTECTION (Type A MFA) CT FOR RESISTOR (R3) PROTECTION (Type A MFA) CT FOR RESISTOR (R1) PROTECTION (Type B MFA)
3904	501	LCP	MFA	000	BOP	401	002	ML	3904	unit(s)	CT7F1 CT7F2	6	CT FOR FILTER ARM PROTECTION (Type A MFA) CT FOR FILTER ARM PROTECTION (Type B MFA)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	ARTECHE	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	CT FOR FILTER ARM PROTECTION (Type A MFA) CT FOR FILTER ARM PROTECTION (Type B MFA)
3924	501	LCP	MFA	000	BOP	401	002	ML	3924	unit(s)	L1F1 L1F2	6	REACTOR (L1) (Type A MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	RMG	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3925	501	LCP	MFA	000	BOP	401	002	ML	3925	unit(s)	L2F1 L2F2	6	REACTOR (L2) (Type A MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	RMG	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3929	501	LCP	MFA	000	BOP	401	002	ML	3929	unit(s)	L3F1 L3F2	6	REACTOR (L3) (Type A MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	RMG	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3930	501	LCP	MFA	000	BOP	401	002	ML	3930	unit(s)		0	REACTOR (L1) (Type B MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	RMG	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3955	501	LCP	MFA	000	BOP	401	002	ML	3955	unit(s)		17	SURGE COUNTER METER: 6 DIGIT CYCLOMETER MINIMUM COUNT CURRENT: 200 AMPS 8/20 MICROSECOND WAVE MAXI. HIGH CURRENT WITHSTAND: 100 KA 4/10 MICROSECOND WAVE METER SCALE: 0-30 mA PEAK(1.41 (NON LINEAR SCALE)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	SIEMENS	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3961	501	LCP	MFA	000	BOP	401	002	ML	3961	unit(s)	C1B3M1F C1D3M4F2	6	MAIN CAPACITOR (C1) (Type A MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	RMT	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3962	501	LCP	MFA	000	BOP	401	002	ML	3962	unit(s)	C6F1 C6F2	6	CAPACITOR (C2b) (Type A MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	RMT	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3963	501	LCP	MFA	000	BOP	401	002	ML	3963	unit(s)	C6F1 C6F2	6	CAPACITOR (C2) (Type A MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	RMT	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3964	501	LCP	MFA	000	BOP	401	002	ML	3964	unit(s)	C7F1 C7F2	6	CAPACITOR (C3) (Type A MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	RMT	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3966	501	LCP	MFA	000	BOP	401	002	ML	3966	unit(s)		0	MAIN CAPACITOR (C1) (Type B MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	RMT	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3971	501	LCP	MFA	000	BOP	401	002	ML	3971	unit(s)	R1F1 R1F2	6	RESISTOR (R1) (Type A MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	CRESSALL	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3972	501	LCP	MFA	000	BOP	401	002	ML	3972	unit(s)	R2F1 R2F2	6	RESISTOR (R2) (Type A MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	CRESSALL	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3973	501	LCP	MFA	000	BOP	401	002	ML	3973	unit(s)	R3F1 R3F2	6	RESISTOR (R3) (Type A MFA)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	CRESSALL	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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AC Filters Major Equipment

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Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
3976	501	LCP	MFA	000	BOP	401	002	ML	3976	unit(s)		0	RESISTOR (R1) (Type B MFA)	ILK-SN-CD-0000-EL-TS-0023-01	GE (PES)	GRESSALL		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3981	501	LCP	MFA	000	BOP	401	002	ML	3981	unit(s)	SA1F1 SA1F2	6	SURGE ARRESTER WITH BPI (Type A MFA)	ILK-SN-CD-0000-EL-TS-0029-01	GE (PES)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3982	501	LCP	MFA	000	BOP	401	002	ML	3982	unit(s)	SA3F1 SA3F2	6	SURGE ARRESTER (Type A MFA)	ILK-SN-CD-0000-EL-TS-0029-01	GE (PES)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3983	501	LCP	MFA	000	BOP	401	002	ML	3983	unit(s)	SA3F1 SA3F2	6	SURGE ARRESTER (Type A MFA)	ILK-SN-CD-0000-EL-TS-0029-01	GE (PES)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3986	501	LCP	MFA	000	BOP	401	002	ML	3986	unit(s)		0	SURGE ARRESTER (Type B MFA)	ILK-SN-CD-0000-EL-TS-0029-01	GE (PES)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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DC Major Equipment

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Rev No. : 05

Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4002	501	LCP	MFA	000	BOP	401	002	ML	4002	unit(s)	T7 (phase A) T7 (phase B) T7 (phase C) T (Spare)	4	SINGLE PHASE TRANSFORMER 315 KV SINGLE PHASE TRANSFORMER 232 MVA/1Ph, 315/√3 KV, 145/√3 KV, 145/√3 KV, 60 Hz	ILK-SN-CD-8000-EL-TS-0022-01	GE (SBC)	TST		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4004	501	LCP	MFA	000	BOP	401	002	ML	4004	unit(s)	V1B41 V2B41 V1B42 V2B42	6	QUADRIVALVE MFA	ILK-SN-CD-8000-EL-TS-0025-01	GE (PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4005	501	LCP	MFA	000	BOP	401	002	ML	4005	unit(s)	B41B61 B61B62	2	DC NEUTRAL BREAKER ALSTOM TYPE GL 316X, 420 KV CLASS OUTDOOR, 4000A, 40 KA INTERRUPTING, 4 HOLES NEMA DRILLED ALUMINUM TERMINALS GALVANIZED STEEL SUPPORT	ILK-SN-CD-4000-EL-TS-0001-01 ILK-SN-CD-8000-EL-TS-0011-01	GE (SBC)	ALSTOM-TDC		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4006	501	LCP	MFA	000	BOP	401	002	ML	4006	unit(s)		3	AC STAR BUSHING 420KV-2500A-949KV BIL OUTDOOR CREEPAGE DISTANCE 12850mm cantilever operation load 2500N SF6 gas insulated Total max approx. 1350kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	RPV		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4007	501	LCP	MFA	000	BOP	401	002	ML	4007	unit(s)		3	AC DELTA BUSHING ± 250KV-2000A-590KV BIL cantilever operation load 2500N outdoor creepage distance 14700mm SF6 gas insulated total mass approx. 520kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	RPV		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4008	501	LCP	MFA	000	BOP	401	002	ML	4008	unit(s)		1	HVDC BUSHING ± 420KV-2500A-1050KV BIL OUTDOOR CREEPAGE DISTANCE 16460mm Cantilever operation load 2500N SF6 gas insulated total mass approx. 1380kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	RPV		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4009	501	LCP	MFA	000	BOP	401	002	ML	4009	unit(s)		1	LVDC BUSHING ± 92KV-2000A-220KV BIL OUTDOOR CREEPAGE DISTANCE 5250mm RIP BUSHING Total mass 150kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	RPV		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4010	501	LCP	MFA	000	BOP	401	002	ML	4010	unit(s)		0	ELECTRODE LINE LVDC BUSHING ± 82KV-2000A-220KV BIL OUTDOOR CREEPAGE DISTANCE 5250mm RIP BUSHING Total mass 150kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4014	501	LCP	MFA	000	BOP	401	002	ML	4014	unit(s)	CT1B42 CT2B42	2	DC CURRENT TRANSFORMER 1500 kV BIL, 1286 A Type COSI CT Maximum system voltage 393 kV BL 1500 kV Creepage 15587 mm Accuracy 0,1% Nominal operating current 1286 A Rated secondary NL 1,6075V, WL 0,5358V Burden 10 kVA Rating factor NL 6,22, WL 18,66		GE (SBC)	DIT		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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Lower Churchill Converters and Transition Compounds Project



MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS  
DC Major Equipment

NALCOR Document No. : ILK-AS-SD-2111-EL-G01-0001-01

Rev No. : 04

ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML

Rev No. : 06

Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4021	501	LCP	MFA	000	BOP	401	002	ML	4021	unit(s)	R1B41B61 R1B61B63	2	DC NEUTRAL REACTOR 1.6 kA thermal 1 sec. 4 kA mechanical peak 40 kV BIL across coil 221 kV BIL across intercoil insulator Reactor rating 0,135 mH, 0,051 ohms, 60 Hz MC1 = 76 mm MC2 = 305 mm	ILK-SN-CD-8000-EL-TS-0027-01	GE (SBC)	Trench		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4022	501	LCP	MFA	000	BOP	401	002	ML	4022	unit(s)	R1B42	1	DC SMOOTHING REACTOR Type XSCM 2x75,00 mH / 1980 A System voltage: 350 kV Max. operating voltage: 370 kV BIL between terminals: 1425 kV Nominal current: 1286 A Rated current: 1320 A Design current: 1980 A Short time current / duration 8 kA / 1s Offset peak current: 8 kAp Temp. class F (155°) MC1 = 4180 mm MC2 = 5700 mm MC3 = 4700 mm MC4 = 7150 mm	ILK-SN-CD-8000-EL-TS-0027-01	GE (SBC)	ALSTOM-RMG		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4023	501	LCP	MFA	000	BOP	401	002	ML	4023	unit(s)	R1B66 R1B67	2	DC EFLR REACTOR	ILK-SN-CD-8000-EL-TS-0027-01	GE (SBC)	ALSTOM-RMG		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4025	501	LCP	MFA	000	BOP	401	002	ML	4025	unit(s)	T7G3	3	AC STAR EARTH SWITCH 21kA x 1 S	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4026	501	LCP	MFA	000	BOP	401	002	ML	4026	unit(s)	T7G4	3	AC DELTA EARTH SWITCH 21kA x 1s	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4027	501	LCP	MFA	000	BOP	401	002	ML	4027	unit(s)	B42G1	1	HVDC EARTH SWITCH 21kA x 1S	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4028	501	LCP	MFA	000	BOP	401	002	ML	4028	unit(s)	B41G1	1	LVDC EARTH SWITCH 21kA x 1S	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4030	501	LCP	MFA	000	BOP	401	002	ML	4030	unit(s)	C1B41	1	DC LV COUPLING CAPACITOR	ILK-SN-CD-8000-EL-TS-0028-01	GE (SBC)	Vishay		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4031	501	LCP	MFA	000	BOP	401	002	ML	4031	unit(s)	C1B41B61 C1B61B63	2	DC NEUTRAL CAPACITOR TYPE C/89/38/60 Rated voltage 69 kV 30 mF, 60 Hz Two bushings capacitor unit	ILK-SN-CD-8000-EL-TS-0028-01	GE (SBC)	Vishay		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4032	501	LCP	MFA	000	BOP	401	002	ML	4032	unit(s)	V01B41	1	LVDC VOLTAGE DIVIDER Rated voltage / SIL / BIL - 70 kV / 188 kV / 221 kV Rated creepage distance 4433 mm HV terminal NEMA 4 Composite gray insulator	ILK-SN-CD-8000-EL-TS-0010-01	GE (SBC)	TRENCH		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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Lower Churchill Converters and Transition Compounds Project



MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS  
DC Major Equipment

NALCOR Document No.: ILK-AS-SD-8211-EL-G91-001-01

Rev No.: 04

ALSTOM Document No.: LCP-MFA-000-BOP-401-002-ML

Rev No.: 05

Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
4033	501	LCP	MFA	000	BOP	401	002	ML	4033	unit(s)	VD1B42 HVDC VOLTAGE DIVIDER Rated voltage / SIL / BIL - 361 kV / 780 kV / 954 kV Rated creepage distance 13350 mm HV terminal NEMA 4 Composite gray insulator	ILK-SN-CD-8000-EL-TS-0010-01	GE (SBC)	TRENCH		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4041	501	LCP	MFA	000	BOP	401	002	ML	4041	unit(s)	SA1B41 SA2B41 SA1B42 SA2B42 DC SURGE ARRESTER Ur = 188 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 188 kV, 60 Hz MCOV 218 kV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 4895 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4042	501	LCP	MFA	000	BOP	401	002	ML	4042	unit(s)	SA3B42 DC SURGE ARRESTER Ur = 180 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 180 kV, 60 Hz MCOV 220 kV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 4330 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4043	501	LCP	MFA	000	BOP	401	002	ML	4043	unit(s)	SA4B42 DC SURGE ARRESTER Ur = 225 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 225 kV, 60 Hz MCOV 275 kV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 5460 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4044	501	LCP	MFA	000	BOP	401	002	ML	4044	unit(s)	SA3B41 DC SURGE ARRESTER Ur = 85 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 85 kV, 60 Hz MCOV 104 kV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 2825 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4045	501	LCP	MFA	000	BOP	401	002	ML	4045	unit(s)	SA1B41B61 SA1B61B63 DC SURGE ARRESTER Ur = 62 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 62 kV, 60 Hz MCOV 70 kV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 3015 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4046	501	LCP	MFA	000	BOP	401	002	ML	4046	unit(s)	SA1B61 SA6B1B63 DC SURGE ARRESTER Ur = 83 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 83 kV, 60 Hz MCOV 97 kV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 3015 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4047	501	LCP	MFA	000	BOP	401	002	ML	4047	unit(s)	SA5T7 TRANSFORMER STAR SURGE ARRESTER Ur = 374 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 374 kV, 60 Hz MCOV 458 kV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 11670 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8211-EL-G61-0091-01	Rev No. : 04									
DC Major Equipment											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML	Rev No. : 04									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4048	501	LCP	MFA	000	BOP	401	002	ML	4048	unit(s)	SA6T7	6	TRANSFORMER DELTA SURGE ARRESTER Ur = 232 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 232 KV, 60 Hz MCOV 283 kV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 5835 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4049	501	LCP	MFA	000	BOP	401	002	ML	4049	unit(s)		6	SURGE COUNTER FOR DC SA METER: 6 DIGIT CYCLOMETER MINIMUM COUNT CURRENT: 200 AMPS 8/20 MICROSECOND WAVE MAX. HIGH CURRENT WITHSTAND: 100 KA 4/10 MICROSECOND WAVE METER SCALE: 0-30 mA PEAK/1,41 (NON LINEAR SCALE)	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4061	501	LCP	MFA	000	BOP	401	002	ML	4061	unit(s)	SA4T7	3	TRANSFORMER NEUTRAL SURGE ARRESTER Ur = xxx kV DESCRIPTION TO COME		GE (PES)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4062	501	LCP	MFA	000	BOP	401	002	ML	4062	unit(s)	SA5B42 SA6B42 SA1B43 SA1B63	4	DC SURGE ARRESTER Ur 314 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 314 KV, 60 Hz MCOV 383 kV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 12420 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4063	501	LCP	MFA	000	BOP	401	002	ML	4063	unit(s)			ONE POLE DISCONNECTOR S2DA2T 82 KV 1980A 21 KA x 1s 82 KV, 670 KV BL 1980 A, 21 KA 1 SEC., ONE POLE MOTOR OPERATED DISCONNECT SWITCH CENTER BREAK WITH TWO GROUNDING SWITCHES. CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS HV TERMINALS: NEMA 4 INSULATOR CREEPAGE DISTANCE: 1040 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (PES)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
4064	501	LCP	MFA	000	BOP	401	002	ML	4064	unit(s)	B43B63 B53B63	2	ONE POLE DISCONNECTOR SPOL 370 KV 1980A 21 KA x 1s 370 KV, 2550 KV BL 1980 A, 21 KA 1 SEC., ONE POLE MOTOR OPERATED, VERTICAL BREAK CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No.: ILK-AS-SD-8211-EL-G91-001-01		Rev No.: 04									
DC Major Equipment										ALSTOM Document No.: LCP-MFA-000-BOP-401-002-ML		Rev No.: 05									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4065	501	LCP	MFA	000	BOP	401	002	ML	4065	unit(s)	B61B63-2 / B61B63G2	1	ONE POLE DISCONNECTOR SPOLT 370 KV 1980A 21 KA x 1s 370 KV, 2550 KV BIL 1980 A, 21 KA 1 SEC., ONE POLE MOTOR OPERATED, VERTICAL BREAK, WITH GROUNDING SWITCH ON JAW SIDE CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS, HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4066	501	LCP	MFA	000	BOP	401	002	ML	4066	unit(s)	B42B43 / B42G2 / B43G1 B43L3501 / B43G2 / L3501G B42B53 / B52G2 / B53G1 B63L3502 / B63G2 / L3502G	4	ONE POLE DISCONNECTOR SPOL2T 370 KV 1980A 21 KA x 1s 370 KV, 2550 KV BIL 1980 A, 21 KA 1 SEC., ONE POLE MOTOR OPERATED, VERTICAL BREAK, WITH TWO GROUNDING SWITCHES, CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4067	501	LCP	MFA	000	BOP	401	002	ML	4067	unit(s)	B61B65-BP	1	ONE POLE DISCONNECTOR SZDA 82 KV 1980A 21 KA x 1s 82 KV, 670 KV BIL 1980 A, 21 KA 1 SEC., ONE POLE MOTOR OPERATED, CENTER BREAK, CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS, HV TERMINALS: NEMA 4 INSULATOR CREEPAGE DISTANCE: 4250 mm INSULATOR MATERIAL: PORCELAIN GRAY ONE POLE GALVANIZED STEEL SUPPORT, HEIGHT: 3.8 m	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4068	501	LCP	MFA	000	BOP	401	002	ML	4068	unit(s)	B41B61-1 / B41B61G-1 B61B63-1 / B61B63G1 B51B61-1 / B51B61G-1 B61NG-2 / B61NGG2 B61NG-1 / B61NGG1 B61B65-1 / B61B65G1 B65B66 / B65B66G1 B65B67 / B65B67G1	8	ONE POLE DISCONNECTOR SZDAT 82 KV 1980A 21 KA x 1s 82 KV, 750 KV BIL 1980 A, 21 KA 1 SEC., ONE POLE MOTOR OPERATED, CENTER BREAK WITH ONE GROUNDING SWITCH, CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS, HV TERMINALS: NEMA 4 INSULATOR CREEPAGE DISTANCE: 4250 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
4074	501	LCP	MFA	000	BOP	401	002	ML	4074	unit(s)	T7G2	1	STAR NEUTRAL GROUNDING SWITCH 2550 KV BIL ONE POLE MOTOR OPERATED, CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS, HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-8211-EL-G81-001-01		Rev No. : B4									
DC Major Equipment										ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 06									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4075	501	LCP	MFA	000	BOP	401	002	ML	4075	unit(s)	B63G1	1	ONE POLE EARTHING SWITCH SPVL 370 KV 21 KA x 1s 370 kv, 2550 kv BIL 21 ka 1 SEC., ONE POLE MOTOR OPERATED, CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS, HV TERMINALS: NEMA 8 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4076	501	LCP	MFA	000	BOP	401	002	ML	4076	unit(s)	B61G B66G1	2	ONE POLE EARTHING SWITCH STA 82 KV 21 KA x 1s 82 kv, 750 kv BIL 21 ka 1 SEC., ONE POLE MOTOR OPERATED, CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS, ALUMINUM ALLOY TERMINAL PAD C/W LINE TERMINAL INSULATOR CREEPAGE DISTANCE: 4250 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	CME		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
4081	501	LCP	MFA	000	BOP	401	002	ML	4081	unit(s)	CT11T7	2	NEUTRAL CURRENT TRANSFORMER STAR DELTA AREA 720 V, 10 KV BIL RATIO: 250:1:1 CL PXR (2)	ILK-SN-CD-4000-EL-TS-0001-01	GE (SBC)	POLYCAST		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4082	501	LCP	MFA	000	BOP	401	002	ML	4082	unit(s)	CT2T7	3	CURRENT TRANSFORMER VALVE HALL STAR BUSHING 750V, 4 KV BIL RATIO: 2500:1:1 CL PXR (2)	ILK-SN-CD-4000-EL-TS-0001-01	GE (SBC)	POLYCAST		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4083	501	LCP	MFA	000	BOP	401	002	ML	4083	unit(s)	CT3T7	3	CURRENT TRANSFORMER VALVE HALL DELTA BUSHING 750V, 4 KV BIL RATIO: 2500:1:1 CL PXR (2)	ILK-SN-CD-4000-EL-TS-0001-01	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4085	501	LCP	MFA	000	BOP	401	002	ML	4085	unit(s)	CT2B41 CTB41B61 CT1B61 CT1B41B63 CT3B61	6	DC CURRENT TRANSFORMER 650 KV BIL, 1286 A Type COSI CT Maximum system voltage 82 kv BIL 650 kv Creepage 4323 mm Accuracy 0,1% Nominal operating current 1286 A Rated secondary NL 1,8075V, WL 0,5356V Burden 10 kOhm Rating factor NL 6,22, WL 18,66		GE (SBC)	DIT		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4086	501	LCP	MFA	000	BOP	401	002	ML	4086	unit(s)	CT2B61B63 CT2B61	2	DC CURRENT TRANSFORMER 650 kv BIL, 100 A Type COSI CT Maximum system voltage 82 kv BIL 650 kv Creepage 4323 mm Accuracy 0,2% Nominal operating current 100 A Rated secondary NL 1,6665V, WL 0,3V Burden 10 kOhm Rating factor NL 6, WL 30		GE (SBC)	DIT		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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nalcor ENERGY	Lower Churchill Converters and Transition Compounds Project																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS DC Major Equipment											NALCOR Document No.: ILK-AS-SD-8211-EL-G91-001-01	Rev No.: 04										
											ALSTOM Document No.: LCP-MFA-000-BOP-401-002-ML	Rev No.: 02										
Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
4087	501	LCP	MFA	000	BOP	401	002	ML	4087	unit(s)	CT1841 CT3841	2	<b>AC CURRENT TRANSFORMER XXX kV BIL, XXX A</b> Type COSI CT Maximum system voltage XX kV BIL XXX kV Creepage XXXX mm Accuracy XX% Nominal operating current XXX A Rated secondary XXXXX Burden XX kOhm Rating factor XXXX		GE (PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4088	501	LCP	MFA	000	BOP	401	002	ML	4088	unit(s)			<b>WRAP AROUND FO CT</b>		GE (PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4081	501	LCP	MFA	000	BOP	401	002	ML	4081	unit(s)	CT1843 CT1893	2	<b>DC LINE FAULT LOCATOR</b> Rated voltage 380,5 kV 5,00 uF BIL 964 kV (HV-LV and HV-GND) BIL 125 kV (LV-GND) HV terminal - 4 NEMA holes Two bushings capacitor unit 6009 V, 90,06 uF, 125 kV BIL	ILK-SN-CD-0000-EL-TS-0016-01	GE (SBC)	Manitoba hydro		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4093	501	LCP	MFA	000	BOP	401	002	ML	4093	unit(s)			<b>GROUND FAULT DETECTOR BOX</b> IPP 66 WEIGHT 40 Color Grey-MUNSELL (ANSI #61)		GE (PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4094	501	LCP	MFA	000	BOP	401	002	ML	4094	unit(s)			<b>ELFL FAULT LOCATOR</b>		GE (SBC)	HVDC Tech		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-0211-EL-G01-001-01		Rev No. : 03								
AC Major Equipment										ALSTOM Document No. : LCP-MFA-000-BOP-401-002-01		Rev No. : 05								
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4163POW	501	LCP	MFA	000	BOP	401	002	ML	4103POW	unit(s)	B311F1 B311F2 B311F3	3	362 KV CIRCUIT BREAKER LIVE TANK SF6 WITH POINT OF WAVE CONTROL  SET OF 3 SINGLE POLE UNITS ALSTOM TYPE GL 315, 315 KV CLASS OUTDOOR, 4000A, 1050 KV LIL, 40 KA INTERRUPTING, 125 VDC CONTROL, SPRING OPERATING MECHANISM DESIGN, CREEPAGE DISTANCE - 8325 mm MIN. PORCELAIN GREY LIGHT-GRAY - MUNSELL SBG 7.0/0.4 (ANSI #70) TWO INTERRUPTING CHAMBERS OPERATING SEQUENCE: O-O.3s-CO-3min.-CO, 6 HOLES NEMA DRILLED ALUMINUM TERMINALS GALVANIZED STEEL SUPPORT DISCONNECT SWITCH	ILK-SN-CD-4000-EL-TS-0001-01	GE (SBC)	Alstom TDC	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4115	501	LCP	MFA	000	BOP	401	002	ML	4115	unit(s)	B311F1-1 B311F2-1 B311F3-1	3	SET OF 3 SINGLE POLE UNITS 347 KV, 1175 KV BIL 1200 A, 40 SA 3 SEC., THREE POLE MOTOR OPERATED, VERTICAL BREAK, C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 6930 mm INSULATOR MATERIAL: PORCELAIN GRAY PHASE TO PHASE DISTANCE: 5 m THREE POLE GALVANIZED STEEL SUPPORT, HEIGHT: 4 m MIN.	ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	Alstom TDC	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4127	501	LCP	MFA	000	BOP	401	002	ML	4127	unit(s)	F10 F30 F30	3	GROUNDING SWITCH WITH INTERLOCK  SET OF 3 SINGLE POLE UNITS SINGLE POLE MANUAL OPERATED 40 KA, SIDE BREAK, C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 6930 mm INSULATOR MATERIAL: PORCELAIN GRAY PHASE TO PHASE DISTANCE: 4 m THREE POLE GALVANIZED STEEL SUPPORT, HEIGHT: 3.8 m MIN.	ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	Alstom TDC	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4128	501	LCP	MFA	000	BOP	401	002	ML	4128	unit(s)	T701	1	GROUNDING SWITCH WITHOUT INTERLOCK  SET OF 3 SINGLE POLE UNITS SINGLE POLE MANUAL OPERATED 40 KA, SIDE BREAK, C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 6930 mm INSULATOR MATERIAL: PORCELAIN GRAY PHASE TO PHASE DISTANCE: 4 m THREE POLE GALVANIZED STEEL SUPPORT, HEIGHT: 3.8 m MIN.	ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	Alstom TDC	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4133	501	LCP	MFA	000	BOP	401	002	ML	4133	unit(s)	CVT1B311	6	CAPACITOR VOLTAGE TRANSFORMER 315 KV CL, 0.3WV(2), 3P(X)2  SINGLE PHASE MAXIMUM OPERATING VOLTAGE 315 KV, 60 Hz INSULATION LEVEL BIL: 1175 KV CREEPAGE DISTANCE: 7920 mm HV TERMINAL NEMA 4 RATIO: 1500-2600:1:1:1:1 CL: 0.3WV(2), 3P(X)2	ILK-SN-CD-8000-EL-TS-0020-01	GE (SBC)	Trench	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4135	501	LCP	MFA	000	BOP	401	002	ML	4135	unit(s)		0	CVT-315-VO-JAC DIVIDERS VERSION 4 OUTPUTS  SINGLE PHASE MAXIMUM OPERATING VOLTAGE 362 KV, 60 Hz INSULATION LEVEL BIL: 1175 KV CREEPAGE DISTANCE: 7920 mm HV TERMINAL NEMA 4 RATIO: 1500-2600:1:1:1:1 CL: 0.3WV(2), 3P(X)2	ILK-SN-CD-8000-EL-TS-0020-01	GE (SBC)	Trench	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
4137	501	LCP	MFA	000	BOP	401	002	ML	4137	unit(s)	CVT1T7	3	CAPACITOR VOLTAGE TRANSFORMER WITH HARMONIC DEVICE 315 KV CL, 0.3WV(2), 3P(X)2  SINGLE PHASE MAXIMUM OPERATING VOLTAGE 315 KV, 60 Hz INSULATION LEVEL BIL: 1175 KV CREEPAGE DISTANCE: 7920 mm HV TERMINAL NEMA 4 RATIO: 1500-2600:1:1:1:1 CL: 0.3WV(2), 3P(X)2	ILK-SN-CD-8000-EL-TS-0020-01	GE (SBC)	Trench	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	FOR MONOPOLE, THIS CVT WILL BE WITH PQ SENSOR (POLE 1 ONLY)

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													Lower Churchill Converters and Transition Compounds Project MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS AC Major Equipment														
													NALCOR Document No. : ILK-AS-SD-8211-EL-061-001-01			Rev No. : 0.4											
													ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML			Rev No. : 0.5											
Item No.	Contractor Tag Number												Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments			
4143	501	LCP	MFA	000	BOP	401	002	ML	4143	unit(s)	CT1B311	3	CURRENT TRANSFORMER 315 KV, CL. 0,3B1,8  SINGLE PHASE MAXIMUM OPERATING VOLTAGE 315 KV, 60 Hz INSULATION LEVEL BIL: 1175 KV CREEPAGE DISTANCE: 7920 mm HV TERMINALS NEMA 6 RATIO: 500:5.5 CLASS 0,3B1,8	ILK-SN-CD-8000-EL-TS-0020-01	GE (SBC)	Alstom-RMG		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03							
4144	501	LCP	MFA	000	BOP	401	002	ML	4144	unit(s)	CT1F1 CT1F2 CT1F3	9	CURRENT TRANSFORMER 315 KV, CL. 0,3B1,8 AND C1000(4)  SINGLE PHASE MAXIMUM OPERATING VOLTAGE 315 KV, 60 Hz INSULATION LEVEL BIL: 1175 KV CREEPAGE DISTANCE: 7920 mm HV TERMINALS NEMA 6 RATIO: 500:11.5:1:1 CLASS C1000 (4) CLASS 0,3B1,8 (1)	ILK-SN-CD-8000-EL-TS-0020-01	GE (SBC)	Alstom-RMG		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03							
4152	501	LCP	MFA	000	BOP	401	002	ML	4152	unit(s)	SA2T7	4	SURGE ARRESTER 347 KV  SINGLE PHASE, ZINC-OXIDE RATED VOLTAGE Ur - 276 KV, 60 Hz MCOV 221 KV, BIL 1175 KV, 10 KA, LINE DISCHARGE CLASS 3 (IEC 60099-4) ENERGY DISSIPATION CAPACITY / KV OF Ur - 7 KJ/KV MINIMUM CREEPAGE DISTANCE 7920 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	Tridelta		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	SA1T7; SA1T8; SA3B241; SA3B311 provided by contract CD502						
4155	501	LCP	MFA	000	BOP	401	002	ML	4155	unit(s)			SURGE COUNTER  METER: 6 DIGIT CYCLOMETER MINIMUM COUNT CURRENT: 200 AMPS 8/20 MICROSECOND WAVE MAXI. HIGH CURRENT WITHSTAND: 100 KA 4/10 MICROSECOND WAVE METER SCALE: 0-30 mA PENK/1.41 (NON LINEAR SCALE) UNDERHUNG SURGE ARRESTER 347 KV	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	Tridelta		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03							
4156	501	LCP	MFA	000	BOP	401	002	ML	4156	unit(s)	SA3T7	4	SINGLE PHASE, ZINC-OXIDE RATED VOLTAGE Ur - 276 KV, 60 Hz MCOV 221 KV, BIL 1175 KV, 10 KA, LINE DISCHARGE CLASS 3 (IEC 60099-4) ENERGY DISSIPATION CAPACITY / KV OF Ur - 7 KJ/KV MINIMUM CREEPAGE DISTANCE 7920 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (SBC)	Tridelta		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04							
4158	501	LCP	MFA	000	BOP	401	002	ML	4158	unit(s)	SA1B311 SA2B311	6	SURGE ARRESTER 347 KV  SINGLE PHASE, ZINC-OXIDE RATED VOLTAGE Ur - 276 KV, 60 Hz MCOV 221 KV, BIL 1175 KV, 10 KA, LINE DISCHARGE CLASS 3 (IEC 60099-4) ENERGY DISSIPATION CAPACITY / KV OF Ur - 7 KJ/KV MINIMUM CREEPAGE DISTANCE 7920 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	ILK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03							
4250	501	LCP	MFA	000	BOP	401	002	ML	4250	unit(s)	SS1 SS2	2	25-0,6 KV PAD MOUNTED SUBSTATION SERVICE TRANSFORMER  3000kVA 25000 Delta-600Y/347V Q/NAN, Dyn11, 3%, 60 Hz IMPEDANCE -5.78% NOMINAL	ILK-SN-CD-8000-EL-TS-0002-01	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03							
										unit(s)			VALVE HALL, INCLUDING SPARE PARTS		GE (PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR								

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01		Rev No. : 04								
Cabinets &JB											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 05								
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments			
4560	501	LCP	MFA	000	BOP	401	002	ML	4560	unit(s)	821B-JB-86-0010; 821B-JB-86-0011; 821B-JB-86-0012; 821B-JB-86-0013; 821B-JB-86-0014; 821B-JB-86-0015; 821B-JB-86-0016; 821B-JB-86-0017;	8	JUNCTION BOX FOR CURRENT TRANSFORMER-(Type 1) NEMA 4X Enclosure plate gauge 14 (2,3 mm min.) stainless steel. Piano-type hinges. Padlockable device. Removable mounting plate gauge 12 Dimensions: L=914 mm, H=902 mm, D=180 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bectrol		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4561	501	LCP	MFA	000	BOP	401	002	ML	4561	unit(s)	821B-JB-86-0024; 821B-JB-86-0025; 821B-JB-86-0026; 821B-JB-86-0028; 821B-JB-86-0029;	5	JUNCTION BOX FOR CURRENT TRANSFORMER-(Type 2) NEMA 4X Enclosure plate gauge 14 (2,3 mm min.) stainless steel. Piano-type hinges. Padlockable device. Removable mounting plate gauge 12 Dimensions: L=914 mm, H=902 mm, D=180 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bectrol		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4562	501	LCP	MFA	000	BOP	401	002	ML	4562	unit(s)	821B-JB-86-0042; 821B-JB-86-0043; 821B-JB-86-0044;	3	JUNCTION BOX FOR CURRENT TRANSFORMER-(Type 3) NEMA 4X Enclosure plate gauge 14 (2,3 mm min.) stainless steel. Piano-type hinges. Padlockable device. Removable mounting plate gauge 12 Dimensions: L=914 mm, H=902 mm, D=180 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bectrol		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4563	501	LCP	MFA	000	BOP	401	002	ML	4563	unit(s)	821B-JB-86-0089	1	JUNCTION BOX FOR CURRENT TRANSFORMER-(Type 4) NEMA 4X Enclosure plate gauge 14 (2,3 mm min.) stainless steel. Piano-type hinges. Padlockable device. Removable mounting plate gauge 12 Dimensions: L=1830 mm, H=1832 mm, D=627 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bectrol		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4564	501	LCP	MFA	000	BOP	401	002	ML	4564	unit(s)	821B-JB-86-0001; 821B-JB-86-0002;	2	JUNCTION BOX FOR CAPACITOR VOLTAGE TRANSFORMER-(Type 1) NEMA 4X Enclosure plate gauge 14 (2,3 mm min.) stainless steel. Piano-type hinges. Padlockable device. Removable mounting plate gauge 12 Dimensions: L=968 mm, H=914 mm, D=180 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bectrol		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4565	501	LCP	MFA	000	BOP	401	002	ML	4565	unit(s)	821E-MR-00-0001	1	INTERFACE SERIES V LANE 1 MARSHALLING PANEL-(Type 1) Interface marshalling panel (Type 1) NEMA 12 Enclosure plate gauge 10 stainless steel. Piano-type hinges. Padlockable device. Removable mounting plate Dimensions: L=1526 mm, H=1830 mm, D=611 mm Provided with terminal blocks and internal wiring. Components: ABB auxiliary relays Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	BECTROL		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Cabinets & JB													NALCOR Document No. : ILK-AS-SD-6211-EL-G01-0001-01 Rev No. : 04								
													ALSTOM Document No. : LCP-MFA-009-BOP-401-002-ML Rev No. : 05								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4566	501	LCP	MFA	000	BOP	401	002	ML	4566	unit(s)	8216-MR-00-0002	1	INTERFACE SERIES V LANE 2 MARSHALLING PANEL-(Type 2) NEMA 12 Enclosure plate gauge 10 stainless steel. Piano-type hinges. Padlockable device. Removable mounting plate Dimensions: L=1526 mm, H=1830 mm, D=611 mm Provided with terminal blocks and internal wiring. Components: ABB auxiliary relays Moulded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)	BECTROL		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4567	501	LCP	MFA	000	BOP	401	002	ML	4567	unit(s)	8216-CP-87-1102; 8216-JB-86-2102;	2	DC YARD CONTROL MARSHALLING PANEL-SOP & MFA DC Yard control marshalling panel NEMA 4X Enclosure plate gauge 12 stainless steel. Piano-type hinges. Padlockable device. Removable mounting plate Dimensions: L=1830 mm, H=1832 mm, D=627 mm Provided with terminal blocks and internal wiring. Components: Moulded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4569	501	LCP	MFA	000	BOP	401	002	ML	4569	unit(s)		0	DC YARD ELFL MARSHALLING KIOSK	ILK-SN-CD-8000-EL-T5-0026-01	GE (PES)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SG-8211-EL-G01-0001-01		Rev No. : 1.1						
Insulators										ALSTOM Document No. : LCP-MFA-000-WOP-401-002-ML		Rev No. : 01						
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
4643	501	LCP	MFA	000	BOP	401	002	ML	4643	unit(s)								
									<b>POST-TYPE INSULATOR 316 KV</b> Solid core porcelain insulator, semiconducting glazing, BIL 1175 KV, Creepage distance 7300 mm, Cantilever strength 10 kN, Caps : Top section: ductile iron hot-dip galvanized, 4 tapped holes M16-19 mm deep, 127 BC, Base section - ductile iron hot-dip galvanized, 8 holes 18 mm diam, 275 mm BC, Height : 2650 mm, Porcelain colour grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 185 kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	CERALEP		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4644	501	LCP	MFA	000	BOP	401	002	ML	4644	unit(s)								
									<b>UNDERHUNG POST-TYPE INSULATOR 315 KV</b> Solid core porcelain insulator, semiconducting glazing, BIL 1175 KV, Creepage distance 7300 mm, Cantilever strength 10 kN, Caps : Top section: ductile iron hot-dip galvanized, 4 tapped holes M16-19 mm deep, 127 BC, Base section - ductile iron hot-dip galvanized, 8 holes 18 mm diam, 275 mm BC, Height : 2650 mm, Porcelain colour grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 185 kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	CERALEP		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4648	501	LCP	MFA	000	BOP	401	002	ML	4648	unit(s)								
									<b>TOUGHENED GLASS STRING INSULATOR 160 KN</b> Ball and socket coupling, Class 50-8, Spacing 170 mm, 280 mm diameter, Creepage distance 380 mm min, Ultimate load: 160 kN, Lightning flashover voltage: 125 kV, Approx. unit weight: 6 kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	SEVES		CD801	ELECTRICAL INSTALLATION CONTRACTOR	03		
4649	501	LCP	MFA	000	BOP	401	002	ML	4649	unit(s)								
									<b>TOUGHENED GLASS STRING INSULATOR 120 KN</b> Ball and socket coupling, Class 50-5, Spacing 148 mm, 254 mm diameter, Creepage distance 320 mm min, Ultimate load: 120 kN, Lightning flashover voltage: 125 kV, Approx. unit weight: 4 kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	SEVES		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
4650	501	LCP	MFA	000	BOP	401	002	ML	4650	unit(s)								
									<b>TOUGHENED GLASS STRING INSULATOR 160 KN FOG TYPE</b> Ball and socket coupling, Class type K and CSA CS-8A, Spacing 170 mm, 330 mm diameter, Creepage distance 550 mm min, Ultimate load: 160 kN, Lightning flashover voltage: 140 kV, Approx. unit weight: 9.3 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (SBC)	SEVES		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
4660	501	LCP	MFA	000	BOP	401	002	ML	4660	unit(s)								
									<b>DC POST-TYPE INSULATOR</b> Post-Type Insulator, Solid core porcelain insulator, semiconducting glazing, BIL 2550 KV, Creepage distance 27202 mm, Cantilever strength 12.5 kN, Caps : Top section: ductile iron hot-dip galvanized, 4 holes 18 mm, 254 BC, Base section - ductile iron hot-dip galvanized, 8 holes 18 mm diam, 356 mm BC, Height: 7500 mm, Porcelain colour grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 1208 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
4662	501	LCP	MFA	000	BOP	401	002	ML	4662	unit(s)								
									<b>DC POST-TYPE INSULATOR 750 kv BIL</b> Post-Type Insulator, Solid core porcelain insulator, semiconducting glazing, BIL 750 KV, Creepage distance 4250 mm, Cantilever strength 12.5 kN, Caps : Top section: malleable cast iron hot-dip galvanized, 4 tapped holes M16x22, 127 mm BC, Base section - malleable cast iron hot-dip galvanized, 4 holes 18 mm diam, 254 mm BC, Height: 1700 mm, Porcelain colour grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 114 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01		Rev No. : 03								
Insulators										ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 05								
Item No.	Contractor Tag Number				Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments				
4663	S01	LCP	MFA	000	BOP	401	002	ML	4663	unit(s)		26	<b>DC POST-TYPE INSULATOR 325 KV BIL</b> Post-Type Insulator Solid core porcelain insulator, semiconducting glazing, Bil, 325 kV, Creepage distance 2160 mm Cantilever strength 16 kN, Caps : Top section: malleable cast iron hot-dip galvanized, 4 lapped holes M16x22, 127 mm BC, Base section - malleable cast iron hot-dip galvanized, 4 lapped holes M16x22, 127 mm BC, Height : 770 mm, Porcelain colour grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 50 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4664	S01	LCP	MFA	000	BOP	401	002	ML	4664	unit(s)		2	<b>DC POST-TYPE UNDERHUNG INSULATOR 750 KV BIL</b> Underhung Post-Type Insulator Solid core porcelain insulator, semiconducting glazing, Bil, 750 kV, Creepage distance: 4550 mm Cantilever strength 12,5 kN, Caps : Top section: malleable cast iron hot-dip galvanized, 4 lapped holes M16x22, 127 mm BC, Base section - malleable cast iron hot-dip galvanized 4 holes 18 mm diam., 254 mm BC, Height : 1700 mm, Porcelain colour grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 114 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4670	S01	LCP	MFA	000	BOP	401	002	ML	4670	unit(s)		9	<b>TRANSFORMER NEUTRAL POST-TYPE INSULATOR 650 KV BIL</b> Post-Type Insulator Solid core porcelain insulator, semiconducting glazing, Bil, 650 kV, Creepage distance 5030 mm Cantilever strength 12,5 kN, Caps : Top section: ductile iron hot-dip galvanized, 4 lapped holes M16x22, 127 BC, Base section - ductile iron hot-dip galvanized 4 holes 18 mm diam., 254 mm BC, Height : 1500 mm, Porcelain colour grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 116 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4671	S01	LCP	MFA	000	BOP	401	002	ML	4671	unit(s)		4	<b>TRANSFORMER STAR POST-TYPE INSULATOR 2250 KV BIL</b> Post-Type Insulator Solid core porcelain insulator, semiconducting glazing, Bil, 2250 kV, Creepage distance 12460 mm Cantilever strength 20 kN, Caps : Top section: ductile iron hot-dip galvanized, 4 holes 18 mm 254 BC, Base section - ductile iron hot-dip galvanized 8 holes 18 mm diam., 356 mm BC, Height : 5000 mm, Porcelain colour grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 719 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS	CD501	ELECTRICAL INSTALLATION CONTRACTOR	05	
4672	S01	LCP	MFA	000	BOP	401	002	ML	4672	unit(s)		24	<b>TRANSFORMER DELTA POST-TYPE INSULATOR 1425 KV BIL</b> Post-Type Insulator Solid core porcelain insulator, semiconducting glazing, Bil, 1425 kV, Creepage distance 7697 mm Cantilever strength 12,5 kN, Caps : Top section: ductile iron hot-dip galvanized 4 lapped holes M16x22 mm - 127 BC, Base section - ductile iron hot-dip galvanized 8 holes 18 mm diam., 325 mm BC, Height : 3150 mm, Porcelain colour grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 291 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4673	S01	LCP	MFA	000	BOP	401	002	ML	4673	unit(s)		38	<b>POST-TYPE INSULATOR 250 KV BIL</b> Solid core porcelain insulator, Bil, 250 kV, Minimum creepage distance 836 mm Cantilever strength 12,5 kN, Caps : Top section - malleable iron hot-dip galvanized, 4 lapped holes M16x24, 127 mm BC, Base section - malleable iron hot-dip galvanized, 4 holes 18 mm, 200 mm BC, Height : 560 mm, Porcelain colour grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 23 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b> <b>Insulators</b>												NALCOR Document No. : ILK-AS-SD-0211-EL-G01-0001-01 Rev No. : 04									
												ALSTOM Document No. : LCP-MFA-000-BOP-001-002-ML Rev No. : 05									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Category Number or Ordering information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
4674	G01	LCP	MFA	000	BOP	401	002	ML	4674	unit(s)		72	<b>POST-TYPE INSULATOR 550 KV BIL</b> Solid core porcelain insulator, BIL 550 kV, Minimum creepage distance 2460 mm, Cantilever strength 84kN, CIPSA : Top section - malleable iron hot-dip galvanized, 4 tapped holes M16x20, 127 mm BC, Base section - malleable iron hot-dip galvanized, 4 holes 18 mm, 200 mm BC, Height - 1220 mm, Porcelain colour gray-light-gray - Munsell 5B6.7, D0.1 (ANSI #70), Unit weight: 53 kg	ILK-SN-CD-0000-EL-TS-002B-01	GE (PES)	PPC INSULATORS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4680	501	LCP	MFA	000	BOP	401	002	ML	4680	unit(s)		As req'd	<b>EPOXY POST-TYPE INSULATOR 6 KV</b> 6 kV epoxy post insulator 80 kV BIL For indoor application, Height: 80 mm approx. Top inset: 1 hole 12.7 mm Bottom inset: 1 hole 12.7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																		
<b>MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b> <b>Cables &amp; Bus Bars</b>											NALCOR Document No. : ILK-AS-SD-0211-EL-01-001-01 Rev No. : 03							
											ALSTOM Document No. : LCP-MFA-000-BOP-01-002-ML Rev No. : 03							
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5002	501	LCP	MFA	000	BOP	401	002	ML	5002	unit(s)								
									SEAMLESS TUBULAR BUSBAR 127 mm IPS SCH. 40 Aluminum alloy T6101-T6 Outside diameter: 141,3 mm Inside diameter: 128,2 mm Length: 16 m	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Westburne		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5004	501	LCP	MFA	000	BOP	401	002	ML	5004	unit(s)								
									TUBULAR BUSBAR 203 mm IPS SCH. 40 Aluminum alloy T6101-T6 Outside diameter: 218,1 mm Inside diameter: 201,7 mm Length: 12 m	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	RYERSON		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5006	501	LCP	MFA	000	BOP	401	002	ML	5006	unit(s)								
									SEAMLESS TUBULAR BUSBAR 127 mm IPS SCH. 40 Aluminum alloy T6101-T6 Outside diameter: 141,3 mm Inside diameter: 128,2 mm Length: 12 m	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	RYERSON		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5010	501	LCP	MFA	000	BOP	401	002	ML	5010	m								From Emergency SWGR to Main SWGR 1
									SPECTRA BUSWAY (1285) 48 FT 3200A Busway One run of UL Copper 3P9W 3200A AC KAIC Housing Ground with Joint-Guard Protection 4 Each 90 Degree Elbows 48 Ft of Feeder Splash Proof (IP54) 2 Each Special / Custom Flanged ends	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5011	501	LCP	MFA	000	BOP	401	002	ML	5011	m								From Emergency SWGR to Main SWGR 2
									SPECTRA BUSWAY (1285) 186 FT 3200A Busway One run of UL Copper 3P9W 3200A AC KAIC Housing Ground with Joint-Guard Protection 4 Each 90 Degree Elbows 186 Ft of Feeder Splash Proof (IP54) 2 Each Special / Custom Flanged ends	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5020	501	LCP	MFA	000	BOP	401	002	ML	5020	m								
									1780 MCM AAC CONDUCTOR Aluminum alloy conductor, 61 strands, Code: Jessamine Diameter: 38,74 mm, Section: 893 mm² Linear weight: 2,44 kg/m	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Westburne		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5022	501	LCP	MFA	000	BOP	401	002	ML	5022	m								
									Conductor COCKCOMB- 27.72 mm OD	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Westburne		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5040	501	LCP	MFA	000	BOP	401	002	ML	5040	m								
									SHIELD WIRE CONDUCTOR Aluminum wire Diameter: 12,4 mm Section: 93,1 mm² Weight: 0,62 kg/m	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Westburne		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5053	501	LCP	MFA	000	BOP	401	002	ML	5053	m								
									4/0 AWG, 1 KV, XLPE INSULATED CABLE Cable 4/0 AWG, 1 kV Cu, XLPE		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS														NALCOR Document No. : ILK-AS-SD-0211-EL-G01-0001-01		Rev No. : 03					
Connectors														ALSTOM Document No. : LCP-MFA-009-BOP-401-002-ML		Rev No. : 05					
Item No.	Contractor Tag Number										Unit	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5100	501	LCP	MFA	000	BOP	401	002	ML	5100	unit(s)	24	ALUMINUM ALLOY STRAIGHT BOLTED TERMINAL 2 X 1750 MCM CONDUCTORS TO NEMA 6 TERMINAL PAD Corona free suitable for 345 kV applications For connecting 2 x 1750 MCM AAC conductors to NEMA 6 terminal pad. Terminal pad width - 152 mm Distance between conductors - 280 mm. 3000 A Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5101	501	LCP	MFA	000	BOP	401	002	ML	5101	unit(s)	15	ALUMINUM ALLOY BOLTED T 90° CONNECTOR FOR 2 X 1750 MCM CONDUCTORS TO NEMA 4 TERMINAL PAD Corona free suitable for 345 kV applications For connecting 2 x 1750 MCM AAC conductors to NEMA 4 terminal pad. Terminal pad width - 102 mm Distance between conductors - 280 mm. 3000 A Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0025-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05		
5103	501	LCP	MFA	000	BOP	401	002	ML	5103	unit(s)	45	ALUMINUM ALLOY T BOLTED CONNECTOR 1 X 1750 MCM TO 1 X 1750 MCM AAC CONDUCTORS Corona free suitable for 345 kV applications For cable to cable connection Run: 1 x 1750 MCM AAC conductor Tap: 1 x 1750 MCM AAC conductor Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0025-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5106	501	LCP	MFA	000	BOP	401	002	ML	5106	unit(s)	240	ALUMINUM ALLOY RIGID SPACER 2 X 1750 MCM CONDUCTORS Corona free suitable for 345 kV applications For 2 x 1750 MCM AAC conductors. Center to center distance between the conductors - 280 mm Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5107	501	LCP	MFA	000	BOP	401	002	ML	5107	unit(s)	3	ALUMINUM ALLOY BOLTED 90° TERMINAL 127 mm IPS PIPE TO NEMA 4 TERMINAL PAD Corona free suitable for 345 kV applications Aluminum alloy bolted 90° terminal for connecting 127 mm IPS aluminum tube to NEMA 4 terminal pad. Terminal pad width - 102 mm. Terminal pad width perpendicular to the pipe. One-wrench installation. 3000 A Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0025-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5115	501	LCP	MFA	000	BOP	401	002	ML	5115	unit(s)	27	ALUMINUM ALLOY BOLTED STRAIGHT TERMINAL Corona free suitable for 345 kV applications Aluminum alloy bolted terminal, straight, centered for joining 127 mm IPS aluminum tube to 2 x 1750 MCM AAC conductors. One-wrench installation. 3000 A Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5116	501	LCP	MFA	000	BOP	401	002	ML	5116	unit(s)	18	ALUMINUM ALLOY BOLTED T CONNECTOR 127 mm IPS PIPE TO 2 X 1750 MCM CONDUCTORS Corona free suitable for 345 kV applications For joining 127 mm IPS aluminum tube to 2 x 1750 MCM AAC conductors. Distance between conductors - 280 mm. One-wrench installation. 3000 A Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5118	501	LCP	MFA	000	BOP	401	002	ML	5118	unit(s)	186	CORONA 4 HOLES SHIELDING CAP Aluminum alloy Corona 4 holes shielding cap Suitable for 345 kV applications.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5119	501	LCP	MFA	000	BOP	401	002	ML	5119	unit(s)	48	CORONA 6 HOLES SHIELDING CAP Aluminum alloy Corona 6 holes shielding cap. Suitable for 345 kV applications.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b>													NALCOR Document No. : ILK-A5-SD-8211-EL-G01-0001-01 Rev No. : 114								
<b>Connectors</b>													ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML Rev No. : 05								
Item No.	Contractor Tag Number										Unit	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5122	801	LCP	MFA	000	BOP	401	002	ML	5122	unit(s)	3	<b>ALUMINUM ALLOY BOLTED T CONNECTOR FOR 2 X 1750 MCM CONDUCTORS TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 345 kV applications For connecting 2 x 1750 MCM AAC conductors to NEMA 4 terminal pad. Terminal pad width - 102 mm Distance between conductors - 280 mm. 3000 A Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5128	501	LCP	MFA	000	BOP	401	002	ML	5128	unit(s)	3	<b>ALUMINUM ALLOY BOLTED TERMINAL 3 X 1750 MCM CONDUCTORS TRIANGULAR FORMATION TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 345 kV applications For connecting 3 x 1750 MCM AAC conductor to NEMA 4 terminal pad. Terminal pad width - 102 mm Distance between conductors - 280 mm. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5129	501	LCP	MFA	000	BOP	401	002	ML	5129	unit(s)	3	<b>ALUMINUM ALLOY T 90° BOLTED CONNECTOR FOR 3X1750 MCM CONDUCTORS TRIANGULAR FORMATION TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 345 kV applications For connecting 3 x 1750 MCM AAC conductors to NEMA 4 terminal pad. Terminal pad parallel to the conductors. Terminal pad width - 102 mm Distance between conductors - 280 mm. 3000 A Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5130	501	LCP	MFA	000	BOP	401	002	ML	5130	unit(s)	9	<b>ALUMINUM ALLOY RIGID SPACER 3 X 1750 MCM CONDUCTORS TRIANGULAR FORMATION</b> Corona free suitable for 345 kV applications For 3 x 1750 MCM AAC conductors. Center to center distance between the conductors - 280 mm Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5152	501	LCP	MFA	000	BOP	401	002	ML	5152	unit(s)	60	<b>ALUMINUM ALLOY STRAIGHT BOLTED TERMINAL 2 X 1750 MCM CONDUCTORS TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 345 kV applications For connecting 2 x 1750 MCM AAC conductors to NEMA 4 terminal pad. Terminal pad width - 102 mm Distance between conductors - 280 mm. 3000 A Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5153	501	LCP	MFA	000	BOP	401	002	ML	5153	unit(s)	12	<b>ALUMINUM ALLOY BOLTED 45° TERMINAL 2 X 1750 MCM CONDUCTOR TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 345 kV applications For connecting 2 x 1750 MCM AAC conductor to NEMA 4 terminal pad at 45°. Distance between conductors - 280 mm. Terminal pad width - 152 mm 3000 A Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5155	501	LCP	MFA	000	BOP	401	002	ML	5155	unit(s)	0	<b>TIN PLATED COPPER BOLTED STRAIGHT CONNECTOR FOR 1 X 4/0 AWG CONDUCTOR TO 13 mm THREADED STUD</b> For connecting 1 x 4/0 AWG copper conductor to 13 mm threaded stud Complete with silicon bronze bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04			
5172	501	LCP	MFA	000	BOP	401	002	ML	5172	unit(s)	12	<b>ALUMINUM ALLOY WELDED SPHERICAL COUPLER</b> For aluminum tube to tube 127 mm IPS sch. 40 Maximum angle 81°	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5173	501	LCP	MFA	000	BOP	401	002	ML	5173	unit(s)	25	<b>ALUMINUM ALLOY WELDED COUPLER</b> For coupling aluminum tube 127 mm IPS sch. 40 End to end.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																			
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0091-01	Rev No. : 03							
Connectors											ALSTOM Document No. : LCP-MFA-400-BOP-401-002-ML	Rev No. : 05							
Item No.	Contractor Tag Number							Unit	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
5175	501	LCP	MFA	000	BOP	401	002	ML	5175	unit(s)	24	ALUMINUM ALLOY WELDED END PLUG Suitable for 230 kV applications For aluminum tube 127 mm IPS sch. 40	ILK-SN-CD-8000-EL-TS-0025-01	GE (SBC)	ALSTOM-SPA	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5178	501	LCP	MFA	000	BOP	401	002	ML	5178	unit(s)	6	FACTORY WELDED A-FRAME H=4500 mm Run: aluminum tube 127 mm IPS sch. 40 Tap: aluminum tube 127 mm IPS sch. 40 Legs and cross arm pipe size: aluminum tube 76 mm IPS sch. 40 Height: 4500 mm Angle: 30°	ILK-SN-CD-8000-EL-TS-0025-01	GE (SBC)	ALSTOM-SPA	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5182	501	LCP	MFA	000	BOP	401	002	ML	5182	unit(s)	21	ALUMINUM ALLOY WELDED END BELL Corona free suitable for 345 kV applications For aluminum tube 127 mm IPS sch. 40	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5187	501	LCP	MFA	000	BOP	401	002	ML	5187	unit(s)	68	ALUMINUM ALLOY BUS SUPPORT FOR POST TYPE INSULATOR Bolted, fix or slip installation. Complete with stainless steel bolts, nuts and washers. Corona free, suitable for 362 kV applications For mounting a 127 mm aluminum tube sch. 40 on a post insulator. Complete with lower corona ring assembly. Insulator bolt circle: 127 mm	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5188	501	LCP	MFA	000	BOP	401	002	ML	5188	unit(s)	12	ALUMINUM ALLOY EXPANSION BUS SUPPORT FOR POST TYPE INSULATOR Bolted. Complete with stainless steel bolts, nuts and washers. Corona free, suitable for 362 kV applications For mounting a 127 mm aluminum tube sch. 40 on a post insulator. Complete with lower corona ring assembly. Insulator bolt circle: 127 mm Current bridge conductor: 3150 A	ILK-SN-CD-8000-EL-TS-0025-01	GE (SBC)	ALSTOM-SPA	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5193	501	LCP	MFA	000	BOP	401	002	ML	5193	unit(s)	3	ALUMINUM ALLOY BUS SUPPORT FOR MOUNTING TWO 1750 MCM ALUMINUM CONDUCTORS TO A POST INSULATOR Aluminum alloy bus support for post type insulator. Corona free, suitable for 362 kV applications Complete with stainless steel bolts, nuts and washers. For mounting 2 x 1750 MCM AAC conductors on a post insulator. Distance between conductors - 280 mm. Complete with lower corona ring assembly. Insulator bolt circle: 127 mm	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	ALSTOM-SPA	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5197	501	LCP	MFA	000	BOP	401	002	ML	5197	unit(s)	3	ALUMINUM ALLOY BUS SUPPORT FOR 3 x 1750 MCM ALUMINUM CONDUCTORS TRIANGULAR FORMATION TO A POST TYPE INSULATOR Corona free, suitable for 345 kV applications. Bolted. Complete with stainless steel bolts, nuts and washers. For mounting 3x1750 MCM on a post insulator. Distance between conductors - 280 mm. Complete with lower corona ring assembly. Insulator bolt circle: 127 mm.	ILK-SN-CD-8000-EL-TS-0025-01	GE (SBC)	ALSTOM-SPA	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Grounding											MALCOR Document No.: ILK-AS-SD-5211-EL-G01-0001-01 Rev No.: 03										
											ALSTOM Document No.: LCP-MFA-005-BOP-401-002-04 Rev No.: 03										
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments			
5300	501	LCP	MFA	000	BOP	401	002	ML	5300	unit(s)		As Req'd	GROUND CONDUCTOR #2 AWG, Cu #2 AWG stranded copper conductor. Base concentric. Lay stranded 7 strands.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5302	501	LCP	MFA	000	BOP	401	002	ML	5302	unit(s)		22473	GROUND CONDUCTOR 40 AWG, Cu 40 AWG stranded copper conductor. Base concentric. Lay stranded. 19 strands.	ILK-SN-CD-8000-EL-TS-0007-01	GE (SBC)	EC6 Electrical Cable Supply		CD0501	ELECTRICAL INSTALLATION CONTRACTOR / CIVIL CONTRACTOR	03	
5305	501	LCP	MFA	000	BOP	401	002	ML	5305	unit(s)		50	1 KV INSULATED GROUND CONDUCTOR 40 AWG, Cu, YELLOW / GREEN 40 AWG stranded copper conductor. Lay stranded. 19 strands.	ILK-SN-CD-8000-EL-TS-0007-01	GE (SBC)	EC6 Electrical Cable Supply		CD0501	ELECTRICAL INSTALLATION CONTRACTOR / CIVIL CONTRACTOR	03	
5307	501	LCP	MFA	000	BOP	401	002	ML	5307	unit(s)		As Req'd	COPPER BUSBAR 50 mm x 6 mm Copper busbar Dimensions: 50 mm x 6 mm	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5310	501	LCP	MFA	000	BOP	401	002	ML	5310	unit(s)		1852	WELDED CONNECTION TYPE X8 FOR TWO 40 AWG CONDUCTORS Horizontal X connection for cross of horizontal cables lapped and not cut. Cable run: 40 AWG Cable tap: 40 AWG Welding cartridge # 250	ILK-SN-CD-8000-EL-TS-0007-01	GE (SBC)	Bundy		CD0501	CIVIL CONTRACTOR	03	
5314	501	LCP	MFA	000	BOP	401	002	ML	5314	unit(s)		As Req'd	WELDED CONNECTION TYPE V6 FOR 40 AWG CONDUCTOR TO FLAT STEEL Welded connection for vertical conductor to vertical flat steel surface type V6. Conductor down at 45° Conductor size: 40 AWG Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5315	501	LCP	MFA	000	BOP	401	002	ML	5315	unit(s)		As Req'd	WELDED CONNECTION TYPE V5 FOR 40 AWG CONDUCTOR TO VERTICAL PIPE # 31,75 mm - 101,6 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type V5. Conductor down at 45° Conductor size: 40 AWG Pipe size: 31,75 mm-101,6 mm IPS Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5316	501	LCP	MFA	000	BOP	401	002	ML	5316	unit(s)		As Req'd	WELDED CONNECTION TYPE VS FOR 40 AWG CONDUCTOR TO VERTICAL PIPE 101,6 mm - 152,4 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VS. Conductor down at 45° Conductor size: 40 AWG Pipe size: 101,6 mm-152,4 mm IPS Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5317	501	LCP	MFA	000	BOP	401	002	ML	5317	unit(s)		As Req'd	WELDED CONNECTION TYPE V7 FOR #2 AWG CONDUCTOR TO VERTICAL PIPE 38,1 mm - 101,4 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type V7. Conductor up to vertical steel pipe. Conductor size: #2 AWG Pipe size: 38,1 mm-101,4 mm IPS Welding cartridge # 65	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5318	501	LCP	MFA	000	BOP	401	002	ML	5318	unit(s)		As Req'd	WELDED CONNECTION TYPE V9 FOR #2 AWG CONDUCTOR TO RIGHT HAND SIDE OF HORIZONTAL PIPE 31,75 mm IPS Welded connector type V9 Conductor to the right hand side of the horizontal steel pipe. Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 45	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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Grounding										ALSTOM Document No.: LCP-MFA-000-BOP-401-002-0L		Rev No.: 03										
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments				
5319	501	LCP	MFA	000	BOP	401	002	ML	5319	unit(s)		As Req'd	WELDED CONNECTION TYPE VN FOR #2 AWG CONDUCTOR TO LEFT HAND SIDE OF HORIZONTAL PIPE 31,75 mm IPS  Welded connector type VN Conductor to the left hand side of the horizontal steel pipe. Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 45	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5320	501	LCP	MFA	000	BOP	401	002	ML	5320	unit(s)		As Req'd	WELDED CONNECTION TYPE HC FOR #2 AWG HORIZONTAL CONDUCTOR TO SIDE OF HORIZONTAL PIPE 31,75 mm IPS  Welded connection through horizontal conductor to side of horizontal steel pipe type HC. Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 45	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5321	501	LCP	MFA	000	BOP	401	002	ML	5321	unit(s)		94	WELDED CONNECTION TYPE GT FOR 4/0 AWG CONDUCTOR TO GROUND ROD 19 mm DIAMETER  Through cable to top of ground rod welded connection type GT for plain or threaded copper clad rod Ground rod size: 19 mm nom Conductor Size: 4/0 AWG Welding cartridge # 115	ILK-SN-CD-0000-EL-TS-0007-01	GE (SBC)	Burndy			CD0501	CIVIL CONTRACTOR	03	
5323	501	LCP	MFA	000	BOP	401	002	ML	5323	unit(s)		42	WELDED PARALLEL CONNECTION TYPE PT FOR TWO 4/0 AWG HORIZONTAL CONDUCTORS  Horizontal parallel through connection for two horizontal cables Cable size: 4/0 AWG Cable tap: 4/0 AWG Welding cartridge # 200	ILK-SN-CD-0000-EL-TS-0007-01	GE (SBC)	Burndy			CD0501	CIVIL CONTRACTOR	03	
5325	501	LCP	MFA	000	BOP	401	002	ML	5325	unit(s)		62	WELDED CONNECTION TYPE GY FOR 4/0 AWG CONDUCTOR TO GROUND ROD 19 mm DIAMETER  Through cable to side of ground rod welded connection type GY for plain or threaded copper clad rod Ground rod size: 19 mm nom Conductor size: 4/0 AWG Welding cartridge # 150	ILK-SN-CD-0000-EL-TS-0007-01	GE (SBC)	Burndy			CD0501	CIVIL CONTRACTOR	03	
5328	501	LCP	MFA	000	BOP	401	002	ML	5328	unit(s)		As Req'd	WELDED CONNECTION TYPE VS FOR 4/0 AWG CONDUCTOR TO VERTICAL PIPE 152,4 mm - 254 mm IPS  Welded connection for vertical conductor to side of vertical steel pipe type VS. Conductor down at 45° Conductor size: 4/0 AWG Pipe size: 152,4 mm - 254 mm IPS Welding cartridge # 115	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5330	501	LCP	MFA	000	BOP	401	002	ML	5330	unit(s)		As Req'd	COMPRESSION CONNECTOR TYPE CRIMPIT TYPE YC2C4  C- shape compression connector for making tap or parallel copper connections. Run: 2 Str - 2 Str Tap: 8 Str - 4 Str.	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5331	501	LCP	MFA	000	BOP	401	002	ML	5331	unit(s)		As Req'd	COMPRESSION CONNECTOR TYPE C  C- shape compression connector for making tap or parallel copper connections. Run: 3/0 Str - 250 MCM Tap: 3/0 Str - 250 MCM	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5345	501	LCP	MFA	000	BOP	401	002	ML	5345	unit(s)		117	GROUND ROD  Solid hardened copper clad ground rod Diameter: 3/4" nom. (19,27 mm) and 50 years service lifetime requirement. Plating thickness 13 mil Length: 3.05 m Staked connection at each end with a shoulder Eisco part number: 013403 or equivalent	ILK-SN-CD-0000-EL-TS-0007-01	GE (SBC)	PTS ELECTRIQUE			CD0501	CIVIL CONTRACTOR	03	

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Grounding											ALSTOM Document No.: LCP-MFA-000-BOP-091-002-05L		Rev No.: 03								
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments			
5349	501	LCP	MFA	000	BOP	401	002	ML	5349	unit(s)	As Req'd		GROUNDING BALL STUD Tin plated copper grounding ball stud Thread diameter: M12 Ball sphere: 25.4 mm Complete with nut, flat and lock washers.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5350	501	LCP	MFA	000	BOP	401	002	ML	5350	unit(s)	As Req'd		COMPRESSION TERMINAL 1 HOLE Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5351	501	LCP	MFA	000	BOP	401	002	ML	5351	unit(s)	As Req'd		COMPRESSION TERMINAL 2 HOLES Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to NEMA 2 terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5354	501	LCP	MFA	000	BOP	401	002	ML	5354	unit(s)	As Req'd		COMPRESSION TERMINAL 1 HOLE Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole 90° terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5357	501	LCP	MFA	000	BOP	401	002	ML	5357	unit(s)	As Req'd		COMPRESSION TERMINAL 1 HOLE Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole 8 mm terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5358	501	LCP	MFA	000	BOP	401	002	ML	5358	unit(s)	As Req'd		COMPRESSION TERMINAL 1 HOLE Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole 10 mm terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5370	501	LCP	MFA	000	BOP	401	002	ML	5370	unit(s)	As Req'd		GROUND TERMINAL FOR ONE COPPER CABLE TO NEMA 2 TERMINAL PAD TYPE MAR28 High copper alloy tin plated ground connector for joining one 2/0 - 4/0 AWG parallel copper conductors to flat bar. Complete with bolts nuts and lock washers.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5371	501	LCP	MFA	000	BOP	401	002	ML	5371	unit(s)	As Req'd		GROUND CONNECTOR FOR TWO COPPER CABLES TO BAR TYPE GC2929W High copper alloy tin plated ground connector for joining two 2/0 - 4/0 MCM parallel copper conductors to flat bar. Complete with bolts nuts and lock washers for 10 mm bar.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5372	501	LCP	MFA	000	BOP	401	002	ML	5372	unit(s)	As Req'd		GROUND CONNECTOR FOR ONE COPPER CABLE TO BAR TYPE GB29W High copper alloy tin plated ground connector for joining one 2/0 - 4/0 MCM copper conductor to flat bar. Complete with bolts nuts and lock washers for 10 mm bar.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5374	501	LCP	MFA	000	BOP	401	002	ML	5374	unit(s)	As Req'd		GROUND CONNECTOR FOR ONE COPPER CABLE TO PIPE 203 mm DIAMETER High conductivity copper ground connector for joining one #4 - 4/0 AWG copper conductor to metallic pipe 203 mm diameter. Complete with silicon bronze bolts nuts and washers. Direct burial application.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5376	501	LCP	MFA	000	BOP	401	002	ML	5376	unit(s)	As Req'd		COMPRESSION GROUND CONNECTOR FOR TWO HOLES TERMINAL TO STEEL BEAM Compression terminal type Bundy YGIB-V028-338-2H #2-40AWG Flat steel thickness 6mm	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5377	501	LCP	MFA	000	BOP	401	002	ML	5377	unit(s)	As Req'd		RAISED FLOOR PEDESTAL GROUND CONNECTOR FOR COPPER CABLE 2/0 AWG TO RAISED FLOOR PEDESTAL TYPE BURINDY GXP1538RF	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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												ALSTOM Document No.: LCP-MFA-000-BOP-401-002-ML Rev No.: 03								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
5378	501	LCP	MFA	000	BOP	401	002	ML	5378	unit(s)	As Req'd	GROUND CONNECTOR FOR THREE CABLES TO BAR TYPE GE2029 High copper alloy tin plated ground connector for joining three #4 Sol - 20 Str parallel copper conductors to flat bar. Complete with bolts, nuts and lock washers for 10 mm bar.	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
5380	601	LCP	MFA	000	BOP	401	002	ML	5380	unit(s)	As Req'd	TIN PLATED FLEXIBLE COPPER GROUND BRAID 20mm LARGE X 200 mm LONG PACS: 1 hole 12mm	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5390	501	LCP	MFA	000	BOP	401	002	ML	5390	unit(s)	As Req'd	GROUNDING MAT Galvanized steel gradient control mat. Dimensions: 1800 mm x 1200 mm. Galvanized steel with 150 mm square mesh. Complete with 3 grounding connectors type GB for connecting 40 AWG ground conductor.	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5395	501	LCP	MFA	000	BOP	401	002	ML	5395	unit(s)	As Req'd	PVC COATED STEEL CLAMP One hole PVC coated steel clamp. Scepter type C3 or equal. For joining 40 AWG grounding conductor.	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
5398	501	LCP	MFA	000	BOP	401	002	ML	5398	unit(s)	73	GROUND PIT Ground pit. Dimensions: 391 mm L x 391 mm W x 457 mm D. Erco # T1415E or equivalent	ILK-SN-CD-0000-EL-TS-0007-01	GE (SBC)	M'CLOUGHLIN	CD0501	CIVIL CONTRACTOR	03		
5397	501	LCP	MFA	000	BOP	401	002	ML	5397	unit(s)	As Req'd	SLEEVE For 40 AWG copper conductor CADWELD type S-429-F-2816	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5398	501	LCP	MFA	000	BOP	401	002	ML	5398	unit(s)	As Req'd	FLAT OMEGA HOLDER Galvanized steel flat omega holder for fixing epoxy insulator on the wall. Distance from the wall: 50 mm. Clipping: 100 mm. Wall mounting hardware diameter: 6.4 mm. Insulator mounting hole: 1 hole 14 mm	ILK-SN-CD-0000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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Cable Trenches											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 03								
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
5400	501	LCP	MFA	000	BOP	401	002	ML	5400	unit(s)		678	PLASTIBETON CABLE TRENCH MODEL #68 Plastibeton cable trench Approximate dimensions: 280 mm W x 265 mm D Supplied with covers and galvanized cable clips.	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure	33110412; 33111411; 34656200	CD501	CIVIL CONTRACTOR	04	
5401	501	LCP	MFA	000	BOP	401	002	ML	5401	unit(s)		3309	PLASTIBETON CABLE TRENCH MODEL #1216 Plastibeton cable trench Approximate dimensions: 440 mm W x 490 mm D Supplied with covers and galvanized cable clips.	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure	33130412; 33131411	CD501	CIVIL CONTRACTOR	03	
5402	501	LCP	MFA	000	BOP	401	002	ML	5402	unit(s)		2721	PLASTIBETON CABLE TRENCH MODEL #2016 Plastibeton cable trench Approximate dimensions: 640 mm W x 500 mm D Supplied with covers and galvanized cable clips.	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure	33150412; 33151411; 33151412;	CD501	CIVIL CONTRACTOR	03	
5403	501	LCP	MFA	000	BOP	401	002	ML	5403	unit(s)		504	PLASTIBETON CABLE TRENCH MODEL #3016 Plastibeton cable trench Approximate dimensions: 855 mm W x 500 mm D Supplied with covers and galvanized cable clips.	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure		CD501	CIVIL CONTRACTOR	03	
5450	501	LCP	MFA	000	BOP	401	002	ML	5450	unit(s)		2383	PLASTIBETON CABLE TRENCH SEPARATOR 300 mm	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5451	501	LCP	MFA	000	BOP	401	002	ML	5451	unit(s)		72	PLASTIBETON CABLE TRENCH SEPARATOR 190 mm	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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<b>Hardware &amp; Conduits</b>													Rev No.: 03 Rev No.: 05					
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5504	501	LCP	MFA	000	BOP	401	002	ML	5504	unit(s)								
									<b>HARDWARE FOR SUSPENSION INSULATOR STRING "V" 120 KN TWIN CONDUCTORS</b> Complete hardware for suspension insulator string "V". Ultimate breaking strength: 120 kN Composed by "V" insulator string For 2 x 1750 MCM AAC conductor. Insulators (2x21 units 120 kN, 146 mm step) to be supplied by others, see item 4549.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5505	501	LCP	MFA	000	BOP	401	002	ML	5505	unit(s)								
									<b>HARDWARE FOR TENSION INSULATOR STRING 160 KN TWIN CONDUCTORS</b> Complete hardware for tension insulator string. Ultimate breaking strength: 160 kN Composed by single insulator string For 2 x 1750 MCM AAC conductor. Insulators (19 units 160 kN, 170 mm step) to be supplied by others, see item 4548.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5507	501	LCP	MFA	000	BOP	401	002	ML	5507	unit(s)								
									<b>HARDWARE FOR SUSPENSION INSULATOR STRING "V" 160 KN THREE CONDUCTORS</b> Complete hardware for suspension insulator string "V". Ultimate breaking strength: 160 kN Composed by "V" insulator string For 3 x 1750 MCM AAC conductor. Insulators (2x27 units 160 kN, 170 mm step) to be supplied by others, see item 4550.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5508	501	LCP	MFA	000	BOP	401	002	ML	5508	unit(s)								
									<b>HARDWARE FOR TENSION INSULATOR STRING 160 KN THREE CONDUCTORS</b> Complete hardware for tension insulator string. Ultimate breaking strength: 160 kN Composed by single insulator string For 3 x 1750 MCM AAC conductor. Insulators (27 units 160 kN, 170 mm step) to be supplied by others, see item 4550.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5510	501	LCP	MFA	000	BOP	401	002	ML	5510	unit(s)								
									<b>HARDWARE FOR SUSPENSION INSULATOR STRING "V" 160 KN THREE CONDUCTORS</b> Complete hardware for suspension insulator string "V". Ultimate breaking strength: 160 kN Composed by "V" insulator string For 3 x 1750 MCM AAC conductor. Insulators (2x31 units 160 kN, 170 mm step) to be supplied by others, see item 4550.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5515	501	LCP	MFA	000	BOP	401	002	ML	5515	unit(s)								
									<b>DEAD END CLAMP TYPE BURNDY CUW30A-6 OR EQUIVALENT</b> High strength aluminum dead end clamp. For dead end attachment of 12,4 mm aluminum wire.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Burndy		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5516	501	LCP	MFA	000	BOP	401	002	ML	5516	unit(s)								
									<b>HOT DIP GALVANIZED STEEL SHACKLE SIZE 15,9 mm (5/8")</b> Hot dip galvanized steel shackle size 15,9 mm (5/8") - 201205 Ultimate load 177,2 kN (40000 lbs) Opening 24 mm (0.84") Clearance length - 89 mm (3.5") One galvanized steel grade 5 bolt 15,9 mm (5/8"), nut (number 140338) and stainless steel cotter pin. Reference drawing number 25823B.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5520	501	LCP	MFA	000	BOP	401	002	ML	5520	unit(s)								
									<b>SHIELD WIRE DEAD END ATTACHMENT</b> For dead end attachment of 12,4 mm aluminum wire. Including one dead end clamp (item 5515) one anchor shackle one ground clamp (item 5371) and one ground clamp (item 5372)	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC) / ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5521	501	LCP	MFA	000	BOP	401	002	ML	5521	unit(s)								
									<b>SHIELD WIRE ATTACHMENT SUBSTATION FEEDER</b> For attachment of 12,4 mm aluminum wire. Including one dead end clamp (item 5515) one anchor shackle one ground clamp (item 5372) and one ground clamp (item 5378)	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC) / ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Hardware & Conduits											HALCOR Document No. : ILK-AS-SD-3211-EL-091-0001-01 ALSTOM Document No. : LCP-MFA-000-SOP-491-002-ML		Rev No. : 01	Rev No. : 01							
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments			
5522	501	LCP	MFA	000	BOP	401	002	ML	5522	unit(s)		Batch	SHIELD WIRE ATTACHMENT SUBSTATION CONTINUOUS CONNECTION  For attachment of 12.4 mm aluminum wire including two dead end clamps (item 5515) two anchor shades (one ground clamp (item 5372) and one ground clamp (item 5378))	ILK-SN-CD-3000-EL-TS-0026-01	OE (SBC) / ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5525	501	LCP	MFA	000	BOP	401	002	ML	5525	m		Batch	60 mm FLEXIBLE CORRUGATED ORANGE CONDUIT FOR PD CABLE		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	05	
5526	501	LCP	MFA	000	BOP	401	002	ML	5526	unit(s)		Batch	CONNECTOR FOR 50 mm CORRUGATED ORANGE CONDUIT  For connecting 50 mm liquid-tight conduit to a junction box.		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	06	
5527	501	LCP	MFA	000	BOP	401	002	ML	5527	unit(s)		Batch	PVC STRAIN RELIEF CONNECTOR FOR 50 mm PVC CONDUIT  Complete with 6 grommets for various cable sizes.		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5531	501	LCP	MFA	000	BOP	401	002	ML	5531	unit(s)		Batch	PVC CONDUIT COUPLER FOR 100 mm PVC CONDUIT  For joining two 100 mm PVC conduits.		CIVIL CONTRACTOR			CD501	CIVIL CONTRACTOR	03	
5533	501	LCP	MFA	000	BOP	401	002	ML	5533	unit(s)		Batch	PVC TRANSITION COUPLER FOR 75 mm PVC CONDUIT TO 50 mm PVC CONDUIT  For joining one 75 mm PVC conduit to one 50 mm PVC conduit.		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5535	501	LCP	MFA	000	BOP	401	002	ML	5535	unit(s)		Batch	LIQUID-TIGHT CONDUIT 30 mm (1.25") NOM. DIAMETER  Liquid-tight flexible non metallic conduit. Diameter: 30 mm (1.25") nom.		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5536	501	LCP	MFA	000	BOP	401	002	ML	5536	unit(s)		Batch	PVC CONDUIT 30 mm DIAMETER  PVC conduit 30 mm (1.25") nominal diameter. Electrical type above ground installation.	ILK-SN-CD-3000-EL-TS-0006-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5537	501	LCP	MFA	000	BOP	401	002	ML	5537	unit(s)		Batch	PVC CONDUIT 50 mm DIAMETER  PVC conduit 50 mm (2") nominal diameter. Electrical type above ground installation.	ILK-SN-CD-3000-EL-TS-0005-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5538	501	LCP	MFA	000	BOP	401	002	ML	5538	unit(s)		Batch	PVC CONDUIT 75 mm DIAMETER  PVC conduit 75 mm (3") nominal diameter. Electrical type above ground installation.	ILK-SN-CD-3000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5539	501	LCP	MFA	000	BOP	401	002	ML	5539	unit(s)		Batch	PVC CONDUIT 100 mm DIAMETER  PVC conduit 100 mm (4") nominal diameter. Electrical type above ground installation.	ILK-SN-CD-3000-EL-TS-0009-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5542	501	LCP	MFA	000	BOP	401	002	ML	5542	unit(s)		Batch	PVC TRANSITION COUPLER FOR 75 mm PVC CONDUIT TO 30 mm PVC CONDUIT  For joining one 75 mm PVC conduit to one 30 mm PVC conduit.	ILK-SN-CD-3000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5543	501	LCP	MFA	000	BOP	401	002	ML	5543	unit(s)		Batch	LIQUID-TIGHT CONNECTOR FOR 30 mm CONDUIT  Liquid-tight connector for connecting 30 mm liquid-tight conduit to a junction box.	ILK-SN-CD-3000-EL-TS-0009-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5544	501	LCP	MFA	000	BOP	401	002	ML	5544	unit(s)		Batch	PVC TRANSITION COUPLER FOR 30 mm PVC CONDUIT TO 30 mm LIQUID-TIGHT CONDUIT  For joining one 30 mm PVC conduit to one 30 mm liquid-tight conduit.	ILK-SN-CD-3000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5550	501	LCP	MFA	000	BOP	401	002	ML	5550	unit(s)		Batch	PVC CONDUIT 50 mm DIAMETER  PVC conduit 50 mm diameter. Electrical type DB2.	ILK-SN-CD-3000-EL-TS-0008-01	CIVIL CONTRACTOR			CD501	CIVIL CONTRACTOR	03	
5551	501	LCP	MFA	000	BOP	401	002	ML	5551	unit(s)		Batch	PVC CONDUIT 75 mm DIAMETER  PVC conduit 75 mm diameter. Electrical type DB2.	ILK-SN-CD-3000-EL-TS-0009-01	CIVIL CONTRACTOR			CD501	CIVIL CONTRACTOR	03	

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-0211-EL-G01-0001-01		Rev No. : 04								
Hardware & Conduits										ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 01								
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
5552	501	LCP	MFA	000	BOP	401	002	ML	5552	unit(s)		Batch	PVC CONDUIT 100 mm DIAMETER PVC conduit 100 mm diameter Electrical type DB2	ILK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
5555	501	LCP	MFA	000	BOP	401	002	ML	5555	unit(s)		Batch	PVC ELBOW 80 mm DIAMETER, R=600 mm PVC elbow 80 mm diameter Radius: 600 mm Electrical type DB2	ILK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
5556	501	LCP	MFA	000	BOP	401	002	ML	5556	unit(s)		Batch	PVC ELBOW 75 mm DIAMETER, R=600 mm PVC elbow 75 mm diameter Radius: 600 mm Electrical type DB2	ILK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
5557	501	LCP	MFA	000	BOP	401	002	ML	5557	unit(s)		Batch	90° PVC ELBOW 100 mm DIAMETER, R=600 mm 90° PVC elbow 100 mm diameter Radius: 600 mm Electrical type DB2	ILK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
5558	501	LCP	MFA	000	BOP	401	002	ML	5558	unit(s)		Batch	45° PVC ELBOW 75 mm DIAMETER, R=600 mm 45° PVC elbow 75 mm diameter Radius: 600 mm Electrical type DB2	ILK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
5559	501	LCP	MFA	000	BOP	401	002	ML	5559	unit(s)		Batch	30° PVC ELBOW 80 mm DIAMETER, R=600 mm 30° PVC elbow 80 mm diameter Radius: 600 mm Electrical type DB2	ILK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
5565	501	LCP	MFA	000	BOP	401	002	ML	5565	unit(s)		Batch	PVC COATED STEEL PIPE STRAP 2 HOLES FOR 50 mm PVC PIPE Two holes PVC coated steel strap For 50 mm PVC pipe		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5566	501	LCP	MFA	000	BOP	401	002	ML	5566	unit(s)		Batch	PVC COATED STEEL PIPE STRAP 2 HOLES FOR 75 mm PVC PIPE Two holes PVC coated steel strap For 75 mm PVC pipe		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5567	501	LCP	MFA	000	BOP	401	002	ML	5567	unit(s)		Batch	PVC COATED STEEL PIPE STRAP 2 HOLES FOR 100 mm PVC PIPE Two holes PVC coated steel strap For 100 mm PVC pipe		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5570	501	LCP	MFA	000	BOP	401	002	ML	5570	unit(s)		Batch	TRANSITION COUPLER FOR 50 mm CONDUIT Waterproof transition coupler For joining 50 mm PVC conduit to 50 mm liquid-tight conduit		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5571	501	LCP	MFA	000	BOP	401	002	ML	5571	unit(s)		Batch	TRANSITION COUPLER FOR 75 mm CONDUIT Waterproof transition coupler For joining 75 mm PVC conduit to 75 mm liquid-tight conduit		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5572	501	LCP	MFA	000	BOP	401	002	ML	5572	unit(s)		Batch	TRANSITION COUPLER FOR 100 mm CONDUIT Waterproof transition coupler 100 mm For joining 100 mm PVC conduit to 100 mm liquid-tight conduit		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5573	501	LCP	MFA	000	BOP	401	002	ML	5573	unit(s)		Batch	TRANSITION COUPLER/REDUCER 100 mm-50 mm Waterproof transition coupler/reducer For joining 100 mm PVC conduit to 50 mm liquid-tight conduit		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5575	501	LCP	MFA	000	BOP	401	002	ML	5575	unit(s)		Batch	LIQUID-TIGHT CONDUIT 50 mm DIAMETER Liquid-tight flexible non metallic conduit Diameter: 50 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5576	501	LCP	MFA	000	BOP	401	002	ML	5576	unit(s)		Batch	LIQUID-TIGHT CONDUIT 75 mm DIAMETER Liquid-tight flexible non metallic conduit Diameter: 75 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Hardware & Conduits											NALCOR Document No. : ILK-AS-SD-0211-EL-001-01 Rev No. : 01		ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML Rev No. : 01							
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
5578	501	LCP	MFA	000	BOP	401	002	ML	5578	units(s)		Batch	LIQUID-TIGHT CONDUIT 100 mm DIAMETER Liquid-tight flexible non metallic conduit. Diameter: 100 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5580	501	LCP	MFA	000	BOP	401	002	ML	5580	unit(s)		Batch	LIQUID-TIGHT CONNECTOR FOR 50 mm CONDUIT Liquid-tight connector for connecting 50 mm liquid-tight conduit to a junction box.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5581	501	LCP	MFA	000	BOP	401	002	ML	5581	unit(s)		Batch	LIQUID-TIGHT CONNECTOR FOR 75 mm CONDUIT Liquid-tight connector for connecting 75 mm liquid-tight conduit to a junction box.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5582	501	LCP	MFA	000	BOP	401	002	ML	5582	unit(s)		Batch	LIQUID-TIGHT CONNECTOR FOR 100 mm CONDUIT Liquid-tight connector for connecting 100 mm liquid-tight conduit to a junction box.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5585	501	LCP	MFA	000	BOP	401	002	ML	5585	unit(s)		Batch	STAINLESS STEEL STRAP Stainless steel strap 20 mm large for fixing liquid-tight conduit and ground conductor in a steel structure. Complete with bushes		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5590	501	LCP	MFA	000	BOP	401	002	ML	5590	unit(s)		Batch	ALUMINUM SINGLE SUPERSTRUT CHANNEL A1200 series single aluminum channel Dimensions: 41,3 mm x 41,3 mm Length: 6 m		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5592	501	LCP	MFA	000	BOP	401	002	ML	5592	unit(s)		Batch	GALVANIZED STEEL SIMPLE SUPERSTRUT CHANNEL (not perforated) T&D #A1200 P A1200 series single galvanized steel channel Dimensions: 41,3 mm x 41,3 mm Length: 6 m		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5593	501	LCP	MFA	000	BOP	401	002	ML	5593	unit(s)		Batch	GALVANIZED STEEL DOUBLE BACK TO BACK SUPERSTRUT CHANNEL (not perforated) T&D #A1202 P A1202 series double galvanized steel channel Dimensions: 82,6 mm x 41,3 mm Length: 6 m		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5595	501	LCP	MFA	000	BOP	401	002	ML	5595	unit(s)		Batch	ALUMINUM SINGLE SUPERSTRUT PVC END COVER PVC end cover for A1200 series single aluminum channel		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01		Rev No. : 01								
Bolts, Nuts & Washers										ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 05								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
5700	501	LCP	MFA	000	BOP	401	002	ML	5700	unit(s)		Batch	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=80 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 80 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5701	501	LCP	MFA	000	BOP	401	002	ML	5701	unit(s)		Batch	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=70 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 70 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5703	501	LCP	MFA	000	BOP	401	002	ML	5703	unit(s)		Batch	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=25 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 25 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5705	501	LCP	MFA	000	BOP	401	002	ML	5705	unit(s)		Batch	STAINLESS STEEL BOLT 15,9 mm DIAMETER, L=40 mm Hexagonal stainless steel bolt SS316 Diameter: 15,9 mm Length: 40 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5707	501	LCP	MFA	000	BOP	401	002	ML	5707	unit(s)		Batch	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=40 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 40 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5709	501	LCP	MFA	000	BOP	401	002	ML	5709	unit(s)		Batch	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=45 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 45 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5710	501	LCP	MFA	000	BOP	401	002	ML	5710	unit(s)		Batch	SILICON BRONZE BOLT 12,7 mm DIAMETER, L=45 mm Hexagonal silicon bronze bolt Diameter: 12,7 mm Length: 45 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5713	501	LCP	MFA	000	BOP	401	002	ML	5713	unit(s)		Batch	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=100 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 100 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5716	501	LCP	MFA	000	BOP	401	002	ML	5716	unit(s)		Batch	SILICON BRONZE BOLT 6,4 mm DIAMETER, L=25 mm Hexagonal silicon bronze bolt Diameter: 6,4 mm Length: 25 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5724	501	LCP	MFA	000	BOP	401	002	ML	5724	unit(s)		Batch	GALVANIZED STEEL BOLT 19 mm DIAMETER, L=35 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 19 mm Length: 35 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5725	501	LCP	MFA	000	BOP	401	002	ML	5725	unit(s)		Batch	GALVANIZED STEEL BOLT 19 mm DIAMETER, L=65 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 19 mm Length: 65 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5726	501	LCP	MFA	000	BOP	401	002	ML	5726	unit(s)		Batch	GALVANIZED STEEL BOLT 12,7 mm DIAMETER, L=45 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 12,7 mm Length: 45 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5727	501	LCP	MFA	000	BOP	401	002	ML	5727	unit(s)		Batch	GALVANIZED STEEL BOLT 12,7 mm DIAMETER, L=25 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 12,7 mm Length: 25 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Bolts, Nuts & Washers													NALCOR Document No. : ILK-A5-SD-8211-EL-G01-0001-01 Rev No. : 04						
													ALSTOM Document No. : LCP-MFA-008-BOP-401-002-ML Rev No. : 04						
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
5729	501	LCP	MFA	000	BOP	401	002	ML	5729	unit(s)	Batch	GALVANIZED STEEL BOLT 22 mm DIAMETER, L=85 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 22 mm Length: 85 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5730	501	LCP	MFA	000	BOP	401	002	ML	5730	unit(s)	Batch	STAINLESS STEEL THREADED STUD 6 mm DIAMETER Stainless steel SS304 threaded stud (for fastening to structural steel) Thread: 6 mm x 20 mm long Shank: 9 mm long		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5731	501	LCP	MFA	000	BOP	401	002	ML	5731	unit(s)	Batch	STAINLESS STEEL 10 mm X 25 mm LONG SELF DRILLING WASHER HEAD SCREW Stainless steel 10mm x 25mm long self drilling washer head screw for fastening to structural steel		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5735	501	LCP	MFA	000	BOP	401	002	ML	5735	unit(s)	Batch	GALVANIZED STEEL THREADED ROD 12,7 mm DIAMETER Galvanized steel threaded rod Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5736	501	LCP	MFA	000	BOP	401	002	ML	5736	unit(s)	Batch	Stainless steel threaded rod SS316 Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5737	501	LCP	MFA	000	BOP	401	002	ML	5737	unit(s)	Batch	SILICON BRONZE NUT 6,4 mm DIAMETER Hexagonal silicon bronze nut Diameter: 6,4 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5740	501	LCP	MFA	000	BOP	401	002	ML	5740	unit(s)	Batch	STAINLESS STEEL NUT 12,7 mm DIAMETER Hexagonal stainless steel nut SS304 Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5744	501	LCP	MFA	000	BOP	401	002	ML	5744	unit(s)	Batch	SILICON BRONZE NUT 8 mm DIAMETER Hexagonal silicon bronze nut Diameter: 8 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5745	501	LCP	MFA	000	BOP	401	002	ML	5745	unit(s)	Batch	SILICON BRONZE NUT 12,7 mm DIAMETER Hexagonal silicon bronze nut Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5747	501	LCP	MFA	000	BOP	401	002	ML	5747	unit(s)	Batch	GALVANIZED STEEL RECTANGULAR REGULAR SPRING NUT 12,7 mm DIAMETER Galvanized steel rectangular regular spring nut for use with single super/nut channel Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5748	501	LCP	MFA	000	BOP	401	002	ML	5748	unit(s)	Batch	GALVANIZED STEEL NUT 12,7 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5749	501	LCP	MFA	000	BOP	401	002	ML	5749	unit(s)	Batch	GALVANIZED STEEL NUT 19 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 19 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5750	501	LCP	MFA	000	BOP	401	002	ML	5750	unit(s)	Batch	STAINLESS STEEL FLAT WASHER FOR 12,7 mm BOLT DIAMETER Stainless steel flat washer SS316 For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5751	501	LCP	MFA	000	BOP	401	002	ML	5751	unit(s)	Batch	STAINLESS STEEL FLAT WASHER FOR 15,9 mm BOLT DIAMETER Stainless steel flat washer SS316 For bolt diameter 15,9 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																			
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Bolts, Nuts & Washers													NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01 Rev No. : 03						
													ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML Rev No. : 05						
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BCM Rev updating the item	Comments	
5754	501	LCP	MFA	000	BOP	401	002	ML	5754	unit(s)	Batch	SILICON BRONZE FLAT WASHER FOR 8 mm BOLT DIAMETER Silicon bronze flat washer For bolt diameter 8 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5755	501	LCP	MFA	000	BOP	401	002	ML	5755	unit(s)	Batch	SILICON BRONZE FLAT WASHER FOR 12,7 mm BOLT DIAMETER Silicon bronze flat washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5756	501	LCP	MFA	000	BOP	401	002	ML	5756	unit(s)	Batch	SILICON BRONZE FLAT WASHER FOR 6,4 mm BOLT DIAMETER Silicon bronze flat washer For bolt diameter 6,4 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5758	501	LCP	MFA	000	BOP	401	002	ML	5758	unit(s)	Batch	GALVANIZED STEEL FLAT WASHER FOR 12,7 mm BOLT DIAMETER Galvanized steel flat washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5760	501	LCP	MFA	000	BOP	401	002	ML	5760	unit(s)	Batch	GALVANIZED STEEL FLAT WASHER FOR 19 mm BOLT DIAMETER Galvanized steel flat washer For bolt diameter 19 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5763	501	LCP	MFA	000	BOP	401	002	ML	5763	unit(s)	Batch	GALVANIZED STEEL NUT 22 mm DIAMETER Hexagonal galvanized steel nut. Grade 5 Diameter: 22 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5764	501	LCP	MFA	000	BOP	401	002	ML	5764	unit(s)	Batch	GALVANIZED STEEL FLAT WASHER FOR 22 mm BOLT DIAMETER Galvanized steel flat washer For bolt diameter 22 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5770	501	LCP	MFA	000	BOP	401	002	ML	5770	unit(s)	Batch	STAINLESS STEEL LOCK WASHER FOR 12,7 mm BOLT DIAMETER Stainless steel lock washer SS316 For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5771	501	LCP	MFA	000	BOP	401	002	ML	5771	unit(s)	Batch	STAINLESS STEEL LOCK WASHER FOR 15,9 mm BOLT DIAMETER Stainless steel lock washer SS316 For bolt diameter 15,9 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5773	501	LCP	MFA	000	BOP	401	002	ML	5773	unit(s)	Batch	SILICON BRONZE LOCK WASHER FOR 8 mm BOLT DIAMETER Silicon bronze lock washer For bolt diameter 8 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5774	501	LCP	MFA	000	BOP	401	002	ML	5774	unit(s)	Batch	SILICON BRONZE LOCK WASHER FOR 6,4 mm BOLT DIAMETER Silicon bronze lock washer For bolt diameter 6,4 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5775	501	LCP	MFA	000	BOP	401	002	ML	5775	unit(s)	Batch	SILICON BRONZE LOCK WASHER FOR 12,7 mm BOLT DIAMETER Silicon bronze lock washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Bolts, Nuts & Washers											NALCOR Document No.: ILK-AS-SD-8211-EL-G01-0001-01 Rev No.: 04										
											ALSTOM Document No.: LCP-MFA-000-BOP-401-002-ML Rev No.: 06										
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BCM Rev updating the item	Comments			
5778	501	LCP	MFA	000	BOP	401	002	ML	5778	unit(s)		Batch	GALVANIZED STEEL LOCK WASHER FOR 12,7 mm BOLT DIAMETER Galvanized steel lock washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5780	501	LCP	MFA	000	BOP	401	002	ML	5780	unit(s)		Batch	GALVANIZED STEEL LOCK WASHER FOR 19 mm BOLT DIAMETER Galvanized steel lock washer For bolt diameter 19 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5784	501	LCP	MFA	000	BOP	401	002	ML	5784	unit(s)		Batch	GALVANIZED STEEL LOCK WASHER FOR 22 mm BOLT DIAMETER Galvanized steel lock washer For bolt diameter 22 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5790	501	LCP	MFA	000	BOP	401	002	ML	5790	unit(s)		Batch	STAINLESS STEEL BELLEVILLE WASHER FOR 12,7 mm BOLT DIAMETER Stainless steel Belleville washer SS 17-7PH For bolt diameter 12,7 mm Flat load: 2857 kg (6300 lbs) approx.		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5791	501	LCP	MFA	000	BOP	401	002	ML	5791	unit(s)		Batch	GALVANIZED STEEL BEVEL WASHER Ø15,9 mm NOM. Galvanized steel bevel washer For bolt diameter 15,9 mm Side dimension: 32 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5792	501	LCP	MFA	000	BOP	401	002	ML	5792	unit(s)		Batch	SILICON BRONZE BOLT 8 mm DIAMETER, L=25 mm Hexagonal silicon bronze bolt Diameter: 8 mm Length: 25 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5793	501	LCP	MFA	000	BOP	401	002	ML	5793	unit(s)		Batch	Stainless steel quick bolt SS316 Diameter: 12,7 mm Length: 45 mm Compete with nut, flat and lock washer		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5794	501	LCP	MFA	000	BOP	401	002	ML	5794	unit(s)		Batch	STAINLESS STEEL QUICK BOLT 9,5 mm DIAMETER Stainless steel quick bolt SS316 Diameter: 9,5 mm Length: 44 mm Threaded length: 18 mm Compete with nut, flat and lock washer		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5795	501	LCP	MFA	000	BOP	401	002	ML	5795	unit(s)		Batch	STAINLESS STEEL QUICK BOLT 6 mm DIAMETER Stainless steel quick bolt SS316 Diameter: 6 mm Length: 44 mm Threaded length: 18 mm Compete with nut, flat and lock washer		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5796	501	LCP	MFA	000	BOP	401	002	ML	5796	unit(s)		Batch	STAINLESS STEEL QUICK BOLT 12,7 mm DIAMETER Stainless steel quick bolt SS316 Diameter: 12,7 mm Anchor length: 140 mm Compete with nut, flat and lock washer		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5798	501	LCP	MFA	000	BOP	401	002	ML	5798	unit(s)		Batch	GALVANIZED STEEL BOLT 16,9 mm DIAMETER, L=66 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 16,9 mm Length: 66 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-3211-EL-G01-0001-01		Rev No. : 04								
Bolts, Nuts & Washers										ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 05								
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
6809	501	LCP	MFA	000	BOP	401	002	ML	6809	unit(s)		Batch	GALVANIZED STEEL BOLT 20 mm DIAMETER, L=100 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 20 mm Length: 100 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
6810	501	LCP	MFA	000	BOP	401	002	ML	6810	unit(s)		Batch	GALVANIZED STEEL NUT 20 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 20 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
6811	501	LCP	MFA	000	BOP	401	002	ML	6811	unit(s)		Batch	GALVANIZED STEEL FLAT WASHER FOR 20 mm BOLT DIAMETER Galvanized steel flat washer For bolt diameter 20 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
6812	501	LCP	MFA	000	BOP	401	002	ML	6812	unit(s)		Batch	GALVANIZED STEEL LOCK WASHER FOR 20 mm BOLT DIAMETER Galvanized steel lock washer For bolt diameter 20 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
6813	501	LCP	MFA	000	BOP	401	002	ML	6813	unit(s)		Batch	GALVANIZED STEEL BOLT 15,9 mm DIAMETER, L=70 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 15,9 mm Length: 70 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
6814	501	LCP	MFA	000	BOP	401	002	ML	6814	unit(s)		Batch	GALVANIZED STEEL BOLT 30 mm DIAMETER, L=90 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 30 mm Length: 90 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
6815	501	LCP	MFA	000	BOP	401	002	ML	6815	unit(s)		Batch	GALVANIZED STEEL NUT 30 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 30 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
6816	501	LCP	MFA	000	BOP	401	002	ML	6816	unit(s)		Batch	GALVANIZED STEEL FLAT WASHER FOR 30 mm BOLT DIAMETER Galvanized steel flat washer For bolt diameter 30 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
6817	501	LCP	MFA	000	BOP	401	002	ML	6817	unit(s)		Batch	GALVANIZED STEEL LOCK WASHER FOR 30 mm BOLT DIAMETER Galvanized steel lock washer For bolt diameter 30 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
6818	501	LCP	MFA	000	BOP	401	002	ML	6818	unit(s)		Batch	GALVANIZED STEEL BOLT M16, L=28 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 16 mm Length: 28 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
6821	501	LCP	MFA	000	BOP	401	002	ML	6821	unit(s)		Batch	GALVANIZED STEEL BOLT 16,9 mm DIAMETER, L=50 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 16,9 mm Length: 50 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																		
<b>MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b> Valve Hall Connectors												NALCOR Document No.: ILK-AS-SD-8211-EL-001-0001-01 Rev No.: 03						
												ALSTOM Document No.: LCP-MFA-000-BOP-401-002-ML Rev No.: 05						
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
6101	501	LCP	MFA	000	BOP	401	002	ML	6101	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6102	501	LCP	MFA	000	BOP	401	002	ML	6102	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6103	501	LCP	MFA	000	BOP	401	002	ML	6103	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6104	501	LCP	MFA	000	BOP	401	002	ML	6104	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6105	501	LCP	MFA	000	BOP	401	002	ML	6105	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6106	501	LCP	MFA	000	BOP	401	002	ML	6106	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6106A	501	LCP	MFA	000	BOP	401	002	ML	6106A	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6107	501	LCP	MFA	000	BOP	401	002	ML	6107	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6108	501	LCP	MFA	000	BOP	401	002	ML	6108	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6108A	501	LCP	MFA	000	BOP	401	002	ML	6108A	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6110	501	LCP	MFA	000	BOP	401	002	ML	6110	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6111	501	LCP	MFA	000	BOP	401	002	ML	6111	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6112	501	LCP	MFA	000	BOP	401	002	ML	6112	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6113	501	LCP	MFA	000	BOP	401	002	ML	6113	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6114	501	LCP	MFA	000	BOP	401	002	ML	6114	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6115	501	LCP	MFA	000	BOP	401	002	ML	6115	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6116	501	LCP	MFA	000	BOP	401	002	ML	6116	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6117	501	LCP	MFA	000	BOP	401	002	ML	6117	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6118	501	LCP	MFA	000	BOP	401	002	ML	6118	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6119	501	LCP	MFA	000	BOP	401	002	ML	6119	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6120	501	LCP	MFA	000	BOP	401	002	ML	6120	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	
6121	501	LCP	MFA	000	BOP	401	002	ML	6121	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two	

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8211-EL-021-0021-01	Rev No. : 04								
Valve Hall Connectors											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-04	Rev No. : 04								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
7101	501	LCP	MFA	000	BOP	401	002	ML	7101	unit(s)		7	Baseplate Um 675kV TO BE USED 422kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two
7103	501	LCP	MFA	001	BOP	401	003	ML	7103	unit(s)		4	Aluminium Alloy-Intermediate Plate		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two
7104	501	LCP	MFA	000	BOP	401	002	ML	7104	unit(s)		6	Aluminium Alloy-Insulator connector Plate Um 422 TO BE USED 820kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two
7105	501	LCP	MFA	000	BOP	401	002	ML	7105	unit(s)		8	Insulator connector Plate Um 675kV TO BE USED 422kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two
7106	501	LCP	MFA	000	BOP	401	002	ML	6125	unit(s)		3	Suspension adaptor Um 265kV TO BE USED 258kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two
7107	501	LCP	MFA	000	BOP	401	002	ML	7107	unit(s)		3	Intermediate-Plate Um 675kV TO BE USED 422kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For Monopole, Initial quantities are divided by two

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MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 04						
DC Yard Connectors																		
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
6201	501	LCP	MFA	000	BOP	401	002	ML	6201	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	CONNECTOR STUD TO TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6202	501	LCP	MFA	000	BOP	401	002	ML	6202	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									0	BUS SUPPORT	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6203	501	LCP	MFA	000	BOP	401	002	ML	6203	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									0	CONNECTOR BUS TO TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6204	501	LCP	MFA	000	BOP	401	002	ML	6204	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									0	T-CONNECTOR BUS TO TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6205	501	LCP	MFA	000	BOP	401	002	ML	6205	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									14	T-CONNECTOR TRIPLE FLEXIBLE TO PALM	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6206	501	LCP	MFA	000	BOP	401	002	ML	6206	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									14	T-CONNECTOR BUS TO PALM	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6207	501	LCP	MFA	000	BOP	401	002	ML	6207	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									16	EXPANSION BUS SUPPORT	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6208	501	LCP	MFA	000	BOP	401	002	ML	6208	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	90 DEG BUS SUPPORT AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6209	501	LCP	MFA	000	BOP	401	002	ML	6209	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									13	90 DEG TERMINAL TRIPLE FLEXIBLE TO PALM	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6210	501	LCP	MFA	000	BOP	401	002	ML	6210	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									6	BUS SUPPORT AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6211	501	LCP	MFA	000	BOP	401	002	ML	6211	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6212	501	LCP	MFA	000	BOP	401	002	ML	6212	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									4	BUS SUPPORT	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6213	501	LCP	MFA	000	BOP	401	002	ML	6213	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									3	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6214	501	LCP	MFA	000	BOP	401	002	ML	6214	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	BUS SUPPORT	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6215	501	LCP	MFA	000	BOP	401	002	ML	6215	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									3	TERMINAL BUS TO PALM	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6216	501	LCP	MFA	000	BOP	401	002	ML	6216	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									0	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6217	501	LCP	MFA	000	BOP	401	002	ML	6217	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	90 DEG BUS SUPPORT AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6218	501	LCP	MFA	000	BOP	401	002	ML	6218	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									6	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6219	501	LCP	MFA	000	BOP	401	002	ML	6219	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6220	501	LCP	MFA	000	BOP	401	002	ML	6220	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	90 DEG BUS SUPPORT AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6221	501	LCP	MFA	000	BOP	401	002	ML	6221	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	CONNECTOR STUD TO TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6222	501	LCP	MFA	000	BOP	401	002	ML	6222	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									14	EXPANSION BUS SUPPORT	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6223	501	LCP	MFA	000	BOP	401	002	ML	6223	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									5	BUS SUPPORT	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6224	501	LCP	MFA	000	BOP	401	002	ML	6224	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	BUS SUPPORT	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6225	501	LCP	MFA	000	BOP	401	002	ML	6225	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	BUS SUPPORT	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6226	501	LCP	MFA	000	BOP	401	002	ML	6226	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									2	BUS SUPPORT	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6227	501	LCP	MFA	000	BOP	401	002	ML	6227	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									4	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6228	501	LCP	MFA	000	BOP	401	002	ML	6228	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									6	BUS SUPPORT	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6229	501	LCP	MFA	000	BOP	401	002	ML	6229	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									17	TERMINAL TRIPLE FLEXIBLE TO PALM	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6230	501	LCP	MFA	000	BOP	401	002	ML	6230	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									7	BUS SUPPORT AND TRIPLE FLEXIBLE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	
6231	501	LCP	MFA	000	BOP	401	002	ML	6231	unit(s)								For reference see ILKAS-SD-8200-EL-F01-0047-01
									4	134 DEG BUS SUPPORT PIPE TO PIPE	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8)	

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	Lower Churchill Converters and Transition Compounds Project																			
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS DC Yard Connectors											NALCOR Document No.: ILK-AS-SD-8211-EL-G91-0091-01	Rev No.: 04								
											ALSTOM Document No.: LCP-MFA-000-BOP-401-002-ML	Rev No.: 01								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
6232	501	LCP	MFA	000	BOP	401	002	ML	6232	unit(s)		2	T BUS SUPPORT		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6233	501	LCP	MFA	000	BOP	401	002	ML	6233	unit(s)		2	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6234	501	LCP	MFA	000	BOP	401	002	ML	6234	unit(s)		5	T-CONNECTOR BUS TO TRIPLE FLEXIBLE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6235	501	LCP	MFA	000	BOP	401	002	ML	6235	unit(s)		3	T BUS SUPPORT BUS AND TRIPLE FLEXIBLES		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6236	501	LCP	MFA	000	BOP	401	002	ML	6236	unit(s)		14	T-CONNECTOR BUS TO FLEXIBLE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6237	501	LCP	MFA	000	BOP	401	002	ML	6237	unit(s)		0	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6238	501	LCP	MFA	000	BOP	401	002	ML	6238	unit(s)		0	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6239	501	LCP	MFA	000	BOP	401	002	ML	6239	unit(s)		0	T BUS SUPPORT		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6240	501	LCP	MFA	000	BOP	401	002	ML	6240	unit(s)		2	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6241	501	LCP	MFA	000	BOP	401	002	ML	6241	unit(s)		2	T BUS SUPPORT BUS AND TRIPLE FLEXIBLE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6271	501	LCP	MFA	000	BOP	401	002	ML	6271	unit(s)		8	ALUMINUM PLATE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6272	501	LCP	MFA	000	BOP	401	002	ML	6272	unit(s)		44	CORONA RING		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6273	501	LCP	MFA	000	BOP	401	002	ML	6273	unit(s)		9	END CAP		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01
6274	501	LCP	MFA	000	BOP	401	002	ML	6274	unit(s)		72	SPACER		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	D4	For Monopole quantities, we multiply bipole quantities by 4/5 (0.8) For reference see: ILK-AS-SD-8200-EL-F01-0047-01

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS</b> Star-Delta Connectors													NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01 Rev No. : 04								
													ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML Rev No. : 06								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
6300	501	LCP	MFA	000	BOP	401	002	ML	6300	unit(s)		2	ALUMINUM ALLOY BOLTED T CONNECTOR 127 mm IPS PIPE TO NEMA 2 TERMINAL PAD  For joining 127 mm IPS aluminum tube to NEMA 2 terminal pad. One-wrench installation. 1250 A Complete with stainless steel bolts, nuts and washers.		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6301	501	LCP	MFA	000	BOP	401	002	ML	6301	unit(s)		6	BUS SUPPORT Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6302	501	LCP	MFA	000	BOP	401	002	ML	6302	unit(s)		4	BUS SUPPORT Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6303	501	LCP	MFA	000	BOP	401	002	ML	6303	unit(s)		2	BUS SUPPORT Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6304	501	LCP	MFA	000	BOP	401	002	ML	6304	unit(s)		8	BUS SUPPORT Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6305	501	LCP	MFA	000	BOP	401	002	ML	6305	unit(s)		7	BUS SUPPORT Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6306	501	LCP	MFA	000	BOP	401	002	ML	6306	unit(s)		7	STRAIGHT TRIPLE FLAT TERMINAL Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6308	501	LCP	MFA	000	BOP	401	002	ML	6308	unit(s)		7	BUS TO TRIPLE FLEXIBLE Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6309	501	LCP	MFA	000	BOP	401	002	ML	6309	unit(s)		4	BUS SUPPORT Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6310	501	LCP	MFA	000	BOP	401	002	ML	6310	unit(s)		5	BUS TO TRIPLE FLEXIBLE Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6311	501	LCP	MFA	000	BOP	401	002	ML	6311	unit(s)		28	CONNECTOR Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6312	501	LCP	MFA	000	BOP	401	002	ML	6312	unit(s)		3	BUS SUPPORT Aluminium Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01		Rev No. :	04							
Star-Delta Connectors										ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. :	05							
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
6313	501	LCP	MFA	000	BOP	401	002	ML	6313	unit(s)		4	BUS SUPPORT PIPE TO TRIPLE FLEXIBLE Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6314	501	LCP	MFA	000	BOP	401	002	ML	6314	unit(s)		3	T-CONNECTOR Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6315	501	LCP	MFA	000	BOP	401	002	ML	6315	unit(s)		16	TRIPLEX SPACER Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6316	501	LCP	MFA	000	BOP	401	002	ML	6316	unit(s)		3	ANGLE TRIPLEX SUPPORT Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6317	501	LCP	MFA	000	BOP	401	002	ML	6317	unit(s)		2	90 Deg TRIPLEX TERMINAL Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6318	501	LCP	MFA	000	BOP	401	002	ML	6318	unit(s)		5	CORONA PROTECTION RING Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6319	501	LCP	MFA	000	BOP	401	002	ML	6319	unit(s)		7	ENG PLUG Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6320	501	LCP	MFA	000	BOP	401	002	ML	6320	unit(s)		5	ENG PLUG Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6321	501	LCP	MFA	000	BOP	401	002	ML	6321	unit(s)		26	CORONA PROTECTION RING Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6322	501	LCP	MFA	000	BOP	401	002	ML	6322	unit(s)		41	TUBE END CAP Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6323	501	LCP	MFA	000	BOP	401	002	ML	6323	unit(s)		36	END CAP Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6324	501	LCP	MFA	000	BOP	401	002	ML	6324	unit(s)		3	BUS SUPPORT Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6325	501	LCP	MFA	000	BOP	401	002	ML	6325	unit(s)		5	BUS SUPPORT Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01		Rev No. :							
Star-Delta Connectors											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. :							
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
6326	501	LCP	MFA	000	BOP	401	002	ML	6326	unit(s)		4	STRAIGHT TRIPLE FLAT TERMINAL Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6327	501	LCP	MFA	000	BOP	401	002	ML	6327	unit(s)		18	TRIPLEX SPACER Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6328	501	LCP	MFA	000	BOP	401	002	ML	6328	unit(s)		7	STRAIGHT TRIPLEX CONNECTOR Tinned copper		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6329	501	LCP	MFA	000	BOP	401	002	ML	6329	unit(s)		4	BUS TO TRIPLE FLEXIBLE COPPER		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6330	501	LCP	MFA	000	BOP	401	002	ML	6330	unit(s)		2	T-CONNECTOR Aluminium Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS AC Filters Connectors													NALCOR Document No. : ILK-AS-SD-8211-EL-G01-0001-01 ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML		Rev No. : 04 Rev No. : 05					
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
6401	501	LCP	MFA	000	BOP	401	002	ML	6401	unit(s)		57	Tube Support - Ring Type Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6402	501	LCP	MFA	000	BOP	401	002	ML	6402	unit(s)		23	Tube to stranded straight Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6403	501	LCP	MFA	000	BOP	401	002	ML	6403	unit(s)		109	T-Connector Tube to Stranded Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6404	501	LCP	MFA	000	BOP	401	002	ML	6404	unit(s)		75	Stranded to Palm Connector @90 Deg Aluminium Alloy MCAV (KV) :145kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6405A	501	LCP	MFA	000	BOP	401	002	ML	6405A	unit(s)		142	Stranded to Palm Connector Straight (Four Hole) Aluminium Alloy MCAV (KV) :145kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6405B	501	LCP	MFA	000	BOP	401	002	ML	6405B	unit(s)		10	Stranded to Palm Connector Straight (Single Hole) Aluminium Alloy MCAV (KV) :145kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6406	501	LCP	MFA	000	BOP	401	002	ML	6406	unit(s)		10	PALM TO TUBE Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6407	501	LCP	MFA	000	BOP	401	002	ML	6407	unit(s)		8	Double Tube Expansion Connector Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6408	501	LCP	MFA	000	BOP	401	002	ML	6408	unit(s)		13	90 Deg Tube to Tube horizontal connector Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6409	501	LCP	MFA	000	BOP	401	002	ML	6409	unit(s)		9	T-Duplex-Connector Aluminium Alloy MCAV (KV) :362kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6410	501	LCP	MFA	000	BOP	401	002	ML	6410	unit(s)		10	Straight Felix to flexi horizontal connector Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6411	501	LCP	MFA	000	BOP	401	002	ML	6411	unit(s)		82	End CAP with provision for installation of 1X1750MCM AAC (S <sub>3</sub> 38.72mm) Conductor as damping cable Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6412	501	LCP	MFA	000	BOP	401	002	ML	6412	unit(s)		9	Earthing GY Cable 240 Sq mm, 500mm Length Copper Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6413	501	LCP	MFA	000	BOP	401	002	ML	6413	unit(s)		4	T-Flat Terminal Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6414	501	LCP	MFA	000	BOP	401	002	ML	6414	unit(s)		6	Earthing GY Cable AWG 4/0 (120 Sq mm), 5000 mm Length Copper Alloy		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6415	501	LCP	MFA	000	BOP	401	002	ML	6415	unit(s)		76	Sheet with 44.5-55 mm Slot Copper -Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)
6416	501	LCP	MFA	000	BOP	401	002	ML	6416	unit(s)		4	90 Deg Support Copper -Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
MUSKRAT FALLS CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS AC Filters Connectors													NALCOR Document No. : ILK-AS-SD-8211-EL-001-0091-01 Rev No. : 04								
													ALSTOM Document No. : LCP-MFA-009-BOP-401-002-ML Rev No. : 06								
Item No.	Contractor Tag Number									Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
7401	501	LCP	MFA	000	BOP	401	002	ML	7401	unit(s)		6	Plate Adapter Plate for BPI Mounted 5A) Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)	
7402	501	LCP	MFA	000	BOP	401	002	ML	7402	unit(s)		6	Adapter to support two BPI Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)	
7403	501	LCP	MFA	000	BOP	401	002	ML	7403	unit(s)		6	Plate For Bus connection Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 For Monopole quantities, we multiply bipole quantities by 1/2 (0.5)	

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<b>Document Front Sheet</b>		 <small>LOWER CHURCHILL PROJECT</small>			
NE-LCP Contractor/Supplier	Contract or Purchase Number and Description: CD0501-001 Lower Churchill Converters and Transition Compounds		Contractor/Supplier Name: Alstom Grid Canada ULC.		
	Document Title: Shoal Cove Transition Compound Bill of Material - High Voltage Equipments		Total Number of Pages Incl. Front Sheet 26		
	Contractor Document Number: LCP-SOC-000-BOP-401-003-ML		Revision Number: 05		
	Supplier Document Number:		Revision Number:		
	NE-LCP Document Number: ILK-AS-SD-8520-EL-G01-0001-01		NE-LCP Issue Number: B4		
	Approver's Signature:		Date (17-Jan-2017):	Review Class:	
	Comments:		Equipment Tag or Model Number:		
	NE-LCP	<small>REVIEW DOES NOT CONSTITUTE APPROVAL OF DESIGN DETAILS, CALCULATIONS, TEST METHODS OR MATERIAL DEVELOPED AND/OR SELECTED BY THE CONTRACTOR, NOR DOES IT RELIEVE THE CONTRACTOR FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS.</small>			
<small>01 - REVIEWED AND ACCEPTED - NO COMMENTS</small> <small>02 - REVIEWED - INCORPORATE COMMENTS, REVISE AND RESUBMIT</small> <small>03 - REVIEWED - NOT ACCEPTED</small> <small>04 - INFORMATION ONLY</small> <small>05 - NOT REVIEWED</small>					
Lead Reviewer:		Date (dd-mmm-yyyy):	Project Manager:	Date (dd-mmm-yyyy):	
NE-LCP Management:		Date (dd-mmm-yyyy):			
<u>General Comments:</u>  					

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Labrador-Island Link Limited Partnership  
Contract CD0501-001

Lower Churchill Converters and Transition Compounds Project

**SHOAL COVE TRANSITION COMPOUND  
BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS**

PHA-ILK-AS-SD-8520-EL-G01-0001-01	REV
PHA-LCP-SOC-000-BOP-401-003-ML	02
ASSUMPTION: Refer to SLD signed on 02/03/2017	

							
PREPARED	17-Jan-17	Ivo Georgiev	I.G.	PROJECT Lower Churchill Converters and Transition Compounds Project			
VERIFIED	17-Jan-17	Asbed Kojakian	A.K.	TITLE Shoal Cove Transition Compound			
APPROVED	17-Jan-17	Eric Guimond	E.G.	Bill of Material - High Voltage Equipments			
	DATE	NAME	SIGNATURE				
Alstom document number <b>LCP-SOC-000-BOP-401-003-ML</b>			Alstom Revision 05	Nalcor document number <b>ILK-AS-SD-8520-EL-G01-0001-01</b>		LCP Status B4	
Internal document number (when applicable)			Internal Revision			Page 02	TOTAL Sheets 23

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SCHEDULE OF MODIFICATIONS

COMPANY REV	CONTRACTOR REV	DATE	PREP.	VER.	APP.	MODIFICATION CONTENTS	PAGE / SECTION
A1	01	8-Sep-15	IG	AK	EG	Original Issue	
B1	02	27-May-16	IG	AK	EG	Issued for Bid	
B2	03	27-Oct-16	IG	AK	EG	Issued for Bid	
B3	04	17-Jan-17	IG	AK	EG	Issued for Implementation and Use	
B4	05	17-Jan-17	IG	AK	EG	Issued for Implementation and Use	

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Reference documents

ILK-AS-SD-8521-EL-G01-0001-01	Shoal Cove Transition compound - Grounding Materials – Bill of Material
ILK-AS-SD-8520-EL-B03-0001-01	Shoal Cove Transition compound - DC Yard – Plan View and Sections
ILK-AS-SD-8521-EL-B99-0001-01	Shoal Cove Transition compound - General Grounding – Grid Layout
ILK-AS-SD-8521-CV-D99-0008-01	Shoal Cove Transition compound - Trenches-Road crossing earthing pit CWGD – Typical and details
ILK-AS-SD-8521-EL-B99-0003-01	Shoal Cove Transition compound - Control Building – Grounding Plan
ILK-AS-SD-8000-EL-B99-0002-01	Common - Grounding Details
ILK-AS-SD-8520-EL-B06-0001-01	Shoal Cove Transition compound - Building and outdoor cable trays and trenches – General arrangement layout and sections
ILK-AS-SD-8000-EL-D03-0006-01	COMMON - BUILDING CABLE TRAY - EQUIPMENT DETAILS

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**BILL OF MATERIAL (B.O.M.) LEGEND**

LCP-NALCOR

SHOAL COVE TRANSITION COMPOUND  
BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS

Legend	Description	Examples	Seal(s)
10XX	Control room	Control and PBC rooms equipment	
20XX	Cable Trays	Cable trays and accessories	
40XX	Major Equipment	Transformers, Breakers, Disconnect switches, CT, Surge arresters, Capacitors	
46XX	Insulators	Post insulators, String insulators	
50XX	Cables & Bus Bars	Tubular bus bars, Aluminum conductors, Cables, Shield wires	
52XX	Compression Connectors & Strain Relief Connectors	Compression connectors, Strain relief connectors	
53XX	Grounding	Grounding conductors, Rods, Grounding connectors (welded, compression, bolted) and braids, Grounding mats, Fence grounding material	
54XX	Cable Trenches	Prefabricated cable trenches and fittings	
55XX	Hardware & Conduits	Overhead line hardware, Shield wire hardware, PVC conduits and fittings, Steel conduits and fittings, Flexible conduits and fittings	
56XX	SST Hardware	SST Hardware	
57XX	Bolts, Nuts and Washers	Bolts, Nuts, Lock washers, Flat washers, Belleville washers, Threaded rods, Threaded studs	
67XX	Connectors	Bolted connectors, Welded connectors, Conductor spacers, Bus supports,	

NE Document no		Rev	Document no		Rev	Sheet	Following Sheet	Last Sheet
ILK-AS-SD-8520-EL-G01-0001-01		B4	LCP-SOC-000-BOP-401-003-ML		05	5	6	23

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nalcor energy	Lower Churchill Converters and Transition Compounds Project											GE									
SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS AC/DC & BATTERY ROOMS EQUIPMENT											NALCOR Document No. : ILK-A5-SD-8211-EL-001-0001-01	Rev No. : 04									
											ALSTOM Document No. : LCP-MFA-000-BOP-401-002-ML	Rev No. : 08									
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
0030	501	LCP	SOC	000	BOP	401	003	ML	0030	unit(s)	8525-BAT-84-1001 8525-BAT-84-2001	2	125 VDC BATTERY		GE (SBC)	Batteries de la Capitale		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0031	501	LCP	SOC	000	BOP	401	003	ML	0031	unit(s)	8525-BAT-85-1001 8525-BAT-85-2001	2	48 VDC BATTERY		GE (SBC)	Batteries de la Capitale		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0035	501	LCP	SOC	000	BOP	401	003	ML	0035	unit(s)	8525-DPB-83-0001 8525-DPB-83-0002	2	SWITCHBOARD		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0040	501	LCP	SOC	000	BOP	401	003	ML	0040	unit(s)	8525-CHR-84-1001 8525-CHR-84-1002 8525-CHR-84-2001 8525-CHR-84-2002	4	125 VDC BATTERY CHARGER		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0041	501	LCP	SOC	000	BOP	401	003	ML	0041	unit(s)	8525-CHR-85-1001 8525-CHR-85-1002 8525-CHR-85-2001 8525-CHR-85-2002	4	48 VDC BATTERY CHARGER		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0042	501	LCP	SOC	000	BOP	401	003	ML	0042	unit(s)	8525-FU-84-1001 8525-FU-84-2001	2	125 VDC FUSE BOX		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0043	501	LCP	SOC	000	BOP	401	003	ML	0043	unit(s)	8525-FU-85-1001 8525-FU-85-2001	2	48 VDC FUSE BOX		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0044	501	LCP	SOC	000	BOP	401	003	ML	0044	unit(s)	8525-DPB-84-1001 8525-DPB-84-2001	4	125 VDC MAIN PANEL (Section 1&2)		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0045	501	LCP	SOC	000	BOP	401	003	ML	0045	unit(s)	8525-DPB-85-1001 8525-DPB-85-2001	4	48 VDC MAIN PANEL (Section 1&2)		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0046	501	LCP	SOC	000	BOP	401	003	ML	0046	unit(s)	8525-DPB-84-1003 8525-DPB-84-2003	2	125 VDC OUTDOOR EQUIPMENT distribution Panel		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0047	501	LCP	SOC	000	BOP	401	003	ML	0047	unit(s)	8523-DPB-83-0012 8523-DPB-83-0013	2	BUILDING SCE DISTRIBUTION PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0048	501	LCP	SOC	000	BOP	401	003	ML	0048	unit(s)	8525-DPB-83-005	1	OUTDOOR EQUIPMENT DISTRIBUTION PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0060	501	LCP	SOC	000	BOP	401	003	ML	0060	unit(s)	8525-DPB-83-0008	1	ESSENTIAL LOAD DISTRIBUTION PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0061	501	LCP	SOC	000	BOP	401	003	ML	0061	unit(s)	8525-UPS-83-0001	1	UPS Panel		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0062	501	LCP	SOC	000	BOP	401	003	ML	0062	unit(s)	8525-DPB-83-0009	1	EXTERIOR SECURITY LIGHTING DISTRIBUTION PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0063	501	LCP	SOC	000	BOP	401	003	ML	0063	unit(s)	8525-ATS-83-0001	1	MANUAL ATS EXTERIOR SECURITY LIGHTING		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0064	501	LCP	SOC	000	BOP	401	003	ML	0064	unit(s)	8525-CP-83-0001	1	EXTERIOR SECURITY LIGHTING CONTROL PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0066	501	LCP	SOC	000	BOP	401	003	ML	0066	unit(s)	8525-DPB-83-0003	1	PROTECTION AND CONTROL DISCRIPTION PANEL		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0342	501	LCP	SOC	000	BOP	401	003	ML	0342	unit(s)		1	Battery Spill Containment system		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0343	501	LCP	SOC	000	BOP	401	003	ML	0343	unit(s)		4	DBL Thermo Bonding Tool Kit Battery Spill Containment system EAGLE-28-172		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0344	501	LCP	SOC	000	BOP	401	003	ML	0344	unit(s)		2	Eagle_Floor Anchor, Deluxe NabPills & SOCs Battery Spill Containment system EAGLE-54-137		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																			
SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS CONTROL AND P&C ROOMS EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8520-EL-G01-0001-01		Rev No. :						
											ALSTOM Document No. : LCP-SOC-000-BOP-401-003-ML		Rev No. :						
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
1000	501	LCP	SOC	000	BOP	401	003	ML	1000	unit(s)	8522-CP-87-2003 8522-CP-87-1003 8522-CP-87-2004 8522-CP-87-1004	4	HMI Panel Type 1 Panel 800x900x750 (mm)	GE (SBC)	Kellour	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Shoal Cove Transition Compound - HMI 2 and Dataserver 2 Panel Shoal Cove Transition Compound - HMI 1 and Dataserver 1 Panel
1001	501	LCP	SOC	000	BOP	401	003	ML	1001	unit(s)	8522-CP-87-2001 8522-CP-87-1001	2	Communication Interface Panel Type 2 Panel 916x1050x2300(mm)	GE (SBC)	Kellour	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Shoal Cove Transition Compound - Communication Interface B Panel Shoal Cove Transition Compound - Communication Interface A Panel
1003	501	LCP	SOC	000	BOP	401	003	ML	1003	unit(s)	8522-CP-87-0001	1	ac/dc Auxiliary service Control Panel Type 4 Panel 916x1050x220(mm)	GE (SBC)	Kellour	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Shoal Cove Transition Compound - ac/dc Auxiliary service Control Panel
1002	501	LCP	SOC	000	BOP	401	003	ML	1002	unit(s)	8522-CP-87-1002 8522-CP-87-2002	2	Common Control and Monitoring dc Cable Panel Type 3 Panel 916x1050x220(mm)	GE (SBC)	Kellour	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Shoal Cove Transition Compound - Common Control 1 and Monitoring dc Cable Panel Shoal Cove Transition Compound - Common Control 2 and Monitoring dc Cable Panel
1023	501	LCP	SOC	000	BOP	401	003	ML	1023	unit(s)	8522-TP-89-0001 8522-TP-89-0002	2	ODF INTERFACE PANEL ODF Interface Panel NEMA 12 Enclosure plate gauge 14 steel. Piano-type hinges. Padlockable device. Removable mounting plate Dimensions: L=762 mm, H=762 mm, D=800 mm Provided with terminal blocks and internal wiring. Components: Fiber optical board	GE (SBC)	Engtech	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1024	501	LCP	SOC	000	BOP	401	003	ML	1024	unit(s)	852E-MR-87-1101 852E-MR-87-2101	2	DC YARD MARSHALLING PANEL DC Yard marshalling panel NEMA 12 Enclosure plate gauge 12 steel. Piano-type hinges. Padlockable device. Removable mounting plate Dimensions: L=916 mm, H=1830 mm, D=611 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat	GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1030	501	LCP	SOC	000	BOP	401	003	ML	1030	unit(s)	8525-DPB-84-1002 8525-DPB-84-2002	2	P&C Distribution Panel 900x1050x2375 (mm)	GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Measurement CC Pole 1 Measurement Pole 2
1036	501	LCP	SOC	000	BOP	401	003	ML	1036	unit(s)	8522-OP-87-0101	1	LFL PANEL	GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
1041	501	LCP	SOC	000	BOP	401	003	ML	1041	unit(s)	8522-CP-87-1101 8522-CP-87-2101	2	DCCT Meas & RTU Panel 900x1050x2300 (mm)	GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
1045	501	LCP	SOC	000	BOP	401	003	ML	1045	unit(s)	8525-DPB-84-0003	1	P&C PANEL FOR 208/120 Vac	GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
1046	501	LCP	SOC	000	BOP	401	003	ML	1046	unit(s)	8525-MR-80-2101	1	DC MARSHALLING RACK 916x611x1830 (mm)	GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1058	501	LCP	SOC	000	BOP	401	003	ML	1058	unit(s)	8522-CP-87-1005 8522-CP-87-2005	2	PRINTER FOR HMI	GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																						
SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-8520-EL-G01-0001-01		Rev No. : 01										
Cable Trays										ALSTOM Document No. : LCP-SOC-000-BOP-401-003-ML		Rev No. : 01										
Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
2000	501	LCP	SOC	000	BOP	401	003	ML	2000	unit(s)		Batch	CABLE TRAY, LADDER TYPE, STRAIGHT (Solid Trough), 600mm WIDE, ALUM. CLASS "D", 150mm SIDE RAIL HEIGHT AND 300mm RUNG SPACING, 3M LENGTH, T & B #AH1-6-24-L12-S-3 or Equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building and SSTH wooden structure	
2001	501	LCP	SOC	000	BOP	401	003	ML	2001	unit(s)		Batch	Aluminum Cover for Cable Tray "2000", W=600mm (24in) L=3m, T & B #ABW-2-24-SFC-3 or Equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building and SSTH wooden structure	
2012	501	LCP	SOC	000	BOP	401	003	ML	2012	unit(s)		Batch	ALUMINUM CABLE TRAY 450 mm Galvanized steel ladder cable tray Width: 450 mm Depth: 150 mm Rung spacing: 300 mm Length: 6 m Civ. splice plates and hardware and aluminum cover.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building	
2219	501	LCP	SOC	000	BOP	401	003	ML	2219	unit(s)		Batch	Aluminum Cover for 90° Horizontal Vertical Outside Bend (Solid Flanged cover) - R=600mm (24in), W=610mm (24in), T & B #AJW-6-24-SFC-V990-24 or Equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building and SSTH wooden structure	
2221	501	LCP	SOC	000	BOP	401	003	ML	2221	unit(s)		Batch	Aluminum 90° Vertical bend "VO", W=600mm (24in), H=150mm (6in) R=610mm (24in), T & B #AHF-6-24-S-V990-24 or Equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building and SSTH wooden structure	
2288	501	LCP	SOC	000	BOP	401	003	ML	2288	unit(s)		Batch	GALVANIZED STEEL SUPERSTRUT BRACKET TYPE, T&B #S249-32HDGC or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	Outdoor entry to control building and SSTH wooden structure	

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nalcor ENERGY		Lower Churchill Converters and Transition Compounds Project										Rev No.								
SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No.: LK-AS-SD-2520-EL-001-001-01		Rev No.: 03								
Major Equipments										ALSTOM Document No.: LCP-SD-000-BOP-401-003-RL		Rev No.: 05								
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
4048	501	LCP	SOC	000	BOP	401	003	ML	4048	unit(s)	5	<b>SURGE COUNTER</b> METER: 8 DIGIT CYCLOMETER MINIMUM COUNT CURRENT: 200 AMPS/8/20 MICROSECOND WAVE MAX. HIGH CURRENT WITHSTAND: 100 KA 4/10 MICROSECOND WAVE METER SCALE: 0-30 mA PEAK/1.41 (NON LINEAR SCALE)	LK-SN-CD-8000-EL-TS-0029-01	GE (FES) / MCT	SIEMENS	3EX5 450-0	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	3 Surge counters supplied and installed by MCT
4057	501	LCP	SOC	000	BOP	401	003	ML	4057	unit(s)	2	<b>DC SURGE ARRESTER Ur 314 KV</b> SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 314 KV, 60 Hz MOV: 333 KV DC Peak, 10-20 KA MINIMUM CREEPAGE DISTANCE 22500 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 6	LK-SN-CD-8000-EL-TS-0029-01	GE (FES)	SIEMENS	3EG3 314-4025	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	R03 - Equipment Tag changed
4060	501	LCP	SOC	000	BOP	401	003	ML	4060	unit(s)	3	<b>DC SURGE ARRESTER (MCT)</b> SINGLE PHASE, METAL OXIDE SILICONE POLYMER-HOUSSED SURGE ARRESTER CORONA RING MINIMUM CREEPAGE DISTANCE 22250 mm GRAY SILICONE RUBBER UPRIGHT MOUNTING HV TERMINAL NEMA 6	LK-SN-CD-8000-EL-TS-0029-01	GE (FES)	ABB	FEXLM 0418-Y030MEP	CD0501	MCT	03	R03 - Equipment Tag changed
4070	501	LCP	SOC	000	BOP	401	003	ML	4070	unit(s)	2	<b>ONE POLE DISCONNECTOR SPOL 370 KV 1980A 21 KA x 1s</b> 370 KV, 2550 KV BL 1980 A 21 KA 1 SEC. ONE POLE MOTOR OPERATED, VERTICAL BREAK, C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm	LK-SN-CD-8000-EL-TS-0011-01	GE (FES)	ALSTOM	SPOL	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4071	501	LCP	SOC	000	BOP	401	003	ML	4071	unit(s)	4	<b>ONE POLE DISCONNECTOR SPOLT 370 KV 1980A 21 KA x 1s</b> 370 KV, 2550 KV BL 1980 A 21 KA 1 SEC. ONE POLE MOTOR OPERATED, VERTICAL BREAK WITH GROUNDING SWITCH ON HINGE SIDE C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	LK-SN-CD-8000-EL-TS-0011-01	GE (FES)	ALSTOM	SPOLT	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4072	501	LCP	SOC	000	BOP	401	003	ML	4072	unit(s)	3	<b>ONE POLE DISCONNECTOR SPOL2T 370 KV 1980A 21 KA x 1s</b> 370 KV, 2550 KV BL 1980 A 21 KA 1 SEC. ONE POLE MOTOR OPERATED, VERTICAL BREAK, WITH TWO GROUNDING SWITCHES C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS HV TERMINALS NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	LK-SN-CD-8000-EL-TS-0011-01	GE (FES)	ALSTOM	SPOL2T	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	R03 - Equipment Tag changed
4078	501	LCP	SOC	000	BOP	401	003	ML	4078	unit(s)	1	<b>ONE POLE BARTHING SWITCH SPVL 370 KV 21 KA x 1s</b> 370 KV, 2550 KV BL 21 KA 1 SEC. ONE POLE MOTOR OPERATED, C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	LK-SN-CD-8000-EL-TS-0011-01	GE (FES)	ALSTOM	SPVL	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4079	501	LCP	SOC	000	BOP	401	003	ML	4079	unit(s)	1	<b>HV DC HIGH SPEED SWITCH</b> ALSTOM TYPE GL 3460, 420 KV CLASS OUTDOOR, 4800A, 40 KA INTERRUPTING, 4 HOLES NEMA GRILLED ALUMINUM TERMINALS GALVANIZED STEEL SUPPORT	LK-SN-CD-8000-EL-TS-0011-01	GE (FES)	ALSTOM-TDC	CH3501070-T	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	To be replaced by a bypass (1 post insulator BOM 4650, 1 steel structure, 2 rigid busbars, 2 HV connectors) if not available

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																					
SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No.: ILK-AS-3D-553D-EL-001-0001-01		Rev No.: 03									
Major Equipments										ALSTOM Document No.: LCP-SCC-005-BOP-001-005-ML		Rev No.: 01									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
4080	501	LCP	SOC	000	BOP	401	003	ML	4080	unit(s)	S1CT1 S2CT1 CBL1CT1 CBL2CT1 CBL3CT1	5	<b>DC CURRENT TRANSFORMER 1425 kV BIL</b> Type COSI CT Maximum system voltage 393 kV BIL 1425 kV Creepage 23500 mm	ILK-SN-CD-8000-EL-TS-0010-01	GE (FES)	DT	JR101920.171450V1+03	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4090	501	LCP	SOC	000	BOP	401	003	ML	4090	unit(s)	S1C1 S2C1	2	<b>DC LINE FAULT LOCATOR</b> Rated voltage 350,5 kV 0,00 uF BIL 354 kV (HV-LV and HV-GND) BIL 125 kV (LV-GND) HV terminal - 4 NEMA holes Two bushings capacitor unit 6509 V, 80,06 uF, 125 kV BIL	ILK-SN-CD-8000-EL-TS-0016-01	GE (SBC)	TBO		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4092	501	LCP	SOC	000	BOP	401	003	ML	4092	unit(s)		2	<b>WAVEFRONT DETECTION UNIT</b> WAVEFRONT DETECTION UNIT FOR LINE FAULT LOCATOR	ILK-SN-CD-8000-EL-TS-0016-01	GE (FES)	TBO		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	R03 - Equipment Tag removed
4192	501	LCP	SOC	000	BOP	401	003	ML	4192	unit(s)		1	<b>DIESEL GENERATOR</b> OUTDOOR TYPE ENCLOSED DIESEL GENERATOR 350 kW, 0,8PF, 437 Kva 208/120V AC, 3#, 4W, 60 Hz K=0,15	ILK-SN-CD-8000-EL-TS-0004-01	GE (SBC)	Wejax		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4281	501	LCP	SOC	000	BOP	401	003	ML	4281	unit(s)	S2T	1	<b>600 KVA, 12500-208/120 Vac POLE MOUNTED SUBSTATION SERVICE TRANSFORMER</b> 600 kVA 12500-208/120 Vac, 5#, 60 Hz Dyn11 Z=5,75%	ILK-SN-CD-8000-EL-TS-0002-01	GE (SBC)	Pioneer		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	R03 - Equipment Tag changed
4283	501	LCP	SOC	000	BOP	401	003	ML	4283	unit(s)	R	1	<b>15 KV POLE MOUNTED RECLOSURE</b> C/w inboard and outboard surge arresters and surge arrester supports		GE (SBC)	TBO		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	R03 - Equipment Tag changed

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																						
SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Insulators											NALCOR Document No. : ILK-AS-SD-8520-EL-G01-0001-01 Rev No. : 03											
											ALSTOM Document No. : LCP-SOC-000-BOP-401-003-ML Rev No. : 03											
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments				
4660	501	LCP	SOC	000	BOP	401	003	ML	4660	unit(s)			19	DC POST-TYPE INSULATOR Post-Type Insulator Solid core porcelain insulator, semiconducting glazing, BIL 2550 kV, Creepage distance 27292 mm Cantilever strength 12.5 kN. Caps : Top section: ductile iron hot-dip galvanized, 8 holes 18 mm, 254 BC, Base section - ductile iron hot-dip galvanized, 8 holes 18 mm diam, 356 mm BC, Height : 7500 mm, Porcelain core porcelain BIL 2550 kV	ILK-SN-CD-8000-EL-TS-0012-01	GE (PES)	PPC	35227-C12,5-2550	CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4661	501	LCP	SOC	000	BOP	401	003	ML	4661	unit(s)			2	DC POST-TYPE UNDERHUNG INSULATOR 2550 kV BIL Post-Type Underhung Insulator Solid core porcelain insulator, semiconducting glazing, BIL 2550 kV, Creepage distance 27292 mm Cantilever strength 12.5 kN. Caps : Top section: ductile iron hot-dip galvanized, 8 holes 18 mm, 254 BC, Base section - ductile iron hot-dip galvanized, Epoxy post-type insulator 5 kV	ILK-SN-CD-8000-EL-TS-0012-01	GE (PES)	PPC		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4660	501	LCP	SOC	000	BOP	401	003	ML	4660	unit(s)			Batch	5 kV epoxy post insulator 60 kV BIL For indoor application. Height: 89 mm approx. Top insert: 1 hole 12.7 mm Bottom insert: 1 hole 12.7 mm	ILK-SN-CD-8000-EL-TS-0012-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4660	501	LCP	SOC	000	BOP	401	003	ML	4660	unit(s)			3	SILICONE LINE POST INSULATOR 35 kV 35 kV Silicone post insulator 150kV Positive Critical Impulse Flashover For outdoor application. Section Length: 424 mm (16.7in) approx. CSA Class LP25M K-LINE INSULATORS # KL355_K Or Equivalent	ILK-SN-CD-8000-EL-TS-0012-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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nalcor energy	Lower Churchill Converters and Transition Compounds Project											96							
SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Cables & Bus Bars											NALCOR Document No. : ILK-AS-SD-0520-EL-001-001-01 Rev No. : 04								
											ALSTOM Document No. : LCP-SOC-000-BOP-401-003-01L Rev No. : 05								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
5008	501	LCP	SOC	000	BOP	401	003	ML	5006	unit(s)	SEAMLESS TUBULAR BUS BAR 127 mm IPS SCH. 40 Aluminum alloy T6101-T6 Outside diameter: 141,3 mm Inside diameter: 128,2 mm Length: 12 m	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	RYERSON		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5020	501	LCP	SOC	000	BOP	401	003	ML	5020	m	1750 MCM AAC CONDUCTOR Aluminum alloy conductor, 61 strands, Code: Jasmine Diameter: 38,74 mm, Section: 886 mm², Linear weight: 2,44 kg/m	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Westburne		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5025	501	LCP	SOC	000	BOP	401	003	ML	5025	m	1/0 AWG AAC CONDUCTOR MONTREAL Diameter: 10,04 mm, Linear weight: 167,6 kg/km	ILK-SN-CD-8000-EL-TS-0026-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5026	501	LCP	SOC	000	BOP	401	003	ML	5026	m	#2 AWG ASC CONDUCTOR Aluminum alloy conductor, 7 strands, Code: Iris Diameter: 7,98 mm, Section: 39,7 mm², Linear weight: 105,7 kg/km	ILK-SN-CD-8000-EL-TS-0026-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5040	501	LCP	SOC	000	BOP	401	003	ML	5040	m	SHIELD WIRE CONDUCTOR Alumoweld wire Diameter: 12,4 mm Section: 53,1 mm² Weight: 0,52 kg/m	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Westburne		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5061	501	LCP	SOC	000	BOP	401	003	ML	5061	unit(s)	CABLE SEALING END Cable sealing end		MCT			CD0501	MCT		

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nalcor energy	Lower Churchill Converters and Transition Compounds Project												GE									
SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS												NALCOR Document No. : ILK-AS-SD-8520-EL-G01-0001-01	Rev No. : 04									
Compression & Strain Relief Connectors												ALSTOM Document No. : LCP-SOC-600-BOP-401-003-01L	Rev No. : 05									
Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
5270	501	LCP	SOC	000	BOP	401	003	ML	5270	unit(s)		Batch	ALUMINUM STRAIN RELIEF CONNECTOR Strain relief connector for connecting 4/0 AWG copper cable to a junction box.	ILK-SN-CD-8000-EL-TS-0026-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5272	501	LCP	SOC	000	BOP	401	003	ML	5272	unit(s)		Batch	ALUMINUM STRAIN RELIEF CONNECTOR FOR P&C AND ELECTRICAL PANELS Strain relief connector for connecting various sizes of cable to P&C, electrical and power panels.	ILK-SN-CD-8000-EL-TS-0026-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5273	501	LCP	SOC	000	BOP	401	003	ML	5273	unit(s)		Batch	ROXTEC TERMINATIONS FOR PES P&C PANELS	ILK-SN-CD-8000-EL-TS-0026-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-8520-EL-G01-0001-01		Rev No. : 04								
Grounding										ALSTOM Document No. : LCP-SOC-400-BOP-401-003-ML		Rev No. : 05								
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
5300	501	LCP	SOC	000	BOP	401	003	ML	5300	unit(s)		Batch	GROUND CONDUCTOR #2 AWG, Cu #2 AWG stranded copper conductor, Bare concentric, Lay stranded, 7 strands.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5302	501	LCP	SOC	000	BOP	401	003	ML	5302	unit(s)		Batch	GROUND CONDUCTOR 4/0 AWG, Cu 4/0 AWG stranded copper conductor, Bare concentric, Lay stranded, 19 strands.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5305	501	LCP	SOC	000	BOP	401	003	ML	5305	unit(s)		Batch	1 KV INSULATED GROUND CONDUCTOR 4/0 AWG, Cu, YELLOW / GREEN 4/0 AWG stranded copper conductor, 1 KV insulated yellow / green Lay stranded, 19 strands.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5307	501	LCP	SOC	000	BOP	401	003	ML	5307	unit(s)		Batch	COPPER BUSBAR 50 mm x 5 mm Copper busbar Dimensions: 50 mm x 5 mm	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5314	501	LCP	SOC	000	BOP	401	003	ML	5314	unit(s)		Batch	WELDED CONNECTION TYPE VS FOR 4/0 AWG CONDUCTOR TO FLAT STEEL Welded connection for vertical conductor to vertical flat steel surface type VS, Conductor down at 45° Conductor size: 4/0 AWG Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5315	501	LCP	SOC	000	BOP	401	003	ML	5315	unit(s)		Batch	WELDED CONNECTION TYPE VS FOR 4/0 AWG CONDUCTOR TO VERTICAL PIPE 31,75 mm - 101,6 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VS, Conductor down at 45° Conductor size: 4/0 AWG Pipe size: 31,75 mm - 101,6 mm IPS Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5316	501	LCP	SOC	000	BOP	401	003	ML	5316	unit(s)		Batch	WELDED CONNECTION TYPE VS FOR 4/0 AWG CONDUCTOR TO VERTICAL PIPE 101,6 mm - 152,4 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VS, Conductor down at 45° Conductor size: 4/0 AWG Pipe size: 101,6 mm - 152,4 mm IPS Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5317	501	LCP	SOC	000	BOP	401	003	ML	5317	unit(s)		Batch	WELDED CONNECTION TYPE VF FOR #2 AWG CONDUCTOR TO VERTICAL PIPE 38,1 mm - 101,4 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VF, Conductor up to vertical steel pipe, Conductor size: #2 AWG Pipe size: 38,1 mm - 101,4 mm IPS Welding cartridge # 85	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5318	501	LCP	SOC	000	BOP	401	003	ML	5318	unit(s)		Batch	WELDED CONNECTION TYPE VN FOR #2 AWG CONDUCTOR TO RIGHT HAND SIDE OF HORIZONTAL PIPE 31,75 mm IPS Welded connector type VN Conductor to the right hand side of the horizontal steel pipe, Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 45	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS													NALCOR Document No. : ILK-A5-SD-8520-EL-G01-0001-01		Rev No. : 04				
Grounding													ALSTOM Document No. : LCP-SOC-000-SOP-401-003-ML		Rev No. : 05				
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5319	501	LCP	SOC	000	BOP	401	003	ML	5319	unit(s)	WELDED CONNECTION TYPE VN FOR #2 AWG CONDUCTOR TO LEFT HAND SIDE OF HORIZONTAL PIPE 31,75 mm IPS  Welded connector type VN Conductor to the left hand side of the horizontal steel pipe. Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 45	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5320	501	LCP	SOC	000	BOP	401	003	ML	5320	unit(s)	WELDED CONNECTION TYPE HC FOR #2 AWG HORIZONTAL CONDUCTOR TO SIDE OF HORIZONTAL PIPE 31,75 mm IPS  Welded connection through horizontal conductor to side of horizontal steel pipe type HC. Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 45	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5323	501	LCP	SOC	000	BOP	401	003	ML	5323	unit(s)	WELDED PARALLEL CONNECTION TYPE PT FOR TWO 4/0 AWG HORIZONTAL CONDUCTORS  Horizontal parallel through connection for two horizontal cables Cable run: 4/0 AWG Cable tap: 4/0 AWG Welding cartridge # 200	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5328	501	LCP	SOC	000	BOP	401	003	ML	5328	unit(s)	WELDED CONNECTION TYPE VS FOR 4/0 AWG CONDUCTOR TO VERTICAL PIPE 152,4 mm - 254 mm IPS  Welded connection for vertical conductor to side of vertical steel pipe type VS. Conductor down at 45° Conductor size: 4/0 AWG Pipe size: 152,4 mm - 254 mm IPS Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5330	501	LCP	SOC	000	BOP	401	003	ML	5330	unit(s)	COMPRESSION CONNECTOR TYPE CRIMPIT TYPE YC2C4  C- shape compression connector for making tap or parallel copper connections. Run: 2 Sol. - 2 Str Tap: 8 Sol. - 4 Str.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5331	501	LCP	SOC	000	BOP	401	003	ML	5331	unit(s)	COMPRESSION CONNECTOR TYPE C  C- shape compression connector for making tap or parallel copper connections. Run: 3/0 Str. - 250 MCM Tap: 3/0 Str. - 250 MCM	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5332	501	LCP	SOC	000	BOP	401	003	ML	5332	unit(s)	COMPRESSION CONNECTOR TYPE C  C- shape compression connector for making tap or parallel copper connections. Run: 3/0 Str. - 250 MCM Tap: #6 AWG - 2/0 AWG	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5350	501	LCP	SOC	000	BOP	401	003	ML	5350	unit(s)	COMPRESSION TERMINAL 1 HOLE  Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5351	501	LCP	SOC	000	BOP	401	003	ML	5351	unit(s)	COMPRESSION TERMINAL 2 HOLES  Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to NEMA 2 terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5354	501	LCP	SOC	000	BOP	401	003	ML	5354	unit(s)	COMPRESSION TERMINAL 1 HOLE  Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole 90° terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8520-EL-G01-001-01		Rev No. :							
Grounding											ALSTOM Document No. : LCP-SOC-000-BOP-401-003-ML		Rev No. :							
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5357	501	LCP	SOC	000	BOP	401	003	ML	5357	unit(s)	Batch	COMPRESSION TERMINAL 1 HOLE Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole 8 mm terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5358	501	LCP	SOC	000	BOP	401	003	ML	5358	unit(s)	Batch	COMPRESSION TERMINAL 1 HOLE Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole 10 mm terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5370	501	LCP	SOC	000	BOP	401	003	ML	5370	unit(s)	Batch	GROUND CONNECTOR FOR ONE COPPER CABLE TO BAR TYPE GB29W High copper alloy tin plated ground connector for joining one 2/0 Sol - 250 MCM copper conductor to flat bar. Complete with bolts nuts and lock washers.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5371	501	LCP	SOC	000	BOP	401	003	ML	5371	unit(s)	Batch	GROUND CONNECTOR FOR TWO COPPER CABLES TO BAR TYPE GG2929W High copper alloy tin plated ground connector for joining two 2/0 Sol - 250 MCM parallel copper conductors to flat bar. Complete with bolts nuts and lock washers for 10 mm bar.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5372	501	LCP	SOC	000	BOP	401	003	ML	5372	unit(s)	Batch	GROUND CONNECTOR FOR ONE COPPER CABLE TO BAR TYPE GB29W High copper alloy tin plated ground connector for joining one 2/0 Sol - 250 MCM copper conductor to flat bar. Complete with bolts nuts and lock washers for 10 mm bar.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5376	501	LCP	SOC	000	BOP	401	003	ML	5376	unit(s)	Batch	COMPRESSION GROUND CONNECTOR FOR TWO HOLES TERMINAL TO STEEL BEAM Compression terminal type Bundry YGIB-W028-338-2N #2-40AWG Flat steel thickness 6mm	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5377	501	LCP	SOC	000	BOP	401	003	ML	5377	unit(s)	Batch	RAISED FLOOR PEDESTAL GROUND CONNECTOR FOR COPPER CABLE 2/0 AWG TO RAISED FLOOR PEDESTAL TYPE BUNDRY GXP1828RF	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5378	501	LCP	SOC	000	BOP	401	003	ML	5378	unit(s)	Batch	GROUND CONNECTOR FOR THREE CABLES TO BAR TYPE GE2929 High copper alloy tin plated ground connector for joining three #4 Sol - 2/0 Str parallel copper conductors to flat bar. Complete with bolts nuts and lock washers for 10 mm bar.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5380	501	LCP	SOC	000	BOP	401	003	ML	5380	unit(s)	Batch	TIN PLATED FLEXIBLE COPPER GROUND BRAID 25mm LARGE X 200 mm LONG. PADS: 1 hole 12mm	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5390	501	LCP	SOC	000	BOP	401	003	ML	5390	unit(s)	Batch	GROUNDING MAT Galvanized steel gradient control mat. Dimensions: 1800 mm x 1200 mm Galvanized steel with 150 mm square mesh. Complete with 3 grounding connectors type GB for connecting 4/0 AWG ground conductor.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		

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SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-9520-EL-G01-0001-01		Rev No. : 01A									
Grounding											ALSTOM Document No. : LCP-SOC-000-BOP-401-003-ML		Rev No. : 05									
Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
5395	501	LCP	SOC	000	BOP	401	003	ML	5395	unit(s)		Batch	<b>PVC COATED STEEL CLAMP</b> One hole PVC coated steel clamp. Scepter type CS or equal. For fixing 4/0 AWG grounding conductor.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05			
5397	501	LCP	SOC	000	BOP	401	003	ML	5397	unit(s)		Batch	<b>SLEEVE</b> For 4/0 AWG copper conductor CADWELD type S-428-F-2516	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03			
5398	501	LCP	SOC	000	BOP	401	003	ML	5398	unit(s)		Batch	<b>FLAT OMEGA HOLDER</b> Galvanized steel flat omega holder for fixing epoxy insulator on the wall. Distance from the wall: 50 mm. Opening: 100 mm. Wall mounting hardware diameter: 6.4 mm. Insulator mounting hole: 1 hole 14 mm	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03			

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SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8529-EL-091-0091-01		Rev No. : 03								
Cable Trenches											ALSTOM Document No. : LCP-SOC-000-BOP-491-003-05L		Rev No. : 08								
Item No.	Contractor Tsg Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
5459	591	LCP	SOC	000	BOP	491	003	ML	6450	m		Batch	PLASTIBETON CABLE TRENCH SEPARATOR 300 mm	ILK-SH-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Hardware & Conduits											NALCOR Document No.: IJK-AS-SO-8520-EL-001-001-01 Rev No.: 04										
											ALSTOM Document No.: LCP-SOC-000-BOP-401-003-ML Rev No.: 03										
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
5515	501	LCP	SOC	000	BOP	401	003	ML	5515	unit(s)		8	<b>DEAD END CLAMP TYPE BURNDY CLW90A-E OR EQUIVALENT</b> High strength aluminum dead end clamp. For dead end attachment of 12,4 mm aluminum wire.	IJK-SN-CD-8000-EL-TS-0026-01	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5516	501	LCP	SOC	000	BOP	401	003	ML	5516	unit(s)		8	<b>HOT DIP GALVANIZED STEEL SHACKLE SIZE 16,9 mm (5/8")</b> Hot dip galvanized steel shackle size 15,9 mm (5/8") - 20126B Ultimate load 177,2 kN (40000 lbs) Opening 24 mm (0.94") Clearance length - 89 mm (3.5") Clw galvanized steel grade 5 bolt 15,9 mm (5/8"), nut (number 143036) and stainless steel cotter pin. Reference drawing number 258235	IJK-SN-CD-8000-EL-TS-0026-01	GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5520	501	LCP	SOC	000	BOP	401	003	ML	5520	unit(s)		Batch	<b>SHIELD WIRE DEAD END ATTACHMENT</b> For dead end attachment of 12,4 mm aluminum wire. Including one dead end clamp (Item 5515) one anchor shackle one ground clamp (Item 5371)	IJK-SN-CD-8000-EL-TS-0026-01	GE (SBC) / ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5521	501	LCP	SOC	000	BOP	401	003	ML	5521	unit(s)		Batch	<b>SHIELD WIRE ATTACHMENT SUBSTATION FEEDER</b> For attachment of 12,4 mm aluminum wire. Including one dead end clamp (Item 5515) one anchor shackle one ground clamp (Item 5372) and one ground clamp (Item 5376)	IJK-SN-CD-8000-EL-TS-0026-01	GE (SBC) / ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5525	501	LCP	SOC	000	BOP	401	003	ML	5525	m		Batch	<b>50 mm FLEXIBLE CORRUGATED ORANGE CONDUIT FOR FO CABLE</b>	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
5526	501	LCP	SOC	000	BOP	401	003	ML	5526	unit(s)		Batch	<b>CONNECTOR FOR 50 mm CORRUGATED ORANGE CONDUIT</b> For connecting 50 mm liquid-tight conduit to a junction box.	IJK-SN-CD-8000-EL-TS-0005-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
5537	501	LCP	SOC	000	BOP	401	003	ML	5537	unit(s)		Batch	<b>PVC CONDUIT 50 mm DIAMETER</b> PVC conduit 50 mm (2") nominal diameter. Electrical type above ground installation.	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5539	501	LCP	SOC	000	BOP	401	003	ML	5539	unit(s)		Batch	<b>PVC CONDUIT 100 mm DIAMETER</b> PVC conduit 100 mm (4") nominal diameter. Electrical type above ground installation.	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5550	501	LCP	SOC	000	BOP	401	003	ML	5550	unit(s)		Batch	<b>PVC CONDUIT 50 mm DIAMETER</b> PVC conduit 50 mm diameter Electrical type DB2.	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5555	501	LCP	SOC	000	BOP	401	003	ML	5555	unit(s)		Batch	<b>PVC ELBOW 50 mm DIAMETER, R=600 mm</b> PVC elbow 50 mm diameter Radius: 600 mm Electrical type DB2.	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5557	501	LCP	SOC	000	BOP	401	003	ML	5557	unit(s)		Batch	<b>90° PVC ELBOW 100 mm DIAMETER, R=600 mm</b> 90° PVC elbow 100 mm diameter Radius: 600 mm Electrical type DB2.	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5565	501	LCP	SOC	000	BOP	401	003	ML	5565	unit(s)		Batch	<b>PVC COATED STEEL PIPE STRAP 2 HOLES FOR 50 mm PVC PIPE</b> Two holes PVC coated steel strap For 50 mm PVC pipe.	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																						
SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS Hardware & Conduits													NALCOR Document No. : ILK-AS-SD-8820-EL-G01-0001-01 Rev No. : 03									
													ALSTOM Document No. : LCP-SOC-000-BOP-401-003-ML Rev No. : 05									
Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole City	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5570	501	LCP	SOC	000	BOP	401	003	ML	5570	unit(s)		Batch	TRANSITION COUPLER FOR 50 mm CONDUIT Waterproof transition coupler For joining 50 mm PVC conduit to 50 mm liquid-tight conduit.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5572	501	LCP	SOC	000	BOP	401	003	ML	5572	unit(s)		Batch	TRANSITION COUPLER FOR 100 mm CONDUIT Waterproof transition coupler 100 mm For joining 100 mm PVC conduit to 100 mm liquid-tight conduit.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5575	501	LCP	SOC	000	BOP	401	003	ML	5575	unit(s)		Batch	LIQUID-TIGHT CONDUIT 50 mm DIAMETER Liquid-tight flexible non metallic conduit. Diameter: 50 mm	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5578	501	LCP	SOC	000	BOP	401	003	ML	5578	unit(s)		Batch	LIQUID-TIGHT CONDUIT 100 mm DIAMETER Liquid-tight flexible non metallic conduit. Diameter: 100 mm.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5580	501	LCP	SOC	000	BOP	401	003	ML	5580	unit(s)		Batch	LIQUID-TIGHT CONNECTOR FOR 50 mm CONDUIT Liquid-tight connector for connecting 50 mm liquid-tight conduit to a junction box.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5582	501	LCP	SOC	000	BOP	401	003	ML	5582	unit(s)		Batch	LIQUID-TIGHT CONNECTOR FOR 100 mm CONDUIT Liquid-tight connector for connecting 100 mm liquid-tight conduit to a junction box.	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5585	501	LCP	SOC	000	BOP	401	003	ML	5585	unit(s)		Batch	STAINLESS STEEL STRAP Stainless steel strap 20 mm large for fixing liquid-tight conduit and ground conductor on a steel structure. Complete with buckles.		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR			
5590	501	LCP	SOC	000	BOP	401	003	ML	5590	unit(s)		Batch	ALUMINUM SINGLE SUPERSTRUT CHANNEL A1200 series single aluminum channel Dimensions: 41,3 mm x 41,3 mm Length: 6 m		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR			
5595	501	LCP	SOC	000	BOP	401	003	ML	5595	unit(s)		Batch	ALUMINUM SINGLE SUPERSTRUT PVC END COVER PVC end cover for A1200 series single aluminum channel		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR			

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SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8520-EL-G01-0001-01	Rev No. : 03								
SSTR Hardware											ALSTOM Document No. : LCP-50C-000-BCP-401-003-ML	Rev No. : 05								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
5650	501	LCP	SOC	000	BOP	401	003	ML	5650	unit(s)		Batch	SHORT STUD FOR LINE POST INSULATOR Size 3/4" - 10UNC Length: Long side 57 mm (2-1/4"), Short side 25.7 mm (1") K-LINE INSULATOR # KLOP027 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5651	501	LCP	SOC	000	BOP	401	003	ML	5651	unit(s)		Batch	STANDARD EYEBOLTS, DROP-FORGED HOT DIP GALVANIZED STEEL Bolt Diam: 19 mm (3/4") Size 12.7 mm (1/2") Opening: 38.1 mm (1-1/2") W = 50.8 mm (2-1/2") H = 76.2 mm (3") HUBBEL #6503 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5652	501	LCP	SOC	000	BOP	401	003	ML	5652	unit(s)		Batch	STANDARD MACHINE BOLT (CROSSARM BOLT OR THROUGH BOLT), HOT DIP GALVANIZED STEEL Bolt Length = 304.8mm (12") Thread Length = 152.4mm (6") Dia. 19 mm (3/4") HUBBEL #6912 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5653	501	LCP	SOC	000	BOP	401	003	ML	5653	unit(s)		Batch	LAG SCREW, HOT DIP GALVANIZED Length 127 mm (5") Dia. 12.7 mm (1/2") HUBBEL #508755 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5654	501	LCP	SOC	000	BOP	401	003	ML	5654	unit(s)		Batch	DOUBLE-ARMING FULL THREAD BOLT 19.05 mm (3/4"), HOT DIP GALVANIZED STEEL Completed with 4 square nuts Bolt Length = 406.4 mm (16") HUBBEL #8886 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5655	501	LCP	SOC	000	BOP	401	003	ML	5655	unit(s)		Batch	DOUBLE-ARMING FULL THREAD BOLT 19.05 mm (3/4"), HOT DIP GALVANIZED STEEL Completed with 4 square nuts Bolt Length = 609.6 mm (24") HUBBEL #8894 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5656	501	LCP	SOC	000	BOP	401	003	ML	5656	unit(s)		Batch	GALVANIZED STEEL SQUARE CURVED WASHER Washer size: 102 x 102 x 4.8 mm (4" x 4" x 3/8") Hole Dia. 20.64 mm (13/16") Bolt Dia. 19 mm (3/4") HUBBEL #DF4W15 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5657	501	LCP	SOC	000	BOP	401	003	ML	5657	unit(s)		Batch	LAG SCREW, HOT DIP GALVANIZED Length 51 mm (2") Dia. 6.4 mm (1/4") HUBBEL #722GP or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5658	501	LCP	SOC	000	BOP	401	003	ML	5658	unit(s)		Batch	GALVANIZED STEEL ROUND WASHER Washer size: 2" O.D. X 9 Ga Hole Dia. 20.64 mm (13/16") Bolt Dia. 19 mm (3/4") HUBBEL #8506 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5659	501	LCP	SOC	000	BOP	401	003	ML	5659	unit(s)		Batch	GALVANIZED STEEL SPRING LOCK WASHER Stock: 6 x 4.8 mm (1/4" x 3/16") Hole Dia. 20.64 mm (13/16") Bolt Dia. 19 mm (3/4") HUBBEL #4037 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5660	501	LCP	SOC	000	BOP	401	003	ML	5660	unit(s)		Batch	ROLLED STAPLE COPPER COATED (DIAMONT POINT) length = 50.8mm (2") Inside = 12.7mm (1/2") Width = 4mm (0.162") HUBBEL #9154 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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SSTR Hardware										ALSTOM Document No. : LCP-SOC-000-BOP-401-003-ML		Rev No. : 05									
Item No.	Contractor Tag Number									Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5661	501	LCP	SOC	000	BOP	401	003	ML	5661	unit(s)	Batch	EXTRA HEAVY DUTY ALUMINUM PLATFORM 1067 mm (42") WIDE Inside poles face to face length 5182 mm (17 ft) Beam Length 6086 mm (20 ft) Uniform vertical load: 13813 lb Single center vertical load: 8633 lb Three vertical loads: 3700 lb HUBBEL #CPEHD182		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03			
5662	501	LCP	SOC	000	BOP	401	003	ML	5662	unit(s)	Batch	ALUMINUM ALLOY STRAIGHT BOLTED TERMINAL 1 X 1/8 AAC TO NEMA 4 TERMINAL PAD For connecting 1 x AAC 4/0-266 MCM, ACSR #4-4/0 AWG conductor to NEMA 4 terminal pad. Terminal pad width - 76 mm (3") Complete with stainless steel bolts, nuts and washers. SEPCOR #AFNC-13-4A or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04			
5663	501	LCP	SOC	000	BOP	401	003	ML	5663	unit(s)	Batch	ALUMINUM ALLOY T BOLTED CONNECTOR FOR ALUMINUM CABLE MAIN TO CABLE TAP For cable to cable connection Run: 1 x AAC 4/0-266 MCM, ACSR #4-4/0 AWG conductor Tap: 1 x AAC 4/0-266 MCM, ACSR #4-4/0 AWG conductor Complete with stainless steel bolts, nuts and washers SEPCOR #ACRCT-1313 or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04			
5665	501	LCP	SOC	000	BOP	401	003	ML	5665	unit(s)	Batch	ALUMINUM ALLOY T-CONNECTOR FOR ALUMINUM AND COPPER CABLE TO CABLE Conductor Run or Tap: Aluminum or copper 1/0 Str-290 MCM ACSR 1/0(5-1) - 40(6-1) Width = 56.42 mm (2-3/4") Length = 139.7 mm (5-5/8") Complete with stainless steel bolts, nuts and washers. BURNDY #NNTC29A29A or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03			
5666	501	LCP	SOC	000	BOP	401	003	ML	5666	unit(s)	Batch	TWO HOLE HYLUG CODE CONDUCTOR LONG BARREL For 750 MCM conductor Stud Hole Side 12.7mm (1/2in) Stud hole spacing 45 mm (1-3/4in) Total Length = 174.5mm (6.7in) BURNDY #YA392N or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03			
5667	501	LCP	SOC	000	BOP	401	003	ML	5667	unit(s)	Batch	45 FT SOUTHERN YELLOW PINE POLE Pole length: 13716 mm (45 FT), Class 1 Minimum circumference at top 656 mm (27") Minimum circumference at 6 foot from bottom 1092 mm (43") STELLA-JONES model or equivalent		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03			

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SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-8520-EL-G01-0001-01		Rev No. : 114										
Bolts, Nuts & Washers										ALSTOM Document No. : LCP-SQC-000-BOP-401-003-ML		Rev No. : 05										
Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5702	501	LCP	SOC	000	BOP	401	003	ML	5702	unit(s)		Batch	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=60 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 60 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5709	501	LCP	SOC	000	BOP	401	003	ML	5709	unit(s)		Batch	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=45 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 45 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5707	501	LCP	SOC	000	BOP	401	003	ML	5707	unit(s)		Batch	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=40 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 40 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5710	501	LCP	SOC	000	BOP	401	003	ML	5710	unit(s)		Batch	SILICON BRONZE BOLT 12,7 mm DIAMETER, L=45 mm Hexagonal silicon bronze bolt Diameter: 12,7 mm Length: 45 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5727	501	LCP	SOC	000	BOP	401	003	ML	5727	unit(s)		Batch	GALVANIZED STEEL BOLT 12,7 mm DIAMETER, L=25 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 12,7 mm Length: 25 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5730	501	LCP	SOC	000	BOP	401	003	ML	5730	unit(s)		Batch	STAINLESS STEEL THREADED STUD 6 mm DIAMETER Stainless steel SS304 threaded stud for fastening to structural steel Thread: 6 mm x 20 mm long Shank: 9 mm long		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5732	501	LCP	SOC	000	BOP	401	003	ML	5732	unit(s)		Batch	GALVANIZED STEEL BOLT 15,9 mm DIAMETER, L=80 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 15,9 mm Length: 80 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5735	501	LCP	SOC	000	BOP	401	003	ML	5735	unit(s)		Batch	GALVANIZED STEEL THREADED ROD 12,7 mm DIAMETER Galvanized steel threaded rod Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5740	501	LCP	SOC	000	BOP	401	003	ML	5740	unit(s)		Batch	STAINLESS STEEL NUT 12,7 mm DIAMETER Hexagonal stainless steel nut SS304 Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5743	501	LCP	SOC	000	BOP	401	003	ML	5743	unit(s)		Batch	GALVANIZED STEEL NUT 15,9 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 15,9 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5745	501	LCP	SOC	000	BOP	401	003	ML	5745	unit(s)		Batch	SILICON BRONZE NUT 12,7 mm DIAMETER Hexagonal silicon bronze nut Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5747	501	LCP	SOC	000	BOP	401	003	ML	5747	unit(s)		Batch	GALVANIZED STEEL RECTANGULAR REGULAR SPRING NUT 12,7 mm DIAMETER Galvanized steel rectangular regular spring nut for use with single superstrut channel Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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Bolts, Nuts & Washers										ALSTOM Document No. : LCP-SOC-000-BOP-401-003-ML		Rev No. : 05								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
5748	501	LCP	SOC	000	BOP	401	003	ML	5748	unit(s)		Batch	GALVANIZED STEEL NUT 12,7 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5750	501	LCP	SOC	000	BOP	401	003	ML	5750	unit(s)		Batch	STAINLESS STEEL FLAT WASHER FOR 12,7 mm BOLT DIAMETER Stainless steel flat washer S8316 For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5755	501	LCP	SOC	000	BOP	401	003	ML	5755	unit(s)		Batch	SILICON BRONZE FLAT WASHER FOR 12,7 mm BOLT DIAMETER Silicon bronze flat washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5758	501	LCP	SOC	000	BOP	401	003	ML	5758	unit(s)		Batch	GALVANIZED STEEL FLAT WASHER FOR 12,7 mm BOLT DIAMETER Galvanized steel flat washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5759	501	LCP	SOC	000	BOP	401	003	ML	5759	unit(s)		Batch	GALVANIZED STEEL FLAT WASHER FOR 15,9 mm BOLT DIAMETER Galvanized steel flat washer For bolt diameter 15,9 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5770	501	LCP	SOC	000	BOP	401	003	ML	5770	unit(s)		Batch	STAINLESS STEEL LOCK WASHER FOR 12,7 mm BOLT DIAMETER Stainless steel lock washer S5316 For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5775	501	LCP	SOC	000	BOP	401	003	ML	5775	unit(s)		Batch	SILICON BRONZE LOCK WASHER FOR 12,7 mm BOLT DIAMETER Silicon bronze lock washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5778	501	LCP	SOC	000	BOP	401	003	ML	5778	unit(s)		Batch	GALVANIZED STEEL LOCK WASHER FOR 12,7 mm BOLT DIAMETER Galvanized steel lock washer For bolt diameter 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5782	501	LCP	SOC	000	BOP	401	003	ML	5782	unit(s)		Batch	GALVANIZED STEEL LOCK WASHER FOR 15,9 mm BOLT DIAMETER Galvanized steel lock washer For bolt diameter 15,9 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5790	501	LCP	SOC	000	BOP	401	003	ML	5790	unit(s)		Batch	STAINLESS STEEL BELLEVILLE WASHER FOR 12,7 mm BOLT DIAMETER Stainless steel belleville washer SS 17-7PH For bolt diameter 12,7 mm Flat load: 2857 kg (6300 lbs) approx.		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5791	501	LCP	SOC	000	BOP	401	003	ML	5791	unit(s)		Batch	GALVANIZED STEEL BEVEL WASHER #15,9mm NOM. Galvanized steel bevel washer For bolt diameter 15,9 mm Side dimension: 32 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS											NALCOR Document No. : ILK-AS-SD-8520-EL-001-001-01		Rev No. :							
Bolts, Nuts & Washers											ALSTOM Document No. : LCP-SOC-000-BOP-401-003-ML		Rev No. :							
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
5795	501	LCP	SOC	000	BOP	401	003	ML	5795	unit(s)		Batch	STAINLESS STEEL QUICK BOLT 6 mm DIAMETER Stainless steel quick bolt SS316 Diameter: 6 mm Length: 44 mm Threaded length: 18 mm Complete with nut, flat and lock washer		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5821	501	LCP	SOC	000	BOP	401	003	ML	5821	unit(s)		Batch	GALVANIZED STEEL BOLT 15,9 mm DIAMETER, L=50 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 15,9 mm Length: 50 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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SHOAL COVE TRANSITION COMPOUND BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENTS										NALCOR Document No. : ILK-AS-SD-8520-EL-G01-0001-01		Rev No. : 05									
Connectors										ALSTOM Document No. : LCP-SOC-000-BOP-401-003-ML		Rev No. : 05									
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments			
6701	501	LCP	SOC	000	BOP	401	003	ML	6701	unit(s)		Batch	AL-Corona Ring	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6702	501	LCP	SOC	000	BOP	401	003	ML	6702	unit(s)		Batch	AL-Connector Tube for Disconnector and Earth Switch	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6703	501	LCP	SOC	000	BOP	401	003	ML	6703	unit(s)		Batch	AL-Through Tube To Tube Straight	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6704	501	LCP	SOC	000	BOP	401	003	ML	6704	unit(s)		Batch	AL-Through Tube To Tube at 90 Deg	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6705	501	LCP	SOC	000	BOP	401	003	ML	6705	unit(s)		Batch	AL Tee Tube-Tube-Tube (Right)	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6706	501	LCP	SOC	000	BOP	401	003	ML	6706	unit(s)		Batch	AL-Connector 90 deg Palm Type Tripplex Flexible for Disconnector and ES	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6707	501	LCP	SOC	000	BOP	401	003	ML	6707	unit(s)		Batch	Al-Tee off connector Tube-Triple Flexible	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6708	501	LCP	SOC	000	BOP	401	003	ML	6708	unit(s)		Batch	Al-Tee off connector Single Flexible to Tripplex Flexible	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6709	501	LCP	SOC	000	BOP	401	003	ML	6709	unit(s)		Batch	Al-Spacer for Tripplex Flexible	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6710	501	LCP	SOC	000	BOP	401	003	ML	6710	unit(s)		Batch	AL-Palm Type Straight Tripplex flexible Connector for HSB	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6711	501	LCP	SOC	000	BOP	401	003	ML	6711	unit(s)		Batch	AL-Palm Type straight Tripplex flexible Connector for HV LFL CAP	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6712	501	LCP	SOC	000	BOP	401	003	ML	6712	unit(s)		Batch	Brass- Palm Type Connector for LV LFL CAP	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6713	501	LCP	SOC	000	BOP	401	003	ML	6713	unit(s)		Batch	Brass-Connector for Earthing Cable Plus GY PVC Insulated Cable 12.4mm dia (AWG 40) 5m length	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6714	501	LCP	SOC	000	BOP	401	003	ML	6714	unit(s)		Batch	AL-Palm Type straight Tripplex flexible Connector for SA	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6715	501	LCP	SOC	000	BOP	401	003	ML	6715	unit(s)		Batch	AL-Through and Tee off Tripplex Flexible to Tripplex Flexible (Underhung)	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6716	501	LCP	SOC	000	BOP	401	003	ML	6716	unit(s)		Batch	End Cap with provision for installation of 1X1750MCM AAC (S) 39.72mm Conductor as damping cable	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6717	501	LCP	SOC	000	BOP	401	003	ML	6717	unit(s)		Batch	AL-Bus Support	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6718	501	LCP	SOC	000	BOP	401	003	ML	6718	unit(s)		Batch	AL-Straight-Triplex-Connector	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01
6719	501	LCP	SOC	000	BOP	401	003	ML	6719	unit(s)		Batch	Connector for Cable Sealing End	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)	TBD		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0023-01

Handwritten initials and numbers: "97" and "JMS" (with a signature) in blue ink.

Document Front Sheet		 <small>LOWER CHURCHILL PROJECT</small>		
<b>NE-LCP Contractor/Supplier</b>	Contract or Purchase Number and Description: CD0501-001 Lower Churchill Converters and Transition Compounds	Contractor/Supplier Name: Alstom Grid Canada ULC.		
	Document Title: Soldiers Pond Converter Station Bill of Material - High Voltage Equipment	Total Number of Pages Incl. Front Sheet 61		
	Contractor Document Number: LCP-SOP-000-BOP-401-001-ML	Revision Number: 05		
	Supplier Document Number:	Revision Number:		
	NE-LCP Document Number: ILK-AS-SD-8221-EL-G01-0001-01	NE-LCP Issue Number: B4		
	Approver's Signature:	Date (20-Jan-2017):	Review Class:	
	Comments:	Equipment Tag or Model Number:		
<b>NE-LCP</b>	<small>REVIEW DOES NOT CONSTITUTE APPROVAL OF DESIGN DETAILS, CALCULATIONS, TEST METHODS OR MATERIAL DEVELOPED AND/OR SELECTED BY THE CONTRACTOR, NOR DOES IT RELIEVE THE CONTRACTOR FROM FULL COMPLIANCE WITH CONTRACTUAL OR OTHER OBLIGATIONS.</small> 01 - REVIEWED AND ACCEPTED - NO COMMENTS 02 - REVIEWED - INCORPORATE COMMENTS, REVISE AND RESUBMIT 03 - REVIEWED - NOT ACCEPTED 04 - INFORMATION ONLY 05 - NOT REVIEWED			
	Lead Reviewer:	Date (dd-mmm-yyyy):	Project Manager:	Date (dd-mmm-yyyy):
	NE-LCP Management:	Date (dd-mmm-yyyy):		
	General Comments:			

97 JM WL

Labrador-Island Link Limited Partnership  
Contract CD0501-001

Lower Churchill Converters and Transition Compounds Project

**SOLDIERS POND CONVERTER STATION  
BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT**

PHA-ILK-AS-SD-8221-EL-G01-0001-01	REV
PHA-LCP-SOP-000-BOP-401-001-ML	02
ASSUMPTION: PRIORITY 1 _ FEEDER1 _ AC FILTER F2 + F3 (Refer to SLD signed on 02/03/2017)	

							
PREPARED	20-Jan-17	Ivo Georgiev	IG	PROJECT Lower Churchill Converters and Transition Compounds Project			
VERIFIED	20-Jan-17	Asbed Kojakian	AK	TITLE Soldiers Pond Converter Station Bill of Material - High Voltage Equipment			
APPROVED	20-Jan-17	Eric Guimond	EG				
	DATE	NAME	SIGNATURE				
Alstom document number LCP-SOP-000-BOP-401-001-ML			Alstom Revision 05	Nalcor document number ILK-AS-SD-8221-EL-G01-0001-01		LCP Status B4	
Internal document number (when applicable)			Internal Revision			Page 02	TOTAL Sheets 52

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SCHEDULE OF MODIFICATIONS

COMPANY REV	CONTRACTOR REV	DATE	PREP.	VER.	APP.	MODIFICATION CONTENTS	PAGE / SECTION
A1	01	8-Sep-15	IG	AK	EG	Original issue	
B1	02	3-Jun-16	IG	AK	EG	Issued for Implementation and Use	
B2	03	27-Oct-16	IG	AK	EG	Issued for Implementation and Use	
B3	04	20-Jan-17	IG	AK	EG	Issued for Implementation and Use	
B4	05	20-Jan-17	IG	AK	EG	Issued for Implementation and Use	

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Reference drawings

ILK-AS-SD-822D-EL-B04-0001-01	SOLDIERS POND CONVERTER STATION/AC YARD POLE 1 SIDE/PLAN VIEW AND SECTIONS
ILK-AS-SD-822R-EL-B04-0001-01	SOLDIERS POND CONVERTER STATION/AC YARD POLE 2 SIDE/PLAN VIEW AND SECTIONS
ILK-AS-SD-8220-EL-D99-0003-01	SOLDIERS POND OUTDOOR HIGH VOLTAGE/EQUIPMENT MOUNTING DETAILS-AC YARDS
ILK-AS-SD-8220-EL-D99-0022-01	SOLDIERS POND OUTDOOR HIGH VOLTAGE/EQUIPMENT MOUNTING DETAILS-DC YARDS
ILK-AS-SD-8220-EL-D99-0023-01	SOLDIERS POND OUTDOOR HIGH VOLTAGE/EQUIPMENT MOUNTING DETAILS-AC FILTER
ILK-AS-SD-822B-EL-B04-0001-01	SOLDIERS POND CONVERTER STATION/CONVERTER TRANSFORMER & AC DELTA/STAR POLE 1/PLAN VIEW AND SECTIONS
ILK-AS-SD-822P-EL-B04-0001-01	SOLDIERS POND CONVERTER STATION/CONVERTER TRANSFORMER & AC DELTA/STAR POLE 2/PLAN VIEW AND SECTIONS
ILK-AS-SD-822G-EN-B01-0001-01	SOLDIERS POND /VALVE HALL POLE 1/GENERAL ARRANGEMENTS
ILK-AS-SD-822U-EN-B01-0001-01	SOLDIERS POND /VALVE HALL POLE 2/GENERAL ARRANGEMENTS
ILK-AS-SD-822B-EL-B01-0001-01	SOLDIERS POND /DC YARD /GENERAL ARRANGEMENT
ILK-AS-SD-8221-EL-B99-0002-01	SOLDIERS POND CONVERTER STATION/GENERAL GROUNDING GRID LAYOUT
ILK-AS-SD-8221-EL-B99-0003-01	SOLDIERS POND CONVERTER STATION/CONTROL BUILDING/GROUNDING PLAN
ILK-AS-SD-8220-EL-B06-0001-01	SOLDIERS POND BUILDING AND OUTDOOR CABLE TRAYS AND TRENCHES - GENERAL ARRANGEMENT LAYOUT AND SECTIONS

BPE-HP1153 - BBA Cable tray BOM reference number on hold

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**BILL OF MATERIAL (BOM)**

LCP-NALCOR

SOLDIERS POND CONVERTER STATION  
BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT

Legend	Description	Examples	Seal(s)
00XX	AC-DC Room & Battery	AC-DC Room & Battery	
10XX	Control room	Control and PBC rooms equipment	
22XX	Cable Trays	Cable trays and accessories	
39XX	AC Filters Major Equipment	CT, Surge arresters, Reactors, Resistors, Capacitors	
40XX	DC Major Equipment	Breakers, Disconnect switches, CT, VD, SA, Reactors, Capacitors	
41XX	AC Major Equipment	Transformers, Breakers, Disconnect switches, CVT, CT, Surge arresters	
45XX	Cabinets & Junction boxes	Equipment cabinets, Junction Boxes	
46XX	Insulators	Post Insulators, String Insulators	
50XX	Cables & Bus Bars	Tubular bus bars, Aluminum conductors, Cables, Shield wires	
51XX	AC Yard Connectors	Bolted connectors, Welded connectors, Conductor spacers, Bus supports, Flexible braids,	
52XX	Compression Connectors & Strain Relief Connectors	Compression connectors, Strain relief connectors	
53XX	Grounding	Grounding conductors, Rods, Grounding connectors (welded, compression, bolted) and braids, Grounding mats, Fence grounding material	
54XX	Cable Trenches	Prefabricated cable trenches and fittings	
55XX	Hardware & Conduits	Overhead line hardware, Shield wire hardware, PVC conduits and fittings, Steel conduits and fittings, Flexible conduits and fittings	
57XX	Bolts, Nuts and Washers	Bolts, Nuts, Lock washers, Flat washers, Belleville washers, Threaded rods, Threaded studs	
61XX	Valve Hall Connectors	Bolted connectors, Conductor spacers, Bus supports	
62XX	DC Yard Connectors	Bolted connectors, Conductor spacers, Bus supports	
63XX	Star-Delta Connectors	Bolted connectors, Conductor spacers, Bus supports	
64XX	AC Filters Connectors	Bolted connectors, Conductor spacers, Bus supports	
	Consolidated BOM List		

NE Document no	Rev	Document no	Rev	Sheet	Following Sheet	Last Sheet
ILK-AS-SD-8221-EL-G01-0001-01	B4	LCP-SOP-000-BOP-401-001-ML	05	5	6	52

*97 July ML*

 Lower Churchill Converters and Transition Compounds Project																					
SOLDIERS POND CONVERTER EQUIPMENT											NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01		Rev No. : R4								
											ALSTOM Document No. : LCP-SOP-000-BOP-001-001-ML		Rev No. : 05								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
0001	501	LCP	SOP	000	BOP	401	001	ML	0001	unit(s)	8225-CP-87-0001 8225-CP-87-0002	2	HMI CONTROL PANEL		GE (SBC)	Batteries de la Capitale		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0030	501	LCP	SOP	000	BOP	401	001	ML	0030	unit(s)	822J-BAT-84-1001 822J-BAT-84-2001 822X-BAT-84-1001 822X-BAT-84-2001	2	125 VDC BATTERY		GE (SBC)	Batteries de la Capitale		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0031	501	LCP	SOP	000	BOP	401	001	ML	0031	unit(s)	8225-BAT-85-1001 8225-BAT-85-2001	2	48 VDC BATTERY		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0032	501	LCP	SOP	000	BOP	401	001	ML	0032	unit(s)	8222-CP-87-0004 8222-CP-87-0005	2	AUXILIARY AC-DC CONTROL PANEL		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0033	501	LCP	SOP	000	BOP	401	001	ML	0033	unit(s)	822J-MCC-82-1002 822J-MCC-82-2002 822X-MCC-82-1002 822X-MCC-82-2002		VALVE COOLING SYSTEM-LV		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0034	501	LCP	SOP	000	BOP	401	001	ML	0034	unit(s)	822J-SW-82-1002 822J-SW-82-2002	2	VALVE COOLING LV DISCONNECT SWITCH		GE (SBC)			CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0035	501	LCP	SOP	000	BOP	401	001	ML	0035	unit(s)	822J-DPB-82-1001 822J-DPB-82-2001 822X-DPB-82-1001 822X-DPB-82-2001	4	SWITCHBOARD		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0036	501	LCP	SOP	000	BOP	401	001	ML	0036	unit(s)	8225-SWG-82-0003	1	EMERGENCY SWITCHGEAR		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0037	501	LCP	SOP	000	BOP	401	001	ML	0037	unit(s)	8225-SWG-82-0001 8225-SWG-82-0002	2	MAIN SWITCHGEAR		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0040	501	LCP	SOP	000	BOP	401	001	ML	0040	unit(s)	822J-CHR-84-1001 822J-CHR-84-1002 822J-CHR-84-2001 822J-CHR-84-2002	4	125 VDC BATTERY CHARGER		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0041	501	LCP	SOP	000	BOP	401	001	ML	0041	unit(s)	8225-CHR-85-1001 8225-CHR-85-1002 8225-CHR-85-2002 8225-CHR-85-2001	4	48 VDC BATTERY CHARGER		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0042	501	LCP	SOP	000	BOP	401	001	ML	0042	unit(s)	822J-FU-84-1001 822J-FU-84-2001	2	125 VDC FUSE BOX		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0043	501	LCP	SOP	000	BOP	401	001	ML	0043	unit(s)	8225-FU-85-1001 8225-FU-85-2001	2	48 VDC FUSE BOX		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0044	501	LCP	SOP	000	BOP	401	001	ML	0044	unit(s)	822J-DPB-84-1001 822J-DPB-84-1001 822J-DPB-84-2001 822J-DPB-84-2001	4	125 VDC MAIN PANEL		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0045	501	LCP	SOP	000	BOP	401	001	ML	0045	unit(s)	8225-DPB-85-1001 8225-CP-85-1001 8225-CP-85-2001	3	48 VDC MAIN PANEL		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0046	501	LCP	SOP	000	BOP	401	001	ML	0046	unit(s)	822J-DPB-84-1004 822J-DPB-84-2004	4	125 VDC OUTDOOR EQUIPMENT distribution Panel		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0047	501	LCP	SOP	000	BOP	401	001	ML	0047	unit(s)	822J-DPB-83-0003 822X-DPB-83-0003	2	BUILDING SERVICES DISTRIBUTION PANEL		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0048	501	LCP	SOP	000	BOP	401	001	ML	0048	unit(s)	822J-DPB-83-0002 822X-DPB-83-0002	2	OUTDOOR EQUIPMENT DISTRIBUTION PANEL 208/120 Vac		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0049	501	LCP	SOP	000	BOP	401	001	ML	0049	unit(s)	822J-DPB-83-0004 822X-DPB-83-0004	2	INDOOR LIGHTING DISTRIBUTION PANEL		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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Lower Churchill Converters and Transition Compounds Project



SOLDIERS POND CONVERTER EQUIPMENT

NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01  
 ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML

Rev No. : F14  
 Rev No. : 05

Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
0050	501	LCP	SOP	000	BOP	401	001	ML	0050	unit(s)	822J-T-83-0003 822X-T-83-0003	2	BUILDING SCE AUXILIARY TRANSFORMER		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0051	501	LCP	SOP	000	BOP	401	001	ML	0051	unit(s)	822J-T-83-0002 822X-T-83-0002	2	OUTDOOR EQUIPMENT AUXILIARY TRANSFORMER		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0052	501	LCP	SOP	000	BOP	401	001	ML	0052	unit(s)	822J-T-83-0004 822X-T-83-0004	2	INDOOR LIGHTING AUXILIARY TRANSFORMER		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0053	501	LCP	SOP	000	BOP	401	001	ML	0053	unit(s)	822J-T-83-0005 822X-T-83-0005	2	AC-DC YARD LIGHTING AUXILIARY TRANSFORMER		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0054	501	LCP	SOP	000	BOP	401	001	ML	0054	unit(s)	822X-DPB-83-0005 822J-DPB-83-0005	2	AC-DC YARD LIGHTING DISTRIBUTION PANEL 600/347 Vac		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0055	501	LCP	SOP	000	BOP	401	001	ML	0055	unit(s)	822J-T-83-0008 822J-T-83-0007 822X-T-83-0008	3	F&C AUXILIARY TRANSFORMER 600-20B/120 V		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0056	501	LCP	SOP	000	BOP	401	001	ML	0056	unit(s)	8225-DPB-83-0003		CONTROL PANEL DISTRIBUTION PANEL		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0057	501	LCP	SOP	000	BOP	401	001	ML	0057	unit(s)	822J-CP-83-0004 822X-CP-83-0004	2	INDOOR LIGHTING CONTROL PANEL		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0058	501	LCP	SOP	000	BOP	401	001	ML	0058	unit(s)	822J-CP-83-0005 822X-CP-83-0005	2	AC-DC YARD LIGHTING CONTROL PANEL		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0059	501	LCP	SOP	000	BOP	401	001	ML	0059	unit(s)	8225-T-83-0001	1	CONTROL AUXILIARY TRANSFORMER		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0060	501	LCP	SOP	000	BOP	401	001	ML	0060	unit(s)	8225-DPB-83-0001	1	ESSENTIAL LOAD DISTRIBUTION PANE		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0061	501	LCP	SOP	000	BOP	401	001	ML	0061	unit(s)	8225-UPS-83-0001 8225-UPS-83-0002	1	UPS Panel		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0063	501	LCP	SOP	000	BOP	401	001	ML	0063	unit(s)	8225-ATS-82-0001	1	MANUAL ATS EXTERIOR SECURITY LIGHTING		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0064	501	LCP	SOP	000	BOP	401	001	ML	0064	unit(s)	8225-CP-82-0001	1	EXTERIOR SECURITY LIGHTING CONTROL PANEL		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0065	501	LCP	SOP	000	BOP	401	001	ML	0065	unit(s)	8225-DPB-82-0001		Diesel Panel		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0066	501	LCP	SOP	000	BOP	401	001	ML	0066	unit(s)	822J-DPB-83-0007 822X-DPB-83-0007	2	PROTECTION AND CONTROL DISTRIBUTION PANEL		GE (SBC)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
0067	501	LCP	MFA	000	BOP	401	002	ML	0067	unit(s)	822J-T-82-0001	1	EXTERIOR SECURITY LIGHTING AUXILIARY TRANSFORMER		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0068	501	LCP	SOP	000	BOP	401	001	ML	0068	unit(s)	822J-T-84-0001 822J-T-84-0002 822J-T-84-0003 822J-T-84-0004	4	125 Vdc BATTERY CHARGER TRANSFORMER		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0069	501	LCP	SOP	000	BOP	401	001	ML	0069	unit(s)	822J-SW-82-1003 822J-SW-82-1004 822J-SW-82-2003 822J-SW-82-2004	4	125 Vdc BATTERY CHARGER DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0070	501	LCP	SOP	000	BOP	401	001	ML	0070	unit(s)	822J-SW-82-1008 822J-SW-82-2005 822X-SW-82-1005 822X-SW-82-2005	4	48 Vdc BATTERY CHARGER DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0071	501	LCP	MFA	000	BOP	401	002	ML	0071	unit(s)	822J-SW-82-1010 822X-SW-82-1011	2	OUTDOOR EQUIPMENT AUXILIARY TRANSFORMER DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0072	501	LCP	SOP	000	BOP	401	001	ML	0072	unit(s)	822J-SW-82-1012 822X-SW-82-1012	2	BUILDING SERVICES AUXILIARY TRANSFORMER DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
SOLDIERS POND CONVERTER EQUIPMENT										NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01		Rev No. : 04								
										ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML		Rev No. : 05								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
0073	501	LCP	SOP	000	BOP	401	001	ML	0073	unit(s)	822J-SW-82-1013 822X-SW-82-1013	2	AC/DC YARD LIGHTING TRANSFORMER DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0074	501	LCP	SOP	000	BOP	401	001	ML	0074	unit(s)	822J-SW-82-2010 822X-SW-82-2011	2	PROTECTION AND CONTROL AUXILIARY TRANSFORMER DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0075	501	LCP	MFA	000	BOP	401	002	ML	0075	unit(s)	822J-SW-82-1011 822X-SW-82-2012	1	INDOOR LIGHTING TRANSFORMER DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0076	501	LCP	SOP	000	BOP	401	001	ML	0076	unit(s)	822J-SW-82-1014	1	MANUAL ATS EXTERIOR SECURITY LIGHTING DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0077	501	LCP	SOP	000	BOP	401	001	ML	0077	unit(s)	822J-SW-82-2014	1	UPS PANEL DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0078	501	LCP	SOP	000	BOP	401	001	ML	0078	unit(s)	822J-SW-82-2008	1	CONTROL DISTRIBUTION PANEL TRANSFORMER DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
0081	501	LCP	SOP	000	BOP	401	001	ML	0081	unit(s)	822J-SW-82-1001 822J-SW-82-2001	2	MCC LV DISCONNECT SWITCH		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0082	501	LCP	SOP	000	BOP	401	001	ML	0082	unit(s)	822J-CP-83-0002 822J-CP-83-0007 822S-CP-83-0003 822X-CP-83-0007	4	VOLTAGE DETECTOR CABINET FOR P&C DISTRIBUTION PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0343	501	LCP	SOP	000	BOP	401	001	ML	0343	unit(s)		2	Battery Spill Containment system EAGLE-28-172 Eagle, Floor Anchor, Deluxe NabPills & SOCs Battery Spill Containment system EAGLE-28-172		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
0345	501	LCP	SOP	000	BOP	401	001	ML	0345	unit(s)		1	Eagle, Floor Anchor, Deluxe NabPills & SOCs		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> <b>CONTROL AND P&amp;C ROOMS EQUIPMENT</b>											NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01 ALSTOM Document No. : LCP-SOP-000-BOP-401-001-01L		Rev No. : 03								
													Rev No. : 05								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
1000	501	LCP	SOP	000	BOP	401	001	ML	1000	unit(s)	8222-CP-87-1002 8222-CP-87-2002	2	HMI Panel Type 1 Panel 800x800x750 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - HMI 2 and Dataserver 2 Panel Soldiers Pond Converter Station - Training Operator
1001	501	LCP	SOP	000	BOP	401	001	ML	1001	unit(s)	8222-CP-87-1001 8222-CP-87-2001	2	Communication Interface Panel Type 2 Panel, 916x1050x2200(mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - Communication Interface A Panel Soldiers Pond Converter Station - Communication Interface B Panel
1002	501	LCP	SOP	000	BOP	401	001	ML	1002	unit(s)	8222-CP-87-0001 8222-CP-87-0002	2	Common Control Panel Type 3 Panel, 916x1050x2200(mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldier Pond Converter Station - Common Control Panel 1 Soldier Pond Converter Station - Common Control Panel 2
1003	501	LCP	SOP	000	BOP	401	001	ML	1003	unit(s)	8222-CP-87-0005 8222-CP-87-0004	2	ac/dc Auxiliary service Control Panel Type 4 Panel, 916x1050x2200(mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - Pole 2 ac/dc Auxiliary service Control Panel Soldiers Pond Converter Station - Pole 1 ac/dc Auxiliary service Control Panel
1004	501	LCP	SOP	000	BOP	401	001	ML	1004	unit(s)	822E-CP-87-0004	1	ac Converter Control Panel Type 5 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - Pole 2 ac Converter T5 I/O Control Panel Soldiers Pond Converter Station - Pole 2 ac Converter T5 I/O Control Panel
1005	501	LCP	SOP	000	BOP	401	001	ML	1005	unit(s)	822E-CP-87-0006 822E-CP-87-0005 822E-CP-87-0007	3	AC Filter Control Panel Type 6 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - AC Filter F2 Control Panel Soldiers Pond Converter Station - AC Filter F1 Control Panel Soldiers Pond Converter Station - AC Filter F4 Control Panel Soldiers Pond Converter Station - AC Filter F5 Control Panel Soldiers Pond Converter Station - AC Filter F6 Control Panel Soldiers Pond Converter Station - AC Filter F3 Control Panel
1006	501	LCP	SOP	000	BOP	401	001	ML	1006	unit(s)	822E-CP-87-0003	1	AC Filter Feeder Control Panel Type 7 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - AC Filter Feeder B231 Control Panel Soldiers Pond Converter Station - AC Filter Feeder B341 Control Panel
1007	501	LCP	SOP	000	BOP	401	001	ML	1007	unit(s)	822F-PP-86-0001	1	AC Metering Panel Type 8 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - AC Converter T5 and Filter F4-F5-F6 Feeders Metering Panel Soldiers Pond Converter Station - AC Converter T4 and Filter F1-F2-F3 Feeders Metering Panel
1008	501	LCP	SOP	000	BOP	401	001	ML	1008	unit(s)	822E-PP-86-1003	1	ac Converter Transformer Protection A Panel Type 9 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - Pole 1 ac Converter T4 & Feeder Protection A Panel Soldiers Pond Converter Station - Pole 2 ac Transformer T5 & Feeder Protection A Panel
1009	501	LCP	SOP	000	BOP	401	001	ML	1009	unit(s)	822E-PP-86-2003	1	ac Converter Transformer Protection B Panel Tpe 10 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - Pole 1 ac Converter T4 & Feeder Protection B Panel Soldiers Pond Converter Station - Pole 2 ac Converter T5 and Feeder Protection B Panel
1010	501	LCP	SOP	000	BOP	401	001	ML	1010	unit(s)	822E-PP-86-1004	1	AC Filter Feeder Protection A Panel Type 11 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - AC Filter Feeder B231 Protection A Panel Soldiers Pond Converter Station - AC Filter Feeder B341 Protection A Panel
1011	501	LCP	SOP	000	BOP	401	001	ML	1011	unit(s)	822E-PP-86-2004	1	AC Filter Feeder Protection B Panel Type 12 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - AC Filter Feeder B231 Protection B Panel Soldiers Pond Converter Station - AC Filter Feeder B341 Protection B Panel
1012	501	LCP	SOP	000	BOP	401	001	ML	1012	unit(s)	822E-PP-86-1005 822E-PP-86-1007 822E-PP-86-1006	3	AC Filter Protection Panel A Type 13 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - AC Filter F3 Protection A Panel Soldiers Pond Converter Station - AC Filter F2 Protection A Panel Soldiers Pond Converter Station - AC Filter F4 Protection A Panel
1013	501	LCP	SOP	000	BOP	401	001	ML	1013	unit(s)	822E-PP-86-2005 822E-PP-86-2006 822E-PP-86-2007	3	AC Filter Protection Panel B Type 14 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - AC Filter F2 Protection B Panel Soldiers Pond Converter Station - AC Filter F3 Protection B Panel Soldiers Pond Converter Station - AC Filter F4 Protection B Panel
1014	501	LCP	SOP	000	BOP	401	001	ML	1014	unit(s)	822E-PP-86-1008	1	Bipole Rapid Filter Removal Panel 1 Type 15 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - Bipole Rapid Filter Removal 1 Panel
1015	501	LCP	SOP	000	BOP	401	001	ML	1015	unit(s)	822E-PP-86-2008	1	Bipole Rapid Filter Removal Panel 2 Type 16 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - Bipole Rapid Filter Removal 2 panel
1016	501	LCP	SOP	000	BOP	401	001	ML	1016	unit(s)	822F-PP-86-0001	1	ac Filter 50BF Protection Panel Type 17 Panel, 916x1050x2200 (mm)		GE (SBC)	KELTOUR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Converter Station - ac Filter F1-F2-F3 50BF Protection Panel Soldiers Pond Converter Station - ac Filter F4-F5-F6 50BF Protection Panel

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SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT CONTROL AND P&C ROOMS EQUIPMENT											NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01 Rev No. : 01										
											ALSTOM Document No. : LCP-SOP-900-BOP-401-001-ML Rev No. : 01										
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
1017	501	LCP	SOP	000	BOP	401	001	ML	1017	unit(s)	4561-CP-87-0024 4561-CP-87-0025 4561-CP-87-0022 4561-CP-87-0023	4	Interface HVDC Lane Panel Type 18 Panel.		GE (SBC)	Envitech		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Control Panel - Interface HVDC Pole 2 Lane 1 Panel Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Control Panel - Interface HVDC Pole 2 Lane 2 Panel Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Control Panel - Interface HVDC Pole 1 Lane 1 Panel Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Control Panel - Interface HVDC Pole 1 Lane 2 Panel
1018	501	LCP	SOP	000	BOP	401	001	ML	1018	unit(s)	4562-PP-86-0024 4562-PP-86-0026	2	Protection Panel - HF system A Panel Type 19 Panel.		GE (SBC)	Envitech		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Protection Panel - HF Pole 1 - System A Panel Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Protection Panel - HF Pole 2 - System A Panel
1019	501	LCP	SOP	000	BOP	401	001	ML	1019	unit(s)	4562-PP-86-0041 4562-PP-86-0043	2	Protection Panel - HF system B Panel Type 20 Panel.		GE (SBC)	Envitech		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Protection Panel - HF Pole 1 - System B Panel Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Protection Panel - HF Pole 2 - System B Panel
1020	501	LCP	SOP	000	BOP	401	001	ML	1020	unit(s)	4562-PP-86-0025 4562-PP-86-0027	2	Protection Panel - CT - System A Panel Type 21 Panel.		GE (SBC)	Envitech		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Protection Panel - CT Pole 1 - System A Panel Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Protection Panel - CT Pole 2 - System A Panel
1021	501	LCP	SOP	000	BOP	401	001	ML	1021	unit(s)	4562-PP-86-0042 4562-PP-86-0044	2	Protection Panel - CT - System B Panel Type 22 Panel.		GE (SBC)	Envitech		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Protection Panel - CT Pole 1 - System B Panel Soldiers Pond Terminal Station (SOPTS) - Protection and Control - Protection Panel - CT Pole 2 - System B Panel
1022	501	LCP	SOP	000	BOP	401	001	ML	1022	unit(s)	8226-TP-89-0095	1	ODF INTERFACE PANEL TYPE 1 ODF Interface Panel NEMA 12 Enclosure plate gauge 14 steel. Piano-type hinges. Padlockable device. Removable mounting plate. Dimensions: L=762 mm, H=762 mm, D=600 mm Provided with terminal blocks and internal wiring. Components: Fiber optical board		GE (SBC)	Envitech		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1023	501	LCP	SOP	000	BOP	401	001	ML	1023	unit(s)	8226-TP-89-0003	1	ODF INTERFACE PANEL TYPE 2 ODF Interface Panel NEMA 12 Enclosure plate gauge 14 steel. Piano-type hinges. Padlockable device. Removable mounting plate. Dimensions: L=1526 mm, H=1070 mm, D=600 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks DC/DC Converters Lighting controlled by door switch Heater with thermostat Fiber optical board Ethernet switches		GE (SBC)	Envitech		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1024	501	LCP	SOP	000	BOP	401	001	ML	1024	unit(s)	822E-CP-87-0101	1	Valve Base Electronics 900x1050x2375 (mm)		GE(PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1025	501	LCP	SOP	000	BOP	401	001	ML	1025	unit(s)	822E-PP-86-1101	1	CCPL1 Panels 900x1050x2375 (mm)		GE(PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	Converter Control & Protection Pole 2 Side A Lane 1 Converter Control & Protection Pole 1 Side A Lane 1
1027	501	LCP	SOP	000	BOP	401	001	ML	1027	unit(s)	822E-PP-86-2101	1	CCPL2 Panels 900x1050x2375 (mm)		GE(PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	Converter Control & Protection Pole 1 Side A Lane 2 Converter Control & Protection Pole 2 Side A Lane 2
1029	501	LCP	SOP	000	BOP	401	001	ML	1029	unit(s)	8222-CP-87-1103 8222-CP-87-2103	2	Bipole Control Panel 900x1050x2375 (mm)		GE(PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	Bipole Control Side A Lane 1 Bipole Control Side A Lane 2

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<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT CONTROL AND P&amp;C ROOMS EQUIPMENT</b>													NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01		Rev No. : 04						
													ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML		Rev No. : 04						
Item No.	Contractor Tag Number									Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
1030	501	LCP	SOP	000	BOP	401	001	ML	1030	unit(s)	8222-CP-87-1101	1	Measurement Panel 900x1050x2375 (mm)		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Measurement CC Pole 1 Measurement Pole 2	
1031	501	LCP	SOP	000	BOP	401	001	ML	1031	unit(s)	8222-CP-87-1102	1	DAC Measurement Panel 900x1050x2375 (mm)		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	DAC Measurement Pole 1 DAC Measurement Pole 2	
1032	501	LCP	SOP	000	BOP	401	001	ML	1032	unit(s)	8222-CP-87-1104 8222-CP-87-2104	2	DFR Panel 800x800x2375 (mm)		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Digital Fault Recorder Pole 1 Digital Fault Recorder Pole 2	
1033	501	LCP	SOP	000	BOP	401	001	ML	1033	unit(s)	8222-CP-87-0101 8222-CP-87-0102 8222-CP-87-0103 8222-CP-87-0107 8222-CP-87-0108	5	Profibus Panels 1200x800x2300 (mm)		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Side A Profibus Cabinet A Side A Profibus Cabinet B Side A Profibus Cabinet C Side A Profibus Cabinet G Profibus Interface Cubicle D Profibus Interface Cubicle E Profibus Interface Cubicle F Profibus Interface Cubicle H	
1034	501	LCP	SOP	000	BOP	401	001	ML	1034	unit(s)		1	Ground Fault Detector Panel 630x200x914 (mm)		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Pole 1 - Ground Fault Detector Pole 2 - Ground Fault detector	
1035	501	LCP	SOP	000	BOP	401	001	ML	1035	unit(s)	8222-CP-87-0111	1	Archive Cubicle 800x1000x2100(mm)		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1036	501	LCP	SOP	000	BOP	401	001	ML	1036	unit(s)	8222-CP-87-1005	1	LFL1 Panel 916x1050x2200 (mm)		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1037	501	LCP	SOP	000	BOP	401	001	ML	1037	unit(s)	8222-CP-87-0114	1	Digital Fault Recorder WorkStation		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1038	501	LCP	SOP	000	BOP	401	001	ML	1038	unit(s)	8222-CP-87-0113 8222-CP-87-0120	2	Mechanical Interlocking Panel		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	Pole 1 Mechanical Interlocking Panel Pole 2 Mechanical Interlocking Panel	
1042	501	LCP	SOP	000	BOP	401	001	ML	1042	unit(s)	8222-CP-87-0110	1	DIGITAL FAULT RECORDER COMMON		GE(PES)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05		
1043	501	LCP	SOP	000	BOP	401	001	ML	1043	unit(s)	8225-GPS-87-0001 8225-GPS-87-0002 8225-GPS-87-0003 8225-GPS-87-0004 822E-GPS-87-0001 822E-GPS-87-0002	6	GPS		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1044	501	LCP	SOP	000	BOP	401	001	ML	1044	unit(s)	8225-DPB-84-1001 8225-DPB-84-2001	2	P&C PANEL FOR 125 Vdc		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1045	501	LCP	SOP	000	BOP	401	001	ML	1045	unit(s)	8225-DPB-83-0002 8225-DPB-83-0003	3	P&C PANEL FOR 208/120 Vac		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		
1046	501	LCP	SOP	000	BOP	401	001	ML	1046	unit(s)	8222-CP-87-0003 8222-CP-87-1003	2	Operator Workstation		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04		

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<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT CONTROL AND P&amp;C ROOMS EQUIPMENT</b>											NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01 ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML	Rev No. : 1.1 01								
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detailed Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	SOM Rev updating the Item	Comments
1047	501	LCP	SOP	000	BOP	401	001	ML	1047	unit(s)	822E-TS-87-0001 822E-TS-87-0002 822E-TS-87-0003	3	Temperature sensor for Ac filter control panel		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1048	501	LCP	SOP	000	BOP	401	001	ML	1048	unit(s)	822S-DPB-84-1005	1	Outdoor equipment 125 Vdc DC Yard common panel		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1049	501	LCP	SOP	000	BOP	401	001	ML	1049	unit(s)	822S-DPB-83-1005	1	Outdoor equipment 208/120 Vac DC Yard common panel		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1050	501	LCP	SOP	000	BOP	401	001	ML	1050	unit(s)	822J-DPB-84-1002 822J-DPB-84-2002	2	P&C 125 Vdc DISTRIBUTION PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1051	501	LCP	SOP	000	BOP	401	001	ML	1051	unit(s)	822J-DPB-83-0007	1	P&C 208/120 Vac DISTRIBUTION PANEL		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1052	501	LCP	SOP	000	BOP	401	001	ML	1052	unit(s)	822S-CP-87-0008 8222-CP-87-0008 822E-CP-87-0009 822E-CP-87-0010 822S-CP-87-0009 822S-CP-87-0010	6	LCP panel		LCP		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	MONOPOLE QTY TO BE CONFIRMED BY COMPAGNY IF REQUIRED. CCVT PANEL TO BE CONFIRMED
1055	501	LCP	SOP	000	BOP	401	001	ML	1055	unit(s)	8222-CP-87-1104	1	Digital Fault recorder pole		GE (SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	04	
1056	501	LCP	SOP	000	BOP	401	001	ML	1056	unit(s)	8222-CP-87-1004 8222-CP-87-2004 8222-CP-87-100X	3	PRINTER SAS & PES		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	
1057	501	LCP	SOP	000	BOP	401	001	ML	1057	unit(s)	8222-CP-87-0109	1	INTERFACE ENGINEER WORKSTATION		GE(SBC)		CD0501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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Cable trays												ALSTOM Document No. : LCP-SOP-000-SOP-401-001-ML		Rev No. : 01				
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
2201	501	LCP	SOP	000	BOP	401	001	ML	2201	unit(s)	As Req'd	Galvanized steel cable tray straight section class D, W=300mm, H=100mm, L=3m, Rung spacing 300mm, #SH1-4-12-L12-3 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2202	501	LCP	SOP	000	BOP	401	001	ML	2202	unit(s)	As Req'd	Galvanized steel cable tray straight section class D, W=450mm, H=100mm, L=3m, Rung spacing 300mm, #SH1-4-18-L12-3 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2203	501	LCP	SOP	000	BOP	401	001	ML	2203	unit(s)	As Req'd	Galvanized steel cable tray straight section class D, W=600mm, H=100mm, L=3m, Rung spacing 300mm, #SH1-4-24-L12-3 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2205	501	LCP	SOP	000	BOP	401	001	ML	2205	unit(s)	As Req'd	Galvanized steel cable tray straight section class D, W=900mm, H=100mm, L=3m, Rung spacing 300mm, #SH1-435-L12-3 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2207	501	LCP	SOP	000	BOP	401	001	ML	2207	unit(s)	As Req'd	PERFORATED TRAY TYPE, STRAIGHT SECTION, 3 METERS LENGTH, STEEL HDGAF, 150mm WIDE, 25mm HEIGHT, B-Line by EATON #P025VCG15SS-150-3000-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2208	501	LCP	SOP	000	BOP	401	001	ML	2208	unit(s)	As Req'd	PERFORATED TRAY TYPE, STRAIGHT SECTION, 3 METERS LENGTH, STEEL HDGAF, 400mm WIDE, 25mm HEIGHT, B-Line by EATON #P025VCG15SS-400-3000-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2209	501	LCP	SOP	000	BOP	401	001	ML	2209	unit(s)	As Req'd	PERFORATED TRAY TYPE, STRAIGHT SECTION, 3 METERS LENGTH, STEEL HDGAF, 600mm WIDE, 25mm HEIGHT, B-Line by EATON #P025VCG15SS-600-3000-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2222	501	LCP	SOP	000	BOP	401	001	ML	2222	unit(s)	As Req'd	Galvanized steel 90° horizontal bend, W=450mm, H=100mm, R=600mm, #SHF-4-18-LHB-24 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2223	501	LCP	SOP	000	BOP	401	001	ML	2223	unit(s)	As Req'd	Galvanized steel 90° horizontal bend, W=600mm, H=100mm, R=600mm, #SHF-4-24-LHB-24 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2224	501	LCP	SOP	000	BOP	401	001	ML	2224	unit(s)	As Req'd	Galvanized steel 45° horizontal bend, W=600mm, H=100mm, R=600mm, #SHF-4-24-LHB45-24 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2227	501	LCP	SOP	000	BOP	401	001	ML	2227	unit(s)	As Req'd	90° HORIZONTAL BEND, RADIUS 300mm, STEEL HDGAF, 150mm WIDE, 25mm HEIGHT, B-Line by EATON #PP025VCG15HB-150-30R300-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2228	501	LCP	SOP	000	BOP	401	001	ML	2228	unit(s)	As Req'd	90° HORIZONTAL BEND, RADIUS 300mm, STEEL HDGAF, 400mm WIDE, 25mm HEIGHT, B-Line by EATON #PP025VCG15HB-400-30R300-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2229	501	LCP	SOP	000	BOP	401	001	ML	2229	unit(s)	As Req'd	90° HORIZONTAL BEND, RADIUS 300mm, STEEL HDGAF, 600mm WIDE, 25mm HEIGHT, B-Line by EATON #PP025VCG15HB-600-30R300-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2232	501	LCP	SOP	000	BOP	401	001	ML	2232	unit(s)	As Req'd	Galvanized steel horizontal tee cross, W=600mm, H=100mm, R=600mm, #SHF-4-18-LHT-24 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2233	501	LCP	SOP	000	BOP	401	001	ML	2233	unit(s)	As Req'd	Galvanized steel horizontal tee cross, W=450mm, H=100mm, R=600mm, #SHF-4-24-LHT-24 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2234	501	LCP	SOP	000	BOP	401	001	ML	2234	unit(s)	As Req'd	Galvanized steel horizontal tee cross, W=900mm, H=100mm, R=600mm, #SHF-4-36-LHT-24 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2237	501	LCP	SOP	000	BOP	401	001	ML	2237	unit(s)	As Req'd	HORIZONTAL TEE STEEL HDGAF, RADIUS 300mm, 25mm HEIGHT, 400mm WIDE, B-Line by EATON #PP025VCG15HT-400-R300-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2238	501	LCP	SOP	000	BOP	401	001	ML	2238	unit(s)	As Req'd	Zinc Plated Steel Cover Clamp for Aluminum cable Ladder, H=100mm - with bolts, T & B BABW-4-FCC or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2240	501	LCP	SOP	000	BOP	401	001	ML	2240	unit(s)	As Req'd	Galvanized steel right side reducer, W1=750mm, W2=600mm, H=100mm, #SHF-4-30-24-L-HRR or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2241	501	LCP	SOP	000	BOP	401	001	ML	2241	unit(s)	As Req'd	Galvanized steel right side reducer, W1=600mm, W2=450mm, H=100mm, #SHF-4-24-18-L-HRR or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2242	501	LCP	SOP	000	BOP	401	001	ML	2242	unit(s)	As Req'd	Galvanized steel left side reducer, W1=750mm, W2=600mm, H=100mm, #SHF-4-30-24-L-HLR or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2243	501	LCP	SOP	000	BOP	401	001	ML	2243	unit(s)	As Req'd	Galvanized steel left side reducer, W1=600mm, W2=450mm, H=100mm, #SHF-4-24-18-L-HLR or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2244	501	LCP	SOP	000	BOP	401	001	ML	2244	unit(s)	As Req'd	Galvanized steel right side reducer, W1=900mm, W2=600mm, H=100mm, #SHF-4-36-24-L-HRR or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2245	501	LCP	SOP	000	BOP	401	001	ML	2245	unit(s)	As Req'd	Galvanized steel left side reducer, W1=800mm, W2=600mm, H=100mm, #SHF-4-36-24-L-HRR or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2247	501	LCP	SOP	000	BOP	401	001	ML	2247	unit(s)	As Req'd	STRAIGHT REDUCER, STEEL HDGAF, 25mm HEIGHT, 400mm TO 150mm WIDE, B-Line by EATON #PM025VCG15-SR-400-150-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2248	501	LCP	SOP	000	BOP	401	001	ML	2248	unit(s)	As Req'd	RIGHT REDUCER, STEEL HDGAF, 25mm HEIGHT, 600mm TO 400mm WIDE, B-Line by EATON #PM025VCG15-RR-600-400-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2249	501	LCP	SOP	000	BOP	401	001	ML	2249	unit(s)	As Req'd	LEFT REDUCER, STEEL HDGAF, 25mm HEIGHT, 600mm TO 400mm WIDE, B-Line by EATON #PM025VCG15-LR-600-400-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2257	501	LCP	SOP	000	BOP	401	001	ML	2257	unit(s)	As Req'd	90° VERTICAL OUTSIDE BEND, RADIUS 300mm, STEEL HDGAF, 150mm WIDE, 25mm HEIGHT, B-Line by EATON #PP025VCG15-V90R-300-SA or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2261	501	LCP	SOP	000	BOP	401	001	ML	2261	unit(s)	As Req'd	Galvanized steel 90° vertical outside bend, W=300mm, H=100mm, R=600mm, #SHF-4-12-L-V90-24 or equivalent	IJK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR	CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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Lower Churchill Converters and Transition Compounds Project																			
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT													NALCOR Document No. : I.LK-AS-SD-8221-EL-G01-0001-01		Rev No. : 17.2				
Cable trays													ALSTOM Document No. : LCP-SOP-600-BOP-401-001-ML		Rev No. : 0.6				
Item No.	Contractor Tag Number					Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
2282	501	LCP	SOP	000	BOP	401	001	ML	2282	unit(s)	As Req'd	Galvanized steel 90° vertical outside bend, W=450mm, H=100mm, R=500mm, #SHF-4-18-L-VO90-24 or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2283	501	LCP	SOP	000	BOP	401	001	ML	2283	unit(s)	As Req'd	Galvanized steel 90° vertical outside bend, W=600mm, H=100mm, R=600mm, #SHF-4-24-L-VO90-24 or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2284	501	LCP	SOP	000	BOP	401	001	ML	2284	unit(s)	As Req'd	Galvanized steel 90° vertical outside bend, W=900mm, H=100mm, R=600mm, #SHF-4-36-L-VO90-24 or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2287	501	LCP	SOP	000	BOP	401	001	ML	2287	unit(s)	As Req'd	90° VERTICAL INSIDE BEND, RADIUS 300mm, STEEL HDGAF, 150mm WIDE, 25mm HEIGHT, B-Line by EATON #PF025VCG15-150-VIBDR-300-SA or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2288	501	LCP	SOP	000	BOP	401	001	ML	2288	unit(s)	As Req'd	Hop Dip Galva. TP Support for superstrut, T & B #A210 HDGC or Equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2271	501	LCP	SOP	000	BOP	401	001	ML	2271	unit(s)	As Req'd	HORIZONTAL CROSS SECTION, 600 WIDE, T&B, #SHF-4-24-L-HX-24 or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2272	501	LCP	SOP	000	BOP	401	001	ML	2272	unit(s)	As Req'd	HORIZONTAL CROSS SECTION, 900 WIDE, T&B, #SHF-4-36-L-HX-24 or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2280	501	LCP	SOP	000	BOP	401	001	ML	2280	unit(s)	As Req'd	Galvanized steel straight section cover, W=450 mm, #SHW-18-SFC-3 or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2281	501	LCP	SOP	000	BOP	401	001	ML	2281	unit(s)	As Req'd	Galvanized steel straight section cover, W=600 mm, #SHW-24-SFC-3 or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2282	501	LCP	SOP	000	BOP	401	001	ML	2282	unit(s)	As Req'd	GALVANIZED STEEL HORIZONTAL ADJUSTABLE PLATE, H=100mm T&B #SHW-4-12-HAP or Equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2283	501	LCP	SOP	000	BOP	401	001	ML	2283	unit(s)	As Req'd	GALVANIZED STEEL HORIZONTAL ADJUSTABLE PLATE, H=100mm T&B #SHW-4-18-HAP or Equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2284	501	LCP	SOP	000	BOP	401	001	ML	2284	unit(s)	As Req'd	GALVANIZED STEEL HORIZONTAL ADJUSTABLE PLATE, H=100mm T&B #SHW-4-24-HAP or Equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2286	501	LCP	SOP	000	BOP	401	001	ML	2286	unit(s)	As Req'd	GALVANIZED STEEL HORIZONTAL ADJUSTABLE PLATE, H=100mm T&B #SHW-4-36-HAP or Equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2290	501	LCP	SOP	000	BOP	401	001	ML	2290	unit(s)	As Req'd	Barrier strip galvanized steel, for cable trays (2202' A'2203' with H=100mm), L=3m, #SHW-3-SB-3 or equivalent.	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2288	501	LCP	SOP	000	BOP	401	001	ML	2288	unit(s)	As Req'd	END FIXING PLATE FOR 300mm TRAY WALL PENETRATION, #SHW-4-12-CEP or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2300	501	LCP	SOP	000	BOP	401	001	ML	2300	unit(s)	As Req'd	GALVANIZED STEEL BARRIER STRIP CLAMP, #SPW-8SC or equivalent	I.LK-SN-CD-8000-EL-TS-0009-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2301	501	LCP	SOP	000	BOP	401	001	ML	2301	unit(s)	As Req'd	GALVANIZED STEEL CABLE TRAY VERTICAL ADJUSTABLE PLATE, H=100MM, #SHW-4-VSP or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2302	501	LCP	SOP	000	BOP	401	001	ML	2302	unit(s)	As Req'd	GALVANIZED STEEL CABLE TRAY COMBINATION HOLD DOWN / EXPANSION CLAMP WITH HARDWARE, #SHW-HEC-HDW or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2305	501	LCP	SOP	000	BOP	401	001	ML	2305	unit(s)	As Req'd	GALVANIZED STEEL SUPERSTRUT BRACKET TYPE, T&B #S256-20-HDGC or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2306	501	LCP	SOP	000	BOP	401	001	ML	2306	unit(s)	As Req'd	GALVANIZED STEEL SUPERSTRUT BRACKET TYPE, T&B #S256-26-HDGC or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2307	501	LCP	SOP	000	BOP	401	001	ML	2307	unit(s)	As Req'd	Hop Dip Galva. Head plate for superstrut Channel T&B, #AP232Q HDGC or Equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2308	501	LCP	SOP	000	BOP	401	001	ML	2308	unit(s)	As Req'd	Hop Dip Galva. Head plate for superstrut Channel Back to Back, T&B #AP235SQ HDGC or Equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2310	501	LCP	SOP	000	BOP	401	001	ML	2310	unit(s)	As Req'd	GALVANIZED STEEL SPICE PLATE, H=100mm (4in), T&B #SHW-4-SSP or Equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2317	501	LCP	SOP	000	BOP	401	001	ML	2317	unit(s)	As Req'd	END FIXING PLATE FOR 600mm TRAY WALL PENETRATION, #SHW-4-24-CEP or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2318	501	LCP	SOP	000	BOP	401	001	ML	2318	unit(s)	As Req'd	END FIXING PLATE FOR 750mm TRAY WALL PENETRATION, #SHW-4-30-CEP or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2319	501	LCP	SOP	000	BOP	401	001	ML	2319	unit(s)	As Req'd	END FIXING PLATE FOR 900mm TRAY WALL PENETRATION, #SHW-4-36-CEP or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2321	501	LCP	SOP	000	BOP	401	001	ML	2321	unit(s)	As Req'd	SOLID STRAIGHT SECTION COVER, STEEL HDGAF, 1.5 METER LENGTH, 150 WIDE, B-Line by EATON #PCFSG15SS-150-1500-SA or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2322	501	LCP	SOP	000	BOP	401	001	ML	2322	unit(s)	As Req'd	SOLID STRAIGHT SECTION COVER, STEEL HDGAF, 1.5 METER LENGTH, 400 WIDE, B-Line by EATON #PCFSG15SS-400-1500-SA or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2323	501	LCP	SOP	000	BOP	401	001	ML	2323	unit(s)	As Req'd	SOLID STRAIGHT SECTION COVER, STEEL HDGAF, 1.5 METER LENGTH, 600 WIDE, B-Line by EATON #PCFSG15SS-600-1500-SA or equivalent	I.LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																			
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> <b>Cable trays</b>										NALCOR Document No. : ILK-AS-SD-2221-EL-G01-0001-01 Rev No. : RA									
										ALSTOM Document No. : LCP-SOP-009-BOP-401-001-ML Rev No. : R5									
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
2325	501	LCP	SOP	000	BOP	401	001	ML	2325	unit(s)	As Req'd	90° HORIZONTAL BEND, SECTION COVER, STEEL HDGAF, 400mm WIDE, B-Line by EATON #PCFSG15-HB-450-R300-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2326	501	LCP	SOP	000	BOP	401	001	ML	2326	unit(s)	As Req'd	90° HORIZONTAL BEND, SECTION COVER, STEEL HDGAF, 600mm WIDE, B-Line by EATON #PCFSG15-HB-600-R300-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2327	501	LCP	SOP	000	BOP	401	001	ML	2327	unit(s)	As Req'd	HORIZONTAL TEE, SECTION COVER, STEEL HDGAF, 400mm WIDE, B-Line by EATON #PCFSG15-HT-400-R300-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2328	501	LCP	SOP	000	BOP	401	001	ML	2328	unit(s)	As Req'd	STRAIGHT REDUCER, SECTION COVER STEEL HDGAF, 400mm TO 150mm WIDE, B-Line by EATON #PCFSG15-SR-400-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2329	501	LCP	SOP	000	BOP	401	001	ML	2329	unit(s)	As Req'd	LEFT REDUCER, SECTION COVER STEEL HDGAF, 600mm TO 450mm WIDE, B-Line by EATON #PCFSG15-LR-600-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2330	501	LCP	SOP	000	BOP	401	001	ML	2330	unit(s)	As Req'd	RIGHT REDUCER, SECTION COVER STEEL HDGAF, 600mm TO 400mm WIDE, B-Line by EATON #PCFSG15-RR-600-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2331	501	LCP	SOP	000	BOP	401	001	ML	2331	unit(s)	As Req'd	90° VERTICAL OUTSIDE BEND, SECTION COVER, RADIUS 300mm, STEEL HDGAF, 25mm HEIGHT, 150mm WIDE, B-Line by EATON #PCFSG15-VO-150-R300-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2332	501	LCP	SOP	000	BOP	401	001	ML	2332	unit(s)	As Req'd	90° VERTICAL INSIDE BEND, SECTION COVER, RADIUS 300mm, STEEL HDGAF, 25mm HEIGHT, 150mm WIDE, B-Line by EATON #PCFSG15-VI-150-S0-R300-025-SA or equivalent	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
2340	501	LCP	SOP	000	BOP	401	001	ML	2340	unit(s)	As Req'd	TRAPEZE KIT FOR 450 mm CABLE TRAY	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
2341	501	LCP	SOP	000	BOP	401	001	ML	2341	unit(s)	As Req'd	TRAPEZE KIT FOR 600 mm CABLE TRAY	ILK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT										ALCOR Document No. : I.K-AS-SD-8221-EL-001-001-01	Rev No.											
AC Filters Major Equipment										ALSTOM Document No. : LCP-80P-608-80P-401-001-ML	Rev No.											
Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specifications Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
3902	501	LCP	SOP	000	BOP	401	001	ML	3902		unit(s)	CT20F2 CT20F3 CT20F4	3	UNBALANCE CT (Type A SOP) UNBALANCE CT (Type B SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	ARTECHE		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	UNBALANCE CT (Type A SOP) UNBALANCE CT (Type B SOP)
3903	501	LCP	SOP	000	BOP	401	001	ML	3903		unit(s)	CT10F2 CT10F3 CT10F4 CT10F5 CT10F6 CT10F7	30	CT FOR RESISTOR (R1) PROTECTION (Type A SOP) CT FOR RESISTOR (L2) PROTECTION (Type A SOP) CT FOR RESISTOR (R2) PROTECTION (Type A SOP) CT FOR RESISTOR (R3) PROTECTION (Type A SOP) CT FOR RESISTOR (R1) PROTECTION (Type B SOP) CT FOR RESISTOR (R2) PROTECTION (Type B SOP) CT FOR RESISTOR (R3) PROTECTION (Type B SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	ARTECHE		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	CT FOR RESISTOR (R1) PROTECTION (Type A SOP) CT FOR RESISTOR (L2) PROTECTION (Type A SOP) CT FOR RESISTOR (R2) PROTECTION (Type A SOP) CT FOR RESISTOR (R3) PROTECTION (Type A SOP) CT FOR RESISTOR (R1) PROTECTION (Type B SOP) CT FOR RESISTOR (R2) PROTECTION (Type B SOP) CT FOR RESISTOR (R3) PROTECTION (Type B SOP)
3905	501	LCP	SOP	000	BOP	401	001	ML	3905		unit(s)	CT77F2 CT77F3 CT77F4	9	CT FOR FILTER ARM PROTECTION (Type A SOP) CT FOR FILTER ARM PROTECTION (Type B SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	ARTECHE		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	CT FOR FILTER ARM PROTECTION (Type A SOP) CT FOR FILTER ARM PROTECTION (Type B SOP)
3921	501	LCP	SOP	000	BOP	401	001	ML	3921		unit(s)	L1F2	3	REACTOR (L1) (Type A SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3922	501	LCP	SOP	000	BOP	401	001	ML	3922		unit(s)	L2F2	3	REACTOR (L2) (Type A SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3923	501	LCP	SOP	000	BOP	401	001	ML	3923		unit(s)	L3F2	3	REACTOR (L3) (Type A SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3926	501	LCP	SOP	000	BOP	401	001	ML	3926		unit(s)	L1F3 L1F4	6	REACTOR (L1) (Type B SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3927	501	LCP	SOP	000	BOP	401	001	ML	3927		unit(s)	L2F3 L2F4	6	REACTOR (L2) (Type B SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3928	501	LCP	SOP	000	BOP	401	001	ML	3928		unit(s)	L3F3 L3F4	6	REACTOR (L3) (Type B SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3931	501	LCP	SOP	000	BOP	401	001	ML	3931		unit(s)	C1-003H4F2	3	MAIN CAPACITOR (C1) (Type A SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3932	501	LCP	SOP	000	BOP	401	001	ML	3932		unit(s)	C2F2	3	CAPACITOR (C2) (Type A SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3933	501	LCP	SOP	000	BOP	401	001	ML	3933		unit(s)	C2F3	3	CAPACITOR (C2) (Type B SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3934	501	LCP	SOP	000	BOP	401	001	ML	3934		unit(s)	C3F2	3	CAPACITOR (C3) (Type A SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3936	501	LCP	SOP	000	BOP	401	001	ML	3936		unit(s)	C1-003H4F3 C1-003H4F4	6	MAIN CAPACITOR (C1) (Type B SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3938	501	LCP	SOP	000	BOP	401	001	ML	3938		unit(s)	C2F3 C2F4	6	CAPACITOR (C2) (Type B SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3939	501	LCP	SOP	000	BOP	401	001	ML	3939		unit(s)	C3F3 C3F4	6	CAPACITOR (C3) (Type B SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	RAY		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3941	501	LCP	SOP	000	BOP	401	001	ML	3941		unit(s)	R1F2	3	RESISTOR (R1) (Type A SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	CHESSELL		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3942	501	LCP	SOP	000	BOP	401	001	ML	3942		unit(s)	R2F2	3	RESISTOR (R2) (Type A SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	CHESSELL		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
3943	501	LCP	SOP	000	BOP	401	001	ML	3943		unit(s)	R3F2	3	RESISTOR (R3) (Type A SOP)	ILK-SN-CD-8000-EL-TS-0020-01	GE (PES)	CHESSELL		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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												Lower Churchill Converters and Transition Compounds Project SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT AC Filters Major Equipment													
												NALCOR Document No. : LK-AS-SD-#221-EL-001-2001-01 ALSTOM Document No. : LCP-SOP-800-80P-401-041-ML						Rev No. : 02							
Item No.	Contractor Tag Number											Unit	Equipment tag for Monopole system	Micropole Qty	Item Detail Description	LCP Specification Document / A.L.S. Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
3546	501	LCP	SOP	000	BOP	401	001	ML	3546		unit(s)	R1F3 R1F5	6	RESISTOR (R1) (Type B SOP)	ILK-SN-CD-8000-EL-TS-6023-01	GE (PES)	CREISSALL		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				
3547	501	LCP	SOP	000	BOP	401	001	ML	3547		unit(s)	R2F3 R2F5	6	RESISTOR (R2) (Type B SOP)	ILK-SN-CD-8000-EL-TS-6023-01	GE (PES)	CREISSALL		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				
3548	501	LCP	SOP	000	BOP	401	001	ML	3548		unit(s)	R3F3 R3F5	6	RESISTOR (R3) (Type B SOP)	ILK-SN-CD-8000-EL-TS-6023-01	GE (PES)	CREISSALL		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				
3551	501	LCP	SOP	000	BOP	401	001	ML	3551		unit(s)	SA1F2	3	SURGE ARRESTER WITH BPI (Type A SOP)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				
3552	501	LCP	SOP	000	BOP	401	001	ML	3552		unit(s)	SA2F2	3	SURGE ARRESTER (Type A SOP)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				
3553	501	LCP	SOP	000	BOP	401	001	ML	3553		unit(s)	SA3F2	3	SURGE ARRESTER (Type A SOP)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				
3555	501	LCP	SOP	000	BOP	401	001	ML	3555		unit(s)		10	SURGE COUNTER METER: 6 DIGIT CYCLOMETER MINIMUM COUNT CURRENT: 200 AMPS @25 MICROSECOND WAVE MAX. HIGH CURRENT WITHSTAND: 100 KA @10 MICROSECOND WAVE METER SCALE: 0-30 IIA PEAK/1.41 (NON LINEAR SCALE)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				
3556	501	LCP	SOP	000	BOP	401	001	ML	3556		unit(s)	SA1F3 SA1F5	6	SURGE ARRESTER WITH BPI (Type B SOP)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				
3557	501	LCP	SOP	000	BOP	401	001	ML	3557		unit(s)	SA2F2 SA2F5	6	SURGE ARRESTER (Type B SOP)	ILK-SN-CD-8000-EL-TS-0023-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> DC Major Equipment												NALCOR Document No. : ILK-AS-SD-3221-EL-G01-0001-01 Rev No. : 04									
												ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML Rev No. : 05									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4001	501	LCP	SOP	000	BOP	401	001	ML	4001	unit(s)	T4 (phase A) T4 (phase B) T4 (phase C)  T (Spare)	4	SINGLE PHASE TRANSFORMER 230 KV  SINGLE PHASE TRANSFORMER 232 MVA/1Ph, 230/√3 KV, 128/√3 KV, 128/√3 KV, 60 Hz	ILK-SN-CD-8000-EL-TS-0022-01	GE (SBC)	TST		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4003	501	LCP	SOP	000	BOP	401	001	ML	4003	unit(s)	V1B41 V2B41 V1B42 V2B42	4	QUADRYALVE SOP Total Mass 24 TONNE Individual Module Mass 1.2 TONNE	ILK-SN-CD-8000-EL-TS-0025-01	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4005	501	LCP	SOP	000	BOP	401	001	ML	4005	unit(s)	B41B61	1	DC NEUTRAL BREAKER  ALSTOM TYPE GL 316X, 420 KV CLASS OUTDOOR, 4000A, 40 KA INTERRUPTING, 4 HOLES NEMA DRILLED ALUMINUM TERMINALS GALVANIZED STEEL SUPPORT	ILK-SN-CD-4000-EL-TS-0001-01 ILK-SN-CD-8000-EL-TS-0011-01	GE (SBC)	GE-TDC		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4006	501	LCP	SOP	000	BOP	401	001	ML	4006	unit(s)		3	AC STAR BUSHING 420KV -2500A- 948KV BIL OUTDOOR CREEPAGE DISTANCE 12850mm cantilever operation load 2500N SF6 gas insulated Total mass approx 1350kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (PES)	RPV		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4007	501	LCP	SOP	000	BOP	401	001	ML	4007	unit(s)		3	AC DELTA BUSHING ± 250KV-2000A-500KV BIL cantilever operation load 2500N outdoor creepage distance 14700mm SF6 gas insulated total mass approx 520kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (PES)	RPV		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4008	501	LCP	SOP	000	BOP	401	001	ML	4008	unit(s)		1	HVDC BUSHING ± 420KV-2500A-1050KV BIL OUTDOOR CREEPAGE DISTANCE 16460mm Cantilever operation load 2500N SF6 gas insulated total mass approx 1380kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (PES)	RPV		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4009	501	LCP	SOP	000	BOP	401	001	ML	4009	unit(s)		1	LVDC BUSHING ± 82KV -2000A-220KV BIL OUTDOOR CREEPAGE DISTANCE 5250mm RIP BUSHING Total mass 150kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (PES)	RPV		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4010	501	LCP	SOP	000	BOP	401	001	ML	4010	unit(s)		0	ELECTRODE LINE LVDC BUSHING ± 82KV -2000A-220KV BIL OUTDOOR CREEPAGE DISTANCE 5250mm RIP BUSHING Total mass 150kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	FOR ELFL

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nalcor energy		Lower Churchill Converters and Transition Compounds Project																			
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT												NALCOR Document No. : ILK-AS-SD-4221-EL-001-001-01		Rev No. : 02							
DC Major Equipment												ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML		Rev No. : 01							
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4011	501	LCP	SOP	000	BOP	401	001	ML	4011	unit(s)	CT2B41 CTB41B61 CT1B61 CT3B61	4	DC CURRENT TRANSFORMER 200 kV BIL, 1286 A Type COSI CT Maximum system voltage 3 kV BIL 200 kV Creepage 1235 mm Accuracy 0,1% Nominal operating current 1286 A Rated secondary NL 1,6075V, WL 0,5358V Burden 10 kOhm Rating factor NL 6,22, WL 18,66		GE (PES)	DIT		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4012	501	LCP	SOP	000	BOP	401	001	ML	4012	unit(s)	CT2B61 CT4B61	2	DC CURRENT TRANSFORMER 200 kV BIL, 100 A Type COSI CT Maximum system voltage 3 kV BIL 200 kV Creepage 1235 mm Accuracy 0,2% Nominal operating current 100 A Rated secondary NL 1,6666V, WL 0,3V Burden 10 kOhm Rating factor NL 6, WL 30		GE (PES)	DIT		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4013	501	LCP	SOP	000	BOP	401	001	ML	4013	unit(s)	CT1B41 CT3B41 CTB61NG	3	AC CURRENT TRANSFORMER XXX kV BIL, XXX A Type COSI CT Maximum system voltage XX kV BIL XXX kV Creepage XXXX mm Accuracy XX% Nominal operating current XXX A Rated secondary XXXXX Burden XX kOhm Rating factor XXXX		GE (PES)	DIT		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4014	501	LCP	SOP	000	BOP	401	001	ML	4014	unit(s)	CT1B42 CT2B42	2	DC CURRENT TRANSFORMER 1500 kV BIL, 1286 A Type COSI CT Maximum system voltage 393 kV BIL 1500 kV Creepage 15687 mm Accuracy 0,1% Nominal operating current 1286 A Rated secondary NL 1,6075V, WL 0,5358V Burden 10 kOhm Rating factor NL 6,22, WL 18,66		GE (PES)	DIT		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4021	501	LCP	SOP	000	BOP	401	001	ML	4021	unit(s)	R1B41B61 R1B1NG	2	DC NEUTRAL REACTOR 1,6 kA thermal 1 sec. 4 kA mechanical peak 40 kV BIL across coil 221 kV BIL across intercoil insulator Reactor rating 0,195 mH, 0,051 ohms, 60 Hz MC1 = 76 mm MC2 = 305 mm	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	Trench		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> DC Major Equipment												NALCOR Document No.: ILK-AS-SD-8221-EL-001-001-01 Rev No.: 04									
												ALSTOM Document No.: LCP-SOP-000-BOP-401-001-NL Rev No.: 05									
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments			
4022	501	LCP	SOP	000	BOP	401	001	ML	4022	unit(s)	R1B42	1	<b>DC SMOOTHING REACTOR</b> Type XSCM 2x75,00 mH / 1980 A System voltage: 350 kV Max. operating voltage: 370 kV BIL between terminals 1425 kV Nominal current: 1286 A Rated current: 1320 A Design current: 1980 A Short time current / duration 8 kA / 1s Offset peak current: 8 kAp Temp. class F (155°) MC1 = 4180 mm MC2 = 5700 mm MC3 = 4700 mm MC4 = 7150 mm	ILK-SN-CD-8000-EL-TS-0027-01	GE (PES)	GE-RMG		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4023	501	LCP	SOP	000	BOP	401	001	ML	4023	unit(s)	R1B66 R1B67	2	<b>DC ELFL REACTOR</b>	ILK-SN-CD-8000-EL-TS-0027-01	GE (PES)	GE-RMG		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	RECOMMENDED TO BE INSTAL EVENT IF IT IS NOT REQUIRED FOR MONOPOLE
4025	501	LCP	SOP	000	BOP	401	001	ML	4025	unit(s)	T4G3	3	<b>AC STAR EARTH SWITCH</b> 21kA x 1 S	ILK-SN-CD-8000-EL-TS-0027-01	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4026	501	LCP	SOP	000	BOP	401	001	ML	4026	unit(s)	T4G4	3	<b>AC DELTA EARTH SWITCH</b> 21kA x 1s	ILK-SN-CD-8000-EL-TS-0027-01	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4027	501	LCP	SOP	000	BOP	401	001	ML	4027	unit(s)	B42G1	1	<b>HVDC EARTH SWITCH</b> 21kA x 1S	ILK-SN-CD-8000-EL-TS-0027-01	GE (PES)	CME		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4028	501	LCP	SOP	000	BOP	401	001	ML	4028	unit(s)	B41G1	1	<b>LVDC EARTH SWITCH</b> 21kA x 1S	ILK-SN-CD-8000-EL-TS-0027-01	GE (PES)	CME		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4030	501	LCP	SOP	000	BOP	401	001	ML	4030	unit(s)	C1B41	1	<b>DC LV COUPLING CAPACITOR</b>	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	Vishay		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4031	501	LCP	SOP	000	BOP	401	001	ML	4031	unit(s)	C1B41B01 C1B1NG	2	<b>DC LV CAPACITOR TYPE C/69/0/60</b> Rated voltage 69 kV 30 mF, 60 Hz Two bushings capacitor unit	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	Vishay		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4032	501	LCP	SOP	000	BOP	401	001	ML	4032	unit(s)	VD1B41	1	<b>LVDC VOLTAGE DIVIDER</b> Rated voltage / SIL / BL - 7,5 kV / 121 kV / 142 kV Rated creepage distance 4433 mm HV terminal NEMA 4 Composite gray insulator	ILK-SN-CD-8000-EL-TS-0010-01	GE (PES)	TRENCH		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> DC Major Equipment													NALCOR Document No. : ILK-AS-SD-8221-EL-GB1-001-01 Rev No. : 04								
													ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML Rev No. : 05								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4033	501	LCP	SOP	000	BOP	401	001	ML	4033	unit(s)	VD1B42	1	HVDC VOLTAGE DIVIDER Rated voltage / SIL / BIL - 361 kV / 780 kV / 964 kV Rated creepage distance 13350 mm HV Terminal NEMA 4 Composite gray insulator	ILK-SN-CD-8000-EL-TS-0010-01	GE (PES)	TRENCH		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4049	501	LCP	SOP	000	BOP	401	001	ML	4049	unit(s)		7	SURGE COUNTER FOR DC SA METER: 6 DIGIT CYCLOMETER MINIMUM COUNT CURRENT: 200 AMPS 8/20 MICROSECOND WAVE MAXI HIGH CURRENT WITSTAND: 100 KA 4/10 MICROSECOND WAVE METER SCALE: 0-30 mA PEAK/1.41 (NON LINEAR SCALE)	LK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4050	501	LCP	SOP	000	BOP	401	001	ML	4050	unit(s)	SA1B61 SA2B61	4	DC SURGE ARRESTER Ur 50 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 50 kV, 60 Hz MCOV 59 kV DC Peak, In-20 KA MINIMUM CREEPAGE DISTANCE 1135 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	LK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
4051	501	LCP	SOP	000	BOP	401	001	ML	4051	unit(s)	SA3B41	1	DC SURGE ARRESTER Ur 54 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 54 kV, 60 Hz MCOV 55 kV DC Peak, In-20 KA MINIMUM CREEPAGE DISTANCE 1700 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	LK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4052	501	LCP	SOP	000	BOP	401	001	ML	4052	unit(s)	SA1B41B61	1	DC SURGE ARRESTER Ur 62 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 62 kV, 60 Hz MCOV 70 kV DC Peak, In-20 KA MINIMUM CREEPAGE DISTANCE 3015 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	LK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4053	501	LCP	SOP	000	BOP	401	001	ML	4053	unit(s)	SA1B41 SA2B41 SA1B42 SA2B42	12	DC SURGE ARRESTER Ur 171 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 171 kV, 60 Hz MCOV 209 kV DC Peak, In-20 KA MINIMUM CREEPAGE DISTANCE 4710 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	LK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4054	501	LCP	SOP	000	BOP	401	001	ML	4054	unit(s)	SA3B42	1	DC SURGE ARRESTER Ur 178 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 178 kV, 60 Hz MCOV 218 kV DC Peak, In-20 KA MINIMUM CREEPAGE DISTANCE 4330 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	LK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> DC Major Equipment												NALCOR Document No.: LK-AS-SD-#221-EL-001-0001-01 Rev No.: 04									
												ALSTOM Document No.: LCP-SOP-000-BOP-401-001-ML Rev No.: 00									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
4055	501	LCP	SOP	000	BOP	401	001	ML	4055	unit(s)	SA4B42	1	DC SURGE ARRESTER Ur 102 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 102 KV, 60 Hz MCOV 222 KV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 5460 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	LK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4056	501	LCP	SOP	000	BOP	401	001	ML	4056	unit(s)	SA5B42 SA6B42 SA1B43 SA1B53	4	DC SURGE ARRESTER Ur 314 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 314 KV, 60 Hz MCOV 383 KV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 10920 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	LK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4058	501	LCP	SOP	000	BOP	401	001	ML	4058	unit(s)	SA4T4	3	TRANSFORMER STAR SURGE ARRESTER Ur = 328 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 328 KV, 60 Hz MCOV 398 KV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 10920 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	LK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4059	501	LCP	SOP	000	BOP	401	001	ML	4059	unit(s)	SA5T4	6	TRANSFORMER DELTA SURGE ARRESTER Ur = 185 kV SINGLE PHASE, METAL-OXIDE RATED VOLTAGE Ur - 185 KV, 60 Hz MCOV 226 KV DC Peak, In-20 KA, MINIMUM CREEPAGE DISTANCE 4330 mm INCLUDING INSULATED BASE HV TERMINAL NEMA 4	LK-SN-CD-8000-EL-TS-0029-01	GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4061	501	LCP	SOP	000	BOP	401	001	ML	4061	unit(s)	SA3T4 SA3T5	0	TRANSFORMER NEUTRAL SURGE ARRESTER Ur = xxx kV DESCRIPTION TO COME		GE (PES)	SIEMENS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4064	501	LCP	SOP	000	BOP	401	001	ML	4064	unit(s)	B43B93 B53B93 B61B93	3	ONE POLE DISCONNECTOR SPOL 370 KV 1960A 21 KA x 1s 370 kV, 2850 KV BL 1980 A, 21 KA 1 SEC., ONE POLE MOTOR OPERATED, VERTICAL BREAK, C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (PES)	CME		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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Lower Churchill Converters and Transition Compounds Project



SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT  
DC Major Equipment

NALCOR Document No. : ILK-AS-SD-8221-EL-001-0001-01

Rev No. : 04

ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML

Rev No. : 05

Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
4066	501	LCP	SOP	000	BOP	401	001	ML	4066	unit(s)	B43B42 / B43G1 / B43G2 B43L3501 / B43G2 / L3601G B52B53 / B52G2 / B53G1 B53L3502 / B53G2 / L3602G	4	ONE POLE DISCONNECTOR SPOL2T 370 KV 1980A 21 KA x 1s  370 KV, 2550 KV BIL 1980 A, 21 KA 1 SEC., ONE POLE MOTOR OPERATED, VERTICAL BREAK, WITH TWO GROUNDING SWITCHES. C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (PES)	CME		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4069	501	LCP	SOP	000	BOP	401	001	ML	4069	unit(s)	B41B61-1 / B41B61G-1 B51B61-1 / B51B61G-1 B61NG-1 / B61NGG1 B61NG-2 / B61NGG2 B61B66 / B66G	5	ONE POLE DISCONNECTOR S2DAT 3 KV 1980A 21 KA x 1s  3 kv, 250 kv BIL 1980 A, 21 KA 1 SEC., ONE POLE MOTOR OPERATED DISCONNECT SWITCH CENTER BREAK WITH ONE GROUNDING SWITCH. C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 1040 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (PES)	CME		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05	
4073	501	LCP	SOP	000	BOP	401	001	ML	4073	unit(s)			ONE POLE DISCONNECTOR S2DA2T 3 KV 1980A 21 KA x 1s  3 kv, 250 kv BIL 1980 A, 21 KA 1 SEC., ONE POLE MOTOR OPERATED DISCONNECT SWITCH CENTER BREAK WITH TWO GROUNDING SWITCHES. C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. HV TERMINALS: NEMA 4 INSULATOR CREEPAGE DISTANCE: 1040 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (PES)	CME		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05	
4074	501	LCP	SOP	000	BOP	401	001	ML	4074	unit(s)	T4G2	1	STAR NEUTRAL GROUNDING SWITCH  2550 kv BIL ONE POLE MOTOR OPERATED. C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. HV TERMINALS: NEMA 6 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (PES)	CME		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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Lower Churchill Converters and Transition Compounds Project



SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT  
DC Major Equipment

NALCOR Document No.: ILK-AS-SD-4221-EL-G01-001-01  
ALSTOM Document No.: LCP-SOP-000-BOP-401-001-ML

Rev No.: 04  
Rev No.: 05

Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
4075	501	LCP	SOP	000	BOP	401	001	ML	4075	unit(s)	B63G	1	ONE POLE EARTHING SWITCH SPVL 370 KV 21 KA x 1s 370 KV, 2550 KV BIL 21 KA 1 SEC. ONE POLE MOTOR OPERATED, C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. HV TERMINALS: NEMA 8 INSULATOR CREEPAGE DISTANCE: 27520 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (PES)	CME		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4077	501	LCP	SOP	000	BOP	401	001	ML	4077	unit(s)	B61G	1	ONE POLE EARTHING SWITCH STA 3 KV 21 KA x 1s 3 KV, 250 KV BIL 21 KA 1 SEC. ONE POLE MOTOR OPERATED, C/W MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. ALUMINUM ALLOY TERMINAL PAD C/W LINE TERMINAL INSULATOR CREEPAGE DISTANCE: 1040 mm INSULATOR MATERIAL: PORCELAIN MOUNSELL GRAY	ILK-SN-CD-8000-EL-TS-0011-01 ILK-SN-CD-4000-EL-TS-0002-01	GE (PES)	CME		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		
4081	501	LCP	SOP	000	BOP	401	001	ML	4081	unit(s)	CT114	2	NEUTRAL CURRENT TRANSFORMER STAR DELTA AREA 720 V, 10 KV BIL RATIO 250:1:1 CL PXR (2)	ILK-SN-CD-4000-EL-TS-0001-01	GE (SBC)	POLYCAST		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4082	501	LCP	SOP	000	BOP	401	001	ML	4082	unit(s)	CT214	3	CURRENT TRANSFORMER VALVE HALL STAR BUSHING 750V, 4 KV BIL RATIO: 2500:1:1 CL PXR (2)	ILK-SN-CD-4000-EL-TS-0001-01	GE (SBC)	POLYCAST		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4083	501	LCP	SOP	000	BOP	401	001	ML	4083	unit(s)	CT314	3	CURRENT TRANSFORMER VALVE HALL DELTA BUSHING 750V, 4 KV BIL RATIO: 2500:1:1 CL PXR (2)	ILK-SN-CD-4000-EL-TS-0001-01	GE (PES)	POLYCAST		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4088	501	LCP	SOP	000	BOP	401	001	ML	4088	unit(s)	CT3B88 CT3B87	0	WRAP AROUND FO CT	ILK-SN-CD-8000-EL-TS-0016-01	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4091	501	LCP	SOP	000	BOP	401	001	ML	4091	unit(s)	C1B43 C1B53	2	DC LINE FAULT LOCATOR Rated voltage 360,5 kV 3,00 uF BIL 954 kV (HV-LV and HV-GND) BIL 125 kV (LV-GND) HV terminal - 4 NEMA holes Two bushings capacitor unit 6009 V, 90,06 uF, 125 kV BIL	ILK-SN-CD-8000-EL-TS-0016-01	GE (SBC)	Manitoba hydro		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
4093	501	LCP	SOP	000	BOP	401	001	ML	4093	unit(s)		2	GROUND FAULT DETECTOR BOX 1PP 66 WEIGHT 40 Colour Grey-MUNSELL (ANSI #61)	ILK-SN-CD-8000-EL-TS-0016-01	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																					
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT										NALCOR Document No. : ILK-AS-SD-8221-EL-G91-0091-01		Rev No. :									
DC Major Equipment										ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML		Rev No. :									
Item No.	Contractor Tag Number									Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
4095	501	LCP	SOP	000	BOP	401	001	ML	4095	unit(s)	C1966 C1967	0	ELFL CAPACITOR	ILK-SN-CD-8000-EL-TS-0010-01	GE (PES)	HVDC Tech		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> AC Major Equipment												NALCOR Document No.: ILK-AS-SD-4221-EL-021-001-01 ALSTOM Document No.: LCP-SOP-900-BCP-461401-ML		Rev No.: 1.1 Rev No.: 1.1						
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
4109POW	501	LCP	SOP	000	BOP	401	001	ML	4109POW	units	B341F1 B341F2 B341F3	3	382 KV CIRCUIT BREAKER LIVE TANK SFS WITH POINT OF WAVE CONTROL  SET OF 3 SINGLE POLE UNITS ALSTOM TYPE GL 315, 382 KV CLASS OUTDOOR, 4000A, 1050 KV LIL, 50 KA INTERRUPTING, 125 VDC CONTROL SPRING OPERATING MECHANISM DESIGN CREEPAGE DISTANCE - 6325 mm MIN PORCELAIN GREY LIGHT GRAY - MUNSELL 5BG 7,00,4 (ANSI #70) TWO INTERRUPTING CHAMBERS OPERATING SEQUENCE: O-0.3s-CO-3min-CO 8 HOLES NEMA DRILLED ALUMINUM TERMINALS GALVANIZED STEEL SUPPORT	ILK-SN-CD-4000-EL-TS-0001-01	GE (SBC)	GE TDC	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4105	501	LCA	SOP	230	ALS	400	001	BM	4105	units	B21B33 B18B33 B14B34 B24B34	4	245 KV CIRCUIT BREAKER LIVE TANK SFS NO POINT OF WAVE CONTROL  ALSTOM TYPE GL 314X, 245 KV CLASS OUTDOOR, 3150A, 1050 KV LIL, 40 KA INTERRUPTING, 125 VDC CONTROL SPRING OPERATING MECHANISM DESIGN CREEPAGE DISTANCE - 6325 mm MIN PORCELAIN GREY LIGHT GRAY - MUNSELL 5BG 7,00,4 (ANSI #70) ONE INTERRUPTING CHAMBER OPERATING SEQUENCE: O-0.3s-CO-3min-CO 8 HOLES NEMA DRILLED ALUMINUM TERMINALS GALVANIZED STEEL SUPPORT	ILK-SN-CD-4000-EL-TS-0001-01	GE (SBC)	GE TDC	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	FOR CD0502
4105POW	501	LCA	SOP	230	ALS	400	001	BM	4105POW	units	B1B13 B13B33 B15B35	4	245 KV CIRCUIT BREAKER LIVE TANK SFS WITH POINT OF WAVE CONTROL  ALSTOM TYPE GL 314X, 245 KV CLASS OUTDOOR, 3150A, 1050 KV LIL, 40 KA INTERRUPTING, 125 VDC CONTROL SPRING OPERATING MECHANISM DESIGN CREEPAGE DISTANCE - 6325 mm MIN PORCELAIN GREY LIGHT GRAY - MUNSELL 5BG 7,00,4 (ANSI #70) ONE INTERRUPTING CHAMBER OPERATING SEQUENCE: O-0.3s-CO-3min-CO 8 HOLES NEMA DRILLED ALUMINUM TERMINALS GALVANIZED STEEL SUPPORT	ILK-SN-CD-4000-EL-TS-0001-01	GE (SBC)	GE TDC	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	FOR CD0502
4129	501	LCP	SOP	000	BOP	401	001	ML	4129	units	B341F1-1 B341F2-1 B341F3-1	3	253 KV, 1200A, 40 KA 3 SEC., THREE POLE MOTOR OPERATED VERTICAL BREAK, CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS. HV TERMINALS: NEMA 4 BIL: 1050 KV BIL INSULATOR CREEPAGE DISTANCE: 6325 mm INSULATOR MATERIAL: PORCELAIN GRAY PHASE TO PHASE DISTANCE: 4 m THREE POLE GALVANIZED STEEL SUPPORT, HEIGHT: 4 m	ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	GE TDC	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4126	501	LCP	SOP	000	BOP	401	001	ML	4126	units	F1G F3G F3G	3	253 KV GROUNDING SWITCH WITH INTERLOCK  THREE POLE MANUAL OPERATED 40 KA, SIDE BREAK, CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS RATED CONTINUOUS CURRENT: 1250 A HV TERMINALS: NEMA 4 INSULATOR CREEPAGE DISTANCE: 6325 mm INSULATOR MATERIAL: PORCELAIN GRAY PHASE TO PHASE DISTANCE: 4 m THREE POLE GALVANIZED STEEL SUPPORT, HEIGHT: 4 m	ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	GE TDC	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4128	501	LCP	SOP	000	BOP	401	001	ML	4128	units	B341G T401	2	253 KV GROUNDING SWITCH WITHOUT INTERLOCK  THREE POLE MANUAL OPERATED 40 KA, SIDE BREAK, CW MOUNTING BOLTS, LOCK WASHERS AND FLAT WASHERS RATED CONTINUOUS CURRENT: 1250 A HV TERMINALS: NEMA 4 INSULATOR CREEPAGE DISTANCE: 6325 mm INSULATOR MATERIAL: PORCELAIN GRAY PHASE TO PHASE DISTANCE: 4 m THREE POLE GALVANIZED STEEL SUPPORT, HEIGHT: 4 m	ILK-SN-CD-4000-EL-TS-0002-01	GE (SBC)	GE TDC	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4132	501	LCP	SOP	000	BOP	401	001	ML	4132	units	CV71B341	3	CAPACITOR VOLTAGE TRANSFORMER 253 KV, 1050 KV BIL  SINGLE PHASE MAXIMUM OPERATING VOLTAGE 253 KV, 60 Hz INSULATION LEVEL BIL: 1050 KV MINIMUM CREEPAGE DISTANCE: 6325 mm HV TERMINAL: NEMA 4 230 KV/2: 110V-110W/3 RATIO: XX (12.5) 230 KV/3: 120V-120W/3 RATIO: XX (3.4)	ILK-SN-CD-4000-EL-TS-0020-01	GE (SBC)	Trench	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																					
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT AC Major Equipment											NALCOR Document No. : ILK-AS-3D-8221-EL-001-0001-01 Rev No. : 01										
ALSTOM Document No. : LCP-SQP-899-BQP-401-001-ML											Rev No. : 00										
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
4250	591	LCP	SOP	000	BQP	401	001	ML	4250	unit(s)	5571	1	25-0.6 kV PAD MOUNTED SUBSTATION SERVICE TRANSFORMER 3000kVA 25000 Delta-600V/0.47V ONAN, Dyn11, 36.60 Hz IMPEDANCE -5.75% NOMINAL	ILK-SN-CD-8999-EL-TS-0002-01	GE (SBC)	Pioneer		CC001	ELECTRICAL INSTALLATION CONTRACTOR	03	ONLY ONE AUXILIARY TRANSFORMER NEEDED FOR MONOPOLE

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 <b>Lower Churchill Converters and Transition Compounds Project</b> SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT Cabinets & JB													NALCOR Document No.: ILK-AS-SD-8221-EL-G01-0001-01 Rev No.: 1.0							
													ALSTOM Document No.: LCP-SOP-000-BOP-401-001-ML Rev No.: 1.0							
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
4560	501	LCP	SOP	000	BOP	401	001	ML	4560	unit(s)	8228-JB-06-0014; 8228-JB-06-0015; 8228-JB-06-0016; 8228-JB-06-0017; 8228-JB-06-0018; 8228-JB-06-0019; 8228-JB-06-0020;	9	JUNCTION BOX FOR CURRENT TRANSFORMER-(Type 1) NEMA 4X Enclosure plate gauge 14 (2,3 mm min.) stainless steel. Piano-type hinges. Paddockable device. Removable mounting plate gauge 12 Dimensions: L=914 mm, H=802 mm, D=160 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bectrol	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4561	501	LCP	SOP	000	BOP	401	001	ML	4561	unit(s)	8228-JB-06-0031; 8228-JB-06-0033; 8228-JB-06-0034; 8228-JB-06-0038; 8228-JB-06-0037	9	JUNCTION BOX FOR CURRENT TRANSFORMER-(Type 2) NEMA 4X Enclosure plate gauge 14 (2,3 mm min.) stainless steel. Piano-type hinges. Paddockable device. Removable mounting plate gauge 12 Dimensions: L=914 mm, H=802 mm, D=160 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bectrol	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4562	501	LCP	SOP	000	BOP	401	001	ML	4562	unit(s)	8228-JB-06-0051; 8228-JB-06-0052; 8228-JB-06-0053;	3	JUNCTION BOX FOR CURRENT TRANSFORMER-(Type 3) NEMA 4X Enclosure plate gauge 14 (2,3 mm min.) stainless steel. Piano-type hinges. Paddockable device. Removable mounting plate gauge 12 Dimensions: L=914 mm, H=802 mm, D=160 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bectrol	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4563	501	LCP	SOP	000	BOP	401	001	ML	4563	unit(s)	8228-JB-06-0057	1	JUNCTION BOX FOR CURRENT TRANSFORMER-(Type 4) NEMA 4X Enclosure plate gauge 14 (2,3 mm min.) stainless steel. Piano-type hinges. Paddockable device. Removable mounting plate gauge 12 Dimensions: L=1830 mm, H=1832 mm, D=627 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bectrol	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4564	501	LCP	SOP	000	BOP	401	001	ML	4564	unit(s)	8228-JB-06-0001; 8228-JB-06-0002	2	JUNCTION BOX FOR CAPACITOR VOLTAGE TRANSFORMER-(Type 1) NEMA 4X Enclosure plate gauge 14 (2,3 mm min.) stainless steel. Piano-type hinges. Paddockable device. Removable mounting plate gauge 12 Dimensions: L=985 mm, H=914 mm, D=160 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bectrol	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4565	501	LCP	SOP	000	BOP	401	001	ML	4565	unit(s)	8228-MR-00-0001	1	INTERFACE SERIES V LANE 1 MARSHALLING PANEL-(Type 1) Interface marshalling panel (Type 1) NEMA 12 Enclosure plate gauge 10 stainless steel. Piano-type hinges. Paddockable device. Removable mounting plate Dimensions: L=1526 mm, H=1830 mm, D=611 mm Provided with terminal blocks and internal wiring. Components: ABB auxiliary relays Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	BECTROL	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> Cabinets & JB														NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01 Rev No. : 01							
														ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML Rev No. : 05							
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
4566	601	LCP	SOP	000	BOP	401	001	ML	4566	unit(s)	822E-MR-00-0002	1	INTERFACE SERIES V LANE 2 MARSHALLING PANEL - (Type 2) NEMA 12 Enclosure plate gauge 10 stainless steel. Piano-type hinges. Padlockable device. Removable mounting plate Dimensions: L=1126 mm, H=1830 mm, D=611 mm Provided with terminal blocks and internal wiring. Components: ABB auxiliary relays Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	BECTROL		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
4567	501	LCP	SOP	000	BOP	401	001	ML	4567	unit(s)	822E-CP-87-1102; 822E-CP-87-2102;	2	DC YARD CONTROL MARSHALLING PANEL-SOP & MPA DC Yard control marshalling panel NEMA 4X Enclosure plate gauge 12 stainless steel. Piano-type hinges. Padlockable device. Removable mounting plate Dimensions: L=1830 mm, H=1832 mm, D=627 mm Provided with terminal blocks and internal wiring. Components: Molded case circuit breakers Terminal blocks Lighting controlled by door switch Heater with thermostat	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)			CD601	ELECTRICAL INSTALLATION CONTRACTOR	03	
4568	001	LCP	SOP	000	BOP	401	001	ML	4568	unit(s)		0	DC YARD ELFL MARSHALLING KIOSK	ILK-SN-CD-8000-EL-TS-0026-01	GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																								
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> Insulators													NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01 Rev No. : 04											
													ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML Rev No. : 05											
Item No.	Contractor Tag Number												Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
4645	501	LCP	SOP	000	BOP	401	001	ML	4645	unit(s)			76	<b>POST-TYPE INSULATOR 245 KV</b> Solid core porcelain insulator, standard glazing, BIL 1050 kV, Creepage distance 6 325 mm Cantilever strength 9 kN, Caps : Top section - malleable iron hot-dip galvanized, 4 tapped holes 5/8"-11 UNC 5" BC, Base section - malleable iron hot-dip galvanized, 4 tapped holes 3/4"-10 UNC, 7" BC, Height : 2337 mm, Porcelain colour: grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 190 kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	CERALEP		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03			
4646	501	LCP	SOP	000	BOP	401	001	ML	4646	unit(s)			11	<b>UNDERHUNG POST-TYPE INSULATOR 245 KV</b> Solid core porcelain insulator, standard glazing, BIL 1050 kV, Creepage distance 6 325 mm Cantilever strength 9 kN, Caps : Bus support section - malleable iron hot-dip galvanized, 4 tapped holes 5/8"-11 UNC, 5" BC, Base section - malleable iron hot-dip galvanized, 4 tapped holes 3/4"-10 UNC, 7" BC, Height : 2337 mm, Porcelain colour: grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 190 kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	CERALEP		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03			
4648	501	LCP	SOP	000	BOP	401	001	ML	4648	unit(s)			204	<b>TOUGHENED GLASS STRING INSULATOR 160 KN</b> Ball and socket coupling, Class E2-B Spacing 170 mm, 280 mm diameter. Creepage distance 380 mm min. Ultimate load: 160 kN Lightning flashover voltage: 125 kV, Approx. unit weight: 6 kg	ILK-SN-CD-8000-EL-TS-0024-01	GE (SBC)	SEVES		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04			
4650	501	LCP	SOP	000	BOP	401	001	ML	4650	unit(s)			448	<b>TOUGHENED GLASS STRING INSULATOR 160 KN FOG TYPE</b> Ball and socket coupling, Class type K and CSA CS-BA Spacing 170 mm, 330 mm diameter. Creepage distance 550 mm min. Ultimate load: 160 kN Lightning flashover voltage: 140 kV, Approx. unit weight: 9,3 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (SBC)	SEVES		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04			
4680	501	LCP	SOP	000	BOP	401	001	ML	4680	unit(s)			37	<b>DC POST-TYPE INSULATOR</b> Post-Type Insulator Solid core porcelain insulator, semiconducting glazing, BIL 2550 kV, Creepage distance 27292 mm Cantilever strength 12,5 kN, Caps : Top section: ductile iron hot-dip galvanized, 8 holes 18 mm, 254 BC, Base section - ductile iron hot-dip galvanized, 8 holes 18 mm diam, 356 mm BC, Height : 7900 mm, Porcelain colour: grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70). Unit weight: 1208 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04			

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																			
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> Insulators											NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01 Rev No. : 04								
											ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML Rev No. : 06								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
4671	501	LCP	SOP	000	BOP	401	001	ML	4671	unit(s)									
									4	TRANSFORMER STAR POST-TYPE INSULATOR 2250 KV BIL Post-Type Insulator Solid core porcelain insulator, semiconducting glazing, BIL 2250 KV, Creepage distance 12468 mm Cantilever strenght 20 kN, Caps : Top section: ductile iron hot-dip galvanized, 4 holes 18 mm 254 BC, Base section - ductile iron hot-dip galvanized, 8 holes 18 mm diam, 356 mm BC, Height : 5000 mm, Porcelain colour:grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 719 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
4672	501	LCP	SOP	000	BOP	401	001	ML	4672	unit(s)									
									24	TRANSFORMER DELTA POST-TYPE INSULATOR 1425 KV BIL Post-Type Insulator Solid core porcelain insulator, semiconducting glazing, BIL 1425 KV, Creepage distance 7967 mm Cantilever strenght 12,5 kN, Caps : Top section: ductile iron hot-dip galvanized, 4 tapped holes M16x22 mm, 127 BC, Base section - ductile iron hot-dip galvanized, 8 holes 18 mm diam, 325 mm BC, Height : 3150 mm, Porcelain colour:grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 291 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
4673	501	LCP	SOP	000	BOP	401	001	ML	4673	unit(s)									
									42	POST-TYPE INSULATOR 250 KV BIL Solid core porcelain insulator, BIL 250 KV, Minimum creepage distance 636 mm Cantilever strenght 12,5 kN, Caps : Top section - malleable iron hot-dip galvanized,4 tapped holes M16x24 , 127 mm BC, Base section - malleable iron hot-dip galvanized,4 holes 18 mm ,200 mm BC, Height : 560 mm, Porcelain colour:grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 23 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
4674	501	LCP	SOP	000	BOP	401	001	ML	4674	unit(s)									
									90	POST-TYPE INSULATOR 550 KV BIL Solid core porcelain insulator, BIL 550 KV, Minimum creepage distance 2450 mm Cantilever strenght 8 kN, Caps : Top section - malleable iron hot-dip galvanized,4 tapped holes M16x20 , 127 mm BC, Base section - malleable iron hot-dip galvanized,4 holes 18 mm ,200 mm BC, Height : 1220 mm, Porcelain colour:grey light-gray - Munsell 5BG 7,0/0,1 (ANSI #70), Unit weight: 53 kg	ILK-SN-CD-8000-EL-TS-0028-01	GE (PES)	PPC INSULATORS		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
4680	501	LCP	SOP	000	BOP	401	001	ML	4680	unit(s)									
									As req'd	EPOXY POST-TYPE INSULATOR 5 KV 5 kv epoxy post insulator 60 kv BIL For indoor application. Height: 86 mm approx. Top insert: 1 hole 12,7 mm Bottom insert: 1 hole 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03			

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																						
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b>													NALCOR Document No. : ILK-AS-SO-8221-EL-G01-0001-01 Rev No. : 04									
<b>Cables &amp; Bus Bars</b>													ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML Rev No. : 05									
Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5002	501	LCP	SOP	000	BOP	401	001	ML	5002	unit(s)		32	SEAMLESS TUBULAR BUSBAR 127 mm IPS SCH. 40 Aluminum alloy T6101-T6 Outside diameter: 141,3 mm Inside diameter: 128,2 mm Length: 15 m	ILK-SN-CD-8000-EL-T6-0026-01	GE (SBC)	Westburne		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5004	501	LCP	SOP	000	BOP	401	001	ML	5004	unit(s)		5	SEAMLESS TUBULAR BUSBAR 203 mm IPS SCH. 40 Aluminum alloy T6101-T6 Outside diameter: 219,1 mm Inside diameter: 201,7 mm Length: 12 m	ILK-SN-CD-8000-EL-T6-0026-01	GE (SBC)	RYERSON		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5006	501	LCP	SOP	000	BOP	401	001	ML	5006	unit(s)		176	SEAMLESS TUBULAR BUSBAR 127 mm IPS SCH. 40 Aluminum alloy T6101-T6 Outside diameter: 141,3 mm Inside diameter: 128,2 mm Length: 12 m	ILK-SN-CD-8000-EL-T6-0026-01	GE (SBC)	RYERSON		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5010	501	LCP	SOP	000	BOP	401	001	ML	5010	m		8	SPECTRA BUSWAY (126S) 48 FT 3200A Busway One run of UL Copper 3P3W 3200A AC KAIC Housing Ground with Joint-Guard Protection 4 Each 90 Degree Elbows 48 Ft of Feeder Splash Proof (IP54) 2 Each Special / Custom Flanged ends	ILK-SN-CD-8000-EL-T6-0026-01	GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	From Emergency SWGR to Main SWGR 1	
5011	501	LCP	SOP	000	BOP	401	001	ML	5011	m		30	SPECTRA BUSWAY (126S) 186 FT 3200A Busway One run of UL Copper 3P3W 3200A AC KAIC Housing Ground with Joint-Guard Protection 4 Each 90 Degree Elbows 186 Ft of Feeder Splash Proof (IP54) 2 Each Special / Custom Flanged ends	ILK-SN-CD-8000-EL-T6-0026-01	GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	From Emergency SWGR to Main SWGR 2	
5020	501	LCP	SOP	000	BOP	401	001	ML	5020	m		8667	1750 MCM AAC CONDUCTOR Aluminum alloy conductor, 61 strands, Code: Jessamine Diameter: 38,74 mm, Section: 896 mm², Linear weight: 2,44 kg/m	ILK-SN-CD-8000-EL-T6-0026-01	GE (SBC)	Westburne		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5022	501	LCP	SOP	000	BOP	401	001	ML	5022	m		350	Conductor COCKCOMB-27,72 mm OD	ILK-SN-CD-8000-EL-T6-0026-01	GE (SBC)	Westburne		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5040	501	LCP	SOP	000	BOP	401	001	ML	5040	m		4250	SHIELD WIRE CONDUCTOR Aluminum wire Diameter: 12,4 mm Section: 83,1 mm² Weight: 0,62 kg/m	ILK-SN-CD-8000-EL-T6-0026-01	GE (SBC)	Westburne		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5053	501	LCP	SOP	000	BOP	401	001	ML	5053	m		Batch	4/0 AWG, 1 KV, XLPE INSULATED CABLE Cable 4/0 AWG, 1 kv Cu, XLPE		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03			

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																			
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> <b>AC Yard Connectors</b>											NALCOR Document No. : ILK-AS-SO-8221-EL-G91-0001-01 Rev No. : 03								
											ALSTOM Document No. : LCP-SOP-400-SOP-401-001-01 Rev No. : 01								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5101	501	LCP	SOP	000	BOP	401	001	ML	5101	unit(s)									
									7	<b>ALUMINIUM ALLOY BOLTED T 80° CONNECTOR FOR 2 X 1750 MCM CONDUCTORS TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 315 kV applications. For connecting 2 x 1750 MCM AAC conductors to NEMA 4 terminal pad. Terminal pad width - 100 mm. Distance between conductors - 300 mm. 2500 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-T5-002B-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		
5102	501	LCP	SOP	000	BOP	401	001	ML	5102	unit(s)									
									0	<b>ALUMINIUM ALLOY T BOLTED CONNECTOR 1 X 1750 MCM CONDUCTOR TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 230 kV applications. For connecting 1 x 1750 MCM AAC conductor to NEMA 4 terminal pad. Terminal pad width - 100 mm. 1250 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-T5-002B-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		
5103	501	LCP	SOP	000	BOP	401	001	ML	5103	unit(s)									
									41	<b>ALUMINIUM ALLOY T BOLTED CONNECTOR 1 X 1750 MCM TO 1 X 1750 MCM AAC CONDUCTORS</b> Corona free suitable for 315 kV applications. For cable to cable connection. Run: 1 x 1750 MCM AAC conductor. Tap: 1 x 1750 MCM AAC conductor. 1250 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-T5-002B-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5104	501	LCP	SOP	000	BOP	401	001	ML	5104	unit(s)									
									74	<b>ALUMINIUM ALLOY STRAIGHT BOLTED TERMINAL 1 X 1750 MCM TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 230 kV applications. For connecting 1 x 1750 MCM AAC conductor to NEMA 4 terminal pad. Terminal pad width - 100 mm. 1250 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-T5-002B-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5105	501	LCP	SOP	000	BOP	401	001	ML	5105	unit(s)									
									18	<b>ALUMINIUM ALLOY STRAIGHT BOLTED TERMINAL 1 X 1750 MCM TO NEMA 6 TERMINAL PAD</b> Corona free suitable for 230 kV applications. For connecting 1 x 1750 MCM AAC conductor to NEMA 6 terminal pad. Terminal pad width - 150 mm. 1250 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-T5-002B-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5106	501	LCP	SOP	000	BOP	401	001	ML	5106	unit(s)									
									78	<b>ALUMINIUM ALLOY RIGID SPACER 2 X 1750 MCM CONDUCTORS</b> Corona free suitable for 315 kV applications. For 2 x 1750 MCM AAC conductors. Center to center distance between the conductors - 300 mm. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-T5-002B-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		
5107	501	LCP	SOP	000	BOP	401	001	ML	5107	unit(s)									
									3	<b>ALUMINIUM ALLOY BOLTED 90° TERMINAL 127 mm IPS PIPE TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 350 kV applications. Aluminum alloy bolted 90° terminal for connecting 127 mm IPS aluminum tube to NEMA 4 terminal pad. Terminal pad width - 100 mm. Terminal pad width perpendicular to the pipe. One-wrench installation. 3000 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-T5-002B-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		
5108	501	LCP	SOP	000	BOP	401	001	ML	5108	unit(s)									
									25	<b>ALUMINIUM ALLOY BOLTED T CONNECTOR 127 mm IPS PIPE TO 1 X 1750 MCM CONDUCTOR</b> Corona free suitable for 315 kV applications. For joining 127 mm IPS aluminum tube to 1 x 1750 MCM AAC conductor. 1250 A. One-wrench installation. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-T5-002B-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> AC Yard Connectors											NALCOR Document No. : ILK-AS-SO-8221-EL-G01-0001-01 Rev No. : 04									
											ALSTOM Document No. : LCP-SOP-000-BOP-401-001-01-01 Rev No. : 01									
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5115	501	LCP	SOP	000	BOP	401	001	ML	5115	unit(s)		<b>ALUMINUM ALLOY BOLTED STRAIGHT TERMINAL</b> Corona free suitable for 315 kV applications. Aluminum alloy bolted terminal, straight, centered for joining 127 mm IPS aluminum tube to 2 x 1750 MCM AAC conductors. One-wrench installation. Distance between conductors - 300 mm. 2500 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5122	501	LCP	SOP	000	BOP	401	001	ML	5122	unit(s)		<b>ALUMINUM ALLOY BOLTED T CONNECTOR FOR 2 X 1750 MCM CONDUCTORS TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 315 kV applications. For connecting 2 x 1750 MCM AAC conductors to NEMA 4 terminal pad. Terminal pad width - 100 mm. Distance between conductors - 300 mm. 2500 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05	
5123	501	LCP	SOP	000	BOP	401	001	ML	5123	unit(s)		<b>ALUMINUM ALLOY BOLTED 90° TERMINAL 1 X 1750 MCM CONDUCTOR TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 315 kV applications. For connecting 1 x 1750 MCM AAC conductor to NEMA 4 terminal pad at 90°. Terminal pad width - 100 mm. 2500 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5128	501	LCP	SOP	000	BOP	401	001	ML	5128	unit(s)		<b>ALUMINUM ALLOY BOLTED TERMINAL 3 X 1750 MCM TO NEMA 4 TERMINAL PAD</b> Corona free, suitable for 350kV applications. For connecting 3 x 1750 MCM AAC conductors. Triangular arrangement to NEMA 4 terminal pad. Center to center distance between the conductors - 300 mm. Terminal pad width - 100 mm. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5129	501	LCP	SOP	000	BOP	401	001	ML	5129	unit(s)		<b>ALUMINUM ALLOY T 90° BOLTED CONNECTOR FOR 3X1750 MCM CONDUCTORS TRIANGULAR FORMATION TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 350 kV applications. For connecting 3 x 1750 MCM AAC conductors to NEMA 4 terminal pad. Terminal pad parallel to the conductors. Terminal pad width - 100 mm. Distance between conductors - 300 mm. 2500 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5130	501	LCP	SOP	000	BOP	401	001	ML	5130	unit(s)		<b>ALUMINUM ALLOY RIGID SPACER 3 X 1750 MCM CONDUCTORS</b> Corona free, suitable for 350kV applications. For 3 x 1750 MCM AAC conductors. Triangular arrangement. Center to center distance between the conductors - 300 mm. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5142	501	LCP	SOP	000	BOP	401	001	ML	5142	unit(s)		<b>ALUMINUM ALLOY BOLTED STRAIGHT TERMINAL</b> Corona free suitable for 315 kV applications. Aluminum alloy bolted terminal, straight, centered for joining 127 mm IPS aluminum tube to 1 x 1750 MCM AAC conductor. One-wrench installation. 2500 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5152	501	LCP	SOP	000	BOP	401	001	ML	5152	unit(s)		<b>ALUMINUM ALLOY STRAIGHT BOLTED TERMINAL 2 X 1750 MCM CONDUCTORS TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 315 kV applications. For connecting 2 x 1750 MCM AAC conductors to NEMA 4 terminal pad. Terminal pad width - 100 mm. Distance between conductors - 300 mm. 2500 A. Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	GE-SPA		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> <b>AC Yard Connectors</b>											MALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01 Rev No. : 04									
											ALSTOM Document No. : LCP-SOP-008-BOP-491-001-ML Rev No. : 05									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
5154	501	LCP	SOP	000	BOP	401	001	ML	5154	unit(s)		9	<b>ALUMINUM ALLOY BOLTED 45° TERMINAL 1 X 1750 MCM CONDUCTOR TO NEMA 4 TERMINAL PAD</b> Corona free suitable for 315 kV applications For connecting 1 x 1750 MCM AAC conductor to NEMA 4 terminal pad at 45° Terminal pad width - 100 mm 1200 A Complete with stainless steel bolts, nuts and washers.	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)	GE-SPA	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5155	501	LCP	SOP	000	BOP	401	001	ML	5155	unit(s)		6	<b>TIN PLATED COPPER BOLTED STRAIGHT CONNECTOR FOR 1 X 40 AWG CONDUCTOR TO 13 mm THREADED STUD</b> For connecting 1 x 40 AWG copper conductor to 13 mm threaded stud Complete with silicon bronze bolts, nuts and washers.	ILK-SN-CD-8000-EL-T5-0026-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5171	501	LCP	SOP	000	BOP	401	001	ML	5171	unit(s)		9	<b>FACTORY WELDED A-FRAME</b> Run: aluminum tube 127 mm IPS sch. 40 Top: aluminum tube 127 mm IPS sch. 40 Legs and cross arm pipe size: aluminum tube 76 mm IPS sch. 40 Height: 4200 mm Angle: 30°	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)	GE-SPA	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5172	501	LCP	SOP	000	BOP	401	001	ML	5172	unit(s)		20	<b>ALUMINUM ALLOY WELDED SPHERICAL COUPLER</b> For aluminum tube to tube 127 mm IPS sch. 40	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)	GE-SPA	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5173	501	LCP	SOP	000	BOP	401	001	ML	5173	unit(s)		9	<b>ALUMINUM ALLOY WELDED COUPLER</b> For coupling aluminum tube 127 mm IPS sch. 40 End to end. 3000 A	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)	GE-SPA	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5175	501	LCP	SOP	000	BOP	401	001	ML	5175	unit(s)		43	<b>ALUMINUM ALLOY WELDED END PLUG</b> Suitable for 230 kV applications For aluminum tube 127 mm IPS sch. 40	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)	GE-SPA	CD501	ELECTRICAL INSTALLATION CONTRACTOR	05	
5184	501	LCP	SOP	000	BOP	401	001	ML	5184	unit(s)		3	<b>ALUMINUM ALLOY BUS SUPPORT FOR MOUNTING 2 X 1750 MCM ALUMINUM CONDUCTORS TO A POST INSULATOR</b> Aluminum alloy bus support for post type insulator. Corona free, suitable for 315 kV applications. Complete with stainless steel bolts, nuts and washers. For mounting 2 x 1750 MCM AAC conductors on a post insulator. Distance between conductors: 300 mm. Insulator bolt circle: 127 mm.	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)	GE-SPA	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5185	501	LCP	SOP	000	BOP	401	001	ML	5185	unit(s)		3	<b>ALUMINUM ALLOY BUS SUPPORT FOR MOUNTING 1 X 1750 MCM ALUMINUM CONDUCTOR TO A POST INSULATOR</b> Aluminum alloy bus support for post type insulator. Corona free, suitable for 315 kV applications. Complete with stainless steel bolts, nuts and washers. For mounting 1 x 1750 MCM AAC conductor on a post insulator. Insulator bolt circle: 127 mm.	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)	GE-SPA	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5190	501	LCP	SOP	000	BOP	401	001	ML	5190	unit(s)		80	<b>ALUMINUM ALLOY BUS SUPPORT FOR POST TYPE INSULATOR</b> Corona free suitable for 315 kV applications. Bolted for on site installation. Complete with stainless steel bolts, nuts and washers. For mounting a 127 mm aluminum tube sch. 40 on a post insulator. Insulator bolt circle: 127 mm.	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)	GE-SPA	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5191	501	LCP	SOP	000	BOP	401	001	ML	5191	unit(s)		8	<b>ALUMINUM ALLOY EXPANSION BUS SUPPORT FOR POST TYPE INSULATOR</b> Corona free suitable for 230 kV applications. Bolted. Complete with stainless steel bolts, nuts and washers. For mounting a 127 mm aluminum tube sch. 40 on a post insulator. Tube expansion 50 mm min. each side. Insulator bolt circle: 127 mm. Current rated bridge conductor: 3150 A.	ILK-SN-CD-8000-EL-T5-0026-01	GE (SBC)	GE-SPA	CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																					
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT										NALCOR Document No. : ILK-AS-SD-8221-EL-G01-001-01		Rev No. : 01									
AC Yard Connectors										ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML		Rev No. : 01									
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments			
5197	501	LCP	SOP	000	BOP	401	001	ML	5197	unit(s)		3	ALUMINIUM ALLOY BUS SUPPORT FOR 3 x 1750 MCM ALUMINIUM CONDUCTORS TRIANGULAR FORMATION TO A POST TYPE INSULATOR  Corona free, suitable for 315 kV applications. Bolted. Complete with stainless steel bolts, nuts and washers. For mounting 3x1750 MCM on a post insulator. Distance between conductors - 300 mm. Complete with lower corona ring assembly. Insulator bolt circle 127 mm.	ILK-SN-CD-8000-EL-TS-0028-01	GE (SBC)	GE-SPA		CDS01	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																			
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> Compression & Strain Relief Connectors											NALCOR Document No.: ILK-AS-SD-4221-EL-007-0001-01 Rev No.: 04								
											ALSTOM Document No.: LCP-SOP-000-BOP-401-001-ML Rev No.: 03								
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
5201	501	LCP	SOP	000	BOP	401	001	ML	5201	unit(s)	2 HOLES TIN PLATED COPPER COMPRESSION LUG FOR 4/0 AWG COPPER CABLE	ILK-SN-CD-8000-EL-TS-0025-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5270	501	LCP	SOP	000	BOP	401	001	ML	5270	unit(s)	STRAIN RELIEF CONNECTOR Strain relief connector for connecting 4/0 AWG copper cable to a junction box.	ILK-SN-CD-8000-EL-TS-0025-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5271	501	LCP	SOP	000	BOP	401	001	ML	5271	unit(s)	CABLE GLAND TYPE 553K FROM CMP Strain relief connector for connecting various cables to a junction box.	ILK-SN-CD-8000-EL-TS-0025-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5272	501	LCP	SOP	000	BOP	401	001	ML	5272	unit(s)	ALUMINUM STRAIN RELIEF CONNECTOR FOR P&C AND ELECTRICAL PANELS Strain relief connector for connecting various sizes of cable to P&C, electrical and power panels.	ILK-SN-CD-8000-EL-TS-0025-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5281	501	LCP	SOP	000	BOP	401	001	ML	5281	unit(s)	ALUMINUM P-CABLE CLAMP For various size of cable.	ILK-SN-CD-8000-EL-TS-0025-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> Grounding											NALCOR Document No. : ILK-AS-SD-4221-EL-G01-0001-01 Rev No. : 04									
											ALSTOM Document No. : LCP-SOP-000-BOP-401-001-01-EL Rev No. : 05									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
5300	501	LCP	SOP	000	BOP	401	001	ML	5300	unit(s)	As Req'd	GROUND CONDUCTOR #2 AWG, Cu #2 AWG stranded copper conductor Bare concentric Lay stranded 7 strands.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5302	501	LCP	SOP	000	BOP	401	001	ML	5302	unit(s)	24538	GROUND CONDUCTOR 4/0 AWG, Cu 4/0 AWG stranded copper conductor Bare concentric Lay stranded 19 strands.	ILK-SN-CD-8000-EL-TS-0007-01	GE (SBC)	EC&S Electrical Cable Supply		CD501	ELECTRICAL INSTALLATION CONTRACTOR / CIVIL CONTRACTOR	03	
5305	501	LCP	SOP	000	BOP	401	001	ML	5305	m	50	1 kV INSULATED GROUND CONDUCTOR 4/0 AWG, Cu, YELLOW / GREEN 4/0 AWG stranded copper conductor 1 kV insulated yellow / green Lay stranded. 19 strands.	ILK-SN-CD-8000-EL-TS-0007-01	GE (SBC)	EC&S Electrical Cable Supply		CD501	ELECTRICAL INSTALLATION CONTRACTOR / CIVIL CONTRACTOR	03	
5307	501	LCP	SOP	000	BOP	401	001	ML	5307	unit(s)	As Req'd	COPPER BUSBAR 50 mm x 5 mm Copper busbar Dimensions: 50 mm x 5 mm	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5310	501	LCP	SOP	000	BOP	401	001	ML	5310	unit(s)	2289	WELDED CONNECTION TYPE XB FOR TWO 4/0 AWG CONDUCTORS Horizontal X connection for cross of horizontal cables. tapped and not cut. Cable run: 4/0 AWG Cable tap: 4/0 AWG Welding cartridge # 250	ILK-SN-CD-8000-EL-TS-0007-01	GE (SBC)	Burndy		CD501	CIVIL CONTRACTOR	03	
5314	501	LCP	SOP	000	BOP	401	001	ML	5314	unit(s)	As Req'd	WELDED CONNECTION TYPE VS FOR 4/0 AWG CONDUCTOR TO FLAT STEEL Welded connection for vertical conductor to vertical flat steel surface type VS. Conductor down at 45° Conductor size: 4/0 AWG Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5315	501	LCP	SOP	000	BOP	401	001	ML	5315	unit(s)	As Req'd	WELDED CONNECTION TYPE VS FOR 4/0 AWG CONDUCTOR TO VERTICAL PIPE 31,75 mm - 101,6 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VS. Conductor down at 45° Conductor size: 4/0 AWG Pipe size: 31,75 mm- 101,6 mm IPS Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5316	501	LCP	SOP	000	BOP	401	001	ML	5316	unit(s)	As Req'd	WELDED CONNECTION TYPE VS FOR 4/0 AWG CONDUCTOR TO VERTICAL PIPE 101,6 mm - 152,4 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VS. Conductor down at 45° Conductor size: 4/0 AWG Pipe size: 101,6 mm- 152,4 mm IPS Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5317	501	LCP	SOP	000	BOP	401	001	ML	5317	unit(s)	As Req'd	WELDED CONNECTION TYPE VF FOR #2 AWG CONDUCTOR TO VERTICAL PIPE 38,1 mm - 101,4 mm IPS Welded connection for vertical conductor to side of vertical steel pipe type VF. Conductor up to vertical steel pipe. Conductor size: #2 AWG Pipe size: 38,1 mm- 101,6 mm IPS Welding cartridge # 65	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5318	501	LCP	SOP	000	BOP	401	001	ML	5318	unit(s)	As Req'd	WELDED CONNECTION TYPE VN FOR #2 AWG CONDUCTOR TO RIGHT HAND SIDE OF HORIZONTAL PIPE 31,75 mm IPS Welded connector type VN Conductor to the right hand side of the horizontal steel pipe. Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 45	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		

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Lower Churchill Converters and Transition Compounds Project																						
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT											NALCOR Document No. : ILK-AS-SD-8321-EL-G01-001-01		Rev No. : 03									
Grounding											ALSTOM Document No. : LCP-SOP-000-BOP-401-001-01		Rev No. : 05									
Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5319	501	LCP	SOP	000	BOP	401	001	ML	5319	unit(s)		As Req'd	WELDED CONNECTION TYPE VH FOR #2 AWG CONDUCTOR TO LEFT HAND SIDE OF HORIZONTAL PIPE 31,75 mm IPS  Welded connection type VH Conductor to the left hand side of the horizontal steel pipe. Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 40	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5320	501	LCP	SOP	000	BOP	401	001	ML	5320	unit(s)		As Req'd	WELDED CONNECTION TYPE HC FOR #2 AWG HORIZONTAL CONDUCTOR TO SIDE OF HORIZONTAL PIPE 31,75 mm IPS  Welded connection through horizontal conductor to side of horizontal steel pipe type HC. Conductor size: #2 AWG Pipe size: 31,75 mm IPS Welding cartridge # 45	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5321	501	LCP	SOP	000	BOP	401	001	ML	5321	unit(s)	94		WELDED CONNECTION TYPE GT FOR #4 AWG CONDUCTOR TO GROUND ROD 19 mm DIAMETER  Through cable to top of ground rod welded connection type GT for plain of threaded copper clad rod. Ground rod size: 19 mm nom. Conductor Size: #4 AWG Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	GE (SBC)	Bumdy			CD501	CIVIL CONTRACTOR	03	
5323	501	LCP	SOP	000	BOP	401	001	ML	5323	unit(s)	42		WELDED PARALLEL CONNECTION TYPE PT FOR TWO #4 AWG HORIZONTAL CONDUCTORS  Horizontal parallel through connection for two horizontal cables Cable run: #4 AWG Cable tap: #4 AWG Welding cartridge # 200	ILK-SN-CD-8000-EL-TS-0007-01	GE (SBC)	Bumdy			CD501	CIVIL CONTRACTOR	03	
5325	501	LCP	SOP	000	BOP	401	001	ML	5325	unit(s)		51	WELDED CONNECTION TYPE GY FOR #4 AWG CONDUCTOR TO GROUND ROD 19 mm DIAMETER  Through cable to side of ground rod welded connection type GY for plain of threaded copper clad rod. Ground rod size: 19 mm nom. Conductor Size: #4 AWG Welding cartridge # 150	ILK-SN-CD-8000-EL-TS-0007-01	GE (SBC)	Bumdy			CD501	CIVIL CONTRACTOR	03	
5326	501	LCP	SOP	000	BOP	401	001	ML	5326	unit(s)		As Req'd	WELDED CONNECTION TYPE TA FOR TWO #4 AWG CONDUCTORS  Horizontal type TA connection Cable run: #4 AWG Cable tap: #4 AWG Welding cartridge # 150	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5328	501	LCP	SOP	000	BOP	401	001	ML	5328	unit(s)		As Req'd	WELDED CONNECTION TYPE VS FOR #4 AWG CONDUCTOR TO VERTICAL PIPE 152,4 mm x 54 mm IPS  Welded connection for vertical conductor to side of vertical steel pipe type VS. Conductor down at 45° Conductor size: #4 AWG Pipe size: 152,4 mm x 54 mm IPS Welding cartridge # 115	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5330	501	LCP	SOP	000	BOP	401	001	ML	5330	unit(s)		As Req'd	COMPRESSION CONNECTOR TYPE CRMPIT TYPE VC204  C-shape compression connector for making top or parallel copper connections. Run: 2 Str. - 2 Str. Tap: 6 Str. - 4 Str.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5331	501	LCP	SOP	000	BOP	401	001	ML	5331	unit(s)		As Req'd	COMPRESSION CONNECTOR TYPE C  C-shape compression connector for making top or parallel copper connections. Run: 3/0 Str. - 250 MCM Tap: 3/0 Str. - 250 MCM	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5345	501	LCP	SOP	000	BOP	401	001	ML	5345	unit(s)	115		GROUND ROD  Solid hardness copper clad ground rod Diameter: 3/4" nom. (19,27 mm) and 50 years service lifetime requirement. Plating thickness 13 mil Length: 3,05 m Screwed connection at each end with a shoulder Erico part number: 613403 or equivalent	ILK-SN-CD-8000-EL-TS-0007-01	GE (SBC)	PTS ELECTRIQUE			CD501	CIVIL CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT Grounding													 Rev No.: 116 Rev No.: 116											
Item No.	Contractor Tag Number												Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
																<b>GROUNDING BALL STUD</b>								
5349	501	LCP	SOP	000	BOP	401	001	ML	5349	unit(s)		As Req'd	Tin plated copper grounding ball stud Thread diameter: M12 Ball sphere: 25.4 mm Complete with nut, flat and lock washers.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03					
5350	501	LCP	SOP	000	BOP	401	001	ML	5350	unit(s)		As Req'd	Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03					
5351	501	LCP	SOP	000	BOP	401	001	ML	5351	unit(s)		As Req'd	Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to NEMA 2 terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03					
5354	501	LCP	SOP	000	BOP	401	001	ML	5354	unit(s)		As Req'd	Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole 90° terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03					
5357	501	LCP	SOP	000	BOP	401	001	ML	5357	unit(s)		As Req'd	Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole 90° terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03					
5358	501	LCP	SOP	000	BOP	401	001	ML	5358	unit(s)		As Req'd	Heavy duty tin plated copper compression terminal for 4/0 AWG str. copper conductor to 1 hole 10 mm terminal pad.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03					
5370	501	LCP	SOP	000	BOP	401	001	ML	5370	unit(s)		As Req'd	<b>GROUND TERMINAL FOR ONE COPPER CABLE TO NEMA 2 TERMINAL PAD TYPE NARDS</b> High copper alloy tin plated ground connector for joining one 2/0 - 4/0 AWG copper conductor to NEMA 2 terminal pad. Complete with bolts nuts and lock washers.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03					
5371	501	LCP	SOP	000	BOP	401	001	ML	5371	unit(s)		As Req'd	<b>GROUND CONNECTOR FOR TWO COPPER CABLES TO BAR TYPE GC2922W</b> High copper alloy tin plated ground connector for joining two 2/0 50k - 250 MCM parallel copper conductors to flat bar. Complete with bolts nuts and lock washers for 10 mm bar.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04					
5372	501	LCP	SOP	000	BOP	401	001	ML	5372	unit(s)		As Req'd	<b>GROUND CONNECTOR FOR ONE COPPER CABLE TO BAR TYPE GR29W</b> High copper alloy tin plated ground connector for joining one 2/0 50k - 250 MCM copper conductor to flat bar. Complete with bolts nuts and lock washers for 10 mm bar.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04					
5374	501	LCP	SOP	000	BOP	401	001	ML	5374	unit(s)		As Req'd	<b>GROUND CONNECTOR FOR ONE COPPER CABLE TO PIPE 203 mm DIAMETER</b> High conductivity copper ground connector for joining one #4 - 4/0 AWG copper conductor to metallic pipe 203 mm diameter. Complete with silicon bronze bolts nuts and washers. Direct burial application.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03					
5376	501	LCP	SOP	000	BOP	401	001	ML	5376	unit(s)		As Req'd	<b>COMPRESSION GROUND CONNECTOR FOR TWO HOLES TERMINAL TO STEEL BEAM</b> Compression terminal type Burndy YQIB-WX28-338-2N #2-40AWG Flat steel thickness 6mm	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03					
5377	501	LCP	SOP	000	BOP	401	001	ML	5377	unit(s)		As Req'd	<b>RAISED FLOOR PEDESTAL GROUND CONNECTOR FOR COPPER CABLE 3/0 AWG TO RAISED FLOOR PEDESTAL TYPE BURNDY OXP1628HF</b>	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03					

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																			
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b>													NALCOR Document No.: ILK-AS-SD-4221-EL-051-001-01 Rev No.: 04						
<b>Grounding</b>													ALSTOM Document No.: LCP-SOP-000-BOP-401-401-ML Rev No.: 05						
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5378	501	LCP	SOP	000	BOP	401	001	ML	5378	unit(s)	<b>GROUND CONNECTOR FOR THREE CABLES TO BAR TYPE GE2323</b> High copper alloy tin plated ground connector for joining three #4 Sol - 2D Str parallel copper conductors to flat bar. Complete with lock nuts and lock washers for 10 mm bar.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		
5380	501	LCP	SOP	000	BOP	401	001	ML	5380	unit(s)	<b>TIN PLATED FLEXIBLE COPPER GROUND BRAID</b> 25mm LARGE X 200 mm LONG. PADS: 1 hole 12mm	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5389	501	LCP	SOP	000	BOP	401	001	ML	5389	unit(s)	<b>GROUNDING MAT</b> Galvanized steel gradient control mat. Dimensions: 1800 mm x 1200 mm. Galvanized steel with 150 mm square mesh. Complete with 3 grounding connectors type CB for connecting 4G AWG ground conductor.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5395	501	LCP	SOP	000	BOP	401	001	ML	5395	unit(s)	<b>PVC COATED STEEL CLAMP</b> One hole PVC coated steel clamp. Scepter type C5 or equal. For tying 4G AWG grounding conductor.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		
5396	501	LCP	SOP	000	BOP	401	001	ML	5396	unit(s)	<b>GROUND PIT</b> Ground pit. Dimensions: 391 mm L x 391 mm W x 457 mm D. Etno # T149E or equivalent.	ILK-SN-CD-8000-EL-TS-0007-01	GE (BBC)	MCCLOUGHLAN	CD501	CIVIL CONTRACTOR	03		
5397	501	LCP	SOP	000	BOP	401	001	ML	5397	unit(s)	<b>SLEEVE</b> For 4G AWG copper conductor. CADWELD type S-429-F-2S10	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		
5398	501	LCP	SOP	000	BOP	401	001	ML	5398	unit(s)	<b>FLAT OMEGA HOLDER</b> Galvanized steel flat omega holder for fixing epoxy insulator on the wall. Distance from the wall: 50 mm. Opening: 100 mm. Wall mounting hardware diameter: 6.4 mm. Insulator mounting hole: 1 hole 14 mm.	ILK-SN-CD-8000-EL-TS-0007-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																		
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> <b>Cable Trenches</b>												NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01 Rev No. : 14						
												ALSTOM Document No. : LCP-SOP-200-BOP-401-001-ML Rev No. : 06						
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5400	501	LCP	SOP	000	BOP	401	001	ML	5400	unit(s)								
									1983 PLASTIBETON CABLE TRENCH MODEL #68 Plastibeton cable trench Approximate dimensions: 260 mm W x 265 mm D Supplied with covers and galvanized cable clips.	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure	33110412; 33111411; 3465200	CD501	CIVIL CONTRACTOR	03		
5401	501	LCP	SOP	000	BOP	401	001	ML	5401	unit(s)								
									4842 PLASTIBETON CABLE TRENCH MODEL #1216 Plastibeton cable trench Approximate dimensions: 440 mm W x 490 mm D Supplied with covers and galvanized cable clips.	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure	33130412;	CD501	CIVIL CONTRACTOR	03		
5402	501	LCP	SOP	000	BOP	401	001	ML	5402	unit(s)								
									3413 PLASTIBETON CABLE TRENCH MODEL #2016 Plastibeton cable trench Approximate dimensions: 840 mm W x 500 mm D Supplied with covers and galvanized cable clips.	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure	33150412; 33151411; 33151412;	CD501	CIVIL CONTRACTOR	03		
5403	501	LCP	SOP	000	BOP	401	001	ML	5403	unit(s)								
									38 PLASTIBETON CABLE TRENCH MODEL #3016 Plastibeton cable trench Approximate dimensions: 895 mm W x 530 mm D Supplied with covers and galvanized cable clips.	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure		CD501	CIVIL CONTRACTOR	03	QTY UNDER REVIEW	
5450	501	LCP	SOP	000	BOP	401	001	ML	5450	unit(s)								
									2404 PLASTIBETON CABLE TRENCH SEPARATOR 300 mm	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	QTY UNDER REVIEW	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																					
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT Cable Trenches										NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01 Rev No. : 04											
										ALSTOM Document No. : LCP-SOP-600-BCP-401-001-ML Rev No. : 05											
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments		
5451	501	LCP	SOP	000	BCP	401	001	ML	5451	unit(s)		35	PLASTIBETON CABLE TRENCH SEPARATOR 150 mm	ILK-SN-CD-8000-EL-TS-0008-01	GE (SBC)	Solutions Oldcastle Enclosure		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	QTY UNDER REVIEW

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																		
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT										MALCOR Document No.: ILK-AS-8D-8221-EL-061-0001-01		Rev No.: 04						
Hardware & Conduits										ALSTOM Document No.: LCP-SOP-469-BCP-401-001-ML		Rev No.: 04						
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
5503	501	LCP	SOP	000	BOP	401	001	ML	5503	unIt(s)								
									<b>HARDWARE FOR TENSION INSULATOR STRING 160 KN TWIN CONDUCTORS</b> Complete hardware for tension insulator string. Ultimate breaking strength: 160 kN Composed by single insulator string For 2 x 1750 MCM AAC conductor. Insulators (17 units 160 kN, 171 mm step) see item 4651.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03		
5507	501	LCP	SOP	000	BOP	401	001	ML	5507	unIt(s)								
									<b>HARDWARE FOR SUSPENSION INSULATOR STRING "V" 160 KN THREE CONDUCTORS</b> Complete hardware for suspension insulator string "V". Ultimate breaking strength: 160 kN Composed by "V" insulator string For 3 x 1750 MCM AAC conductor. Insulators (2x27 units 160 kN, 170 mm step) to be supplied by others see item 4650.	ILK-SN-CD-8000-EL-TS-0025-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5508	501	LCP	SOP	000	BOP	401	001	ML	5508	unIt(s)								
									<b>HARDWARE FOR TENSION INSULATOR STRING 160 KN THREE CONDUCTORS</b> Complete hardware for tension insulator string. Ultimate breaking strength: 160 kN Composed by single insulator string For 3 x 1750 MCM AAC conductor. Insulators (27 units 160 kN, 170 mm step) see item 4650.	ILK-SN-CD-8000-EL-TS-0025-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5510	501	LCP	SOP	000	BOP	401	001	ML	5510	unIt(s)								
									<b>HARDWARE FOR SUSPENSION INSULATOR STRING "V" 160 KN THREE CONDUCTORS</b> Complete hardware for suspension insulator string "V". Ultimate breaking strength: 160 kN Composed by "V" insulator string For 3 x 1750 MCM AAC conductor. Insulators (2x31 units 160 kN, 170 mm step) to be supplied by others see item 4650.	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5515	501	LCP	SOP	000	BOP	401	001	ML	5515	unIt(s)								
									<b>DEAD END CLAMP TYPE BURKDY CUN30A-E OR EQUIVALENT</b> High strength aluminum dead end clamp. For steel end attachment of 12.4 mm aluminum wire	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	Bundy		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5516	501	LCP	SOP	000	BOP	401	001	ML	5516	unIt(s)								
									<b>HOT DIP GALVANIZED STEEL SHACKLE SIZE 15.9 mm (5/8")</b> Hot dip galvanized steel shackle size 15.9 mm (5/8") - 201268 Ultimate load 177.2 kN (40000 lbf) Opening 24 mm (0.94") Clearance length - 89 mm (3.5") C/w galvanized steel grade 5 bolt 15.9 mm (5/8"), nut (number 14303B) and stainless steel cotter pin. Reference drawing number: 25823B	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC)	SLACAN		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5520	501	LCP	SOP	000	BOP	401	001	ML	5520	unIt(s)								
									<b>SHIELD WIRE DEAD END ATTACHMENT</b> For dead end attachment of 12.4 mm aluminum wire. Including one dead end clamp (item 5515) one anchor shackle one ground clamp (item 5371) and one ground clamp (item 5372)	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC) / ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5521	501	LCP	SOP	000	BOP	401	001	ML	5521	unIt(s)								
									<b>SHIELD WIRE ATTACHMENT SUBSTATION FEEDER</b> For attachment of 12.4 mm aluminum wire. Including one dead end clamp (item 5515) one anchor shackle one ground clamp (item 5372) and one ground clamp (item 5378)	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC) / ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5522	501	LCP	SOP	000	BOP	401	001	ML	5522	unIt(s)								
									<b>SHIELD WIRE ATTACHMENT SUBSTATION CONTINUOUS CONNECTION</b> For attachment of 12.4 mm aluminum wire. Including two dead end clamps (item 5515) two anchor shackles one ground clamp (item 5372) and one ground clamp (item 5378)	ILK-SN-CD-8000-EL-TS-0026-01	GE (SBC) / ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		
5525	501	LCP	SOP	000	BOP	401	001	ML	5525	m								
									<b>50 mm FLEXIBLE CORRUGATED ORANGE CONDUIT FOR FO CABLE</b>		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		
5526	501	LCP	SOP	000	BOP	401	001	ML	5526	unIt(s)								
									<b>CONNECTOR FOR 50 mm CORRUGATED ORANGE CONDUIT</b> For connecting 50 mm liquid tight conduit to a junction box.		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	05		
5527	501	LCP	SOP	000	BOP	401	001	ML	5527	unIt(s)								
									<b>PVC STRAIN RELIEF CONNECTOR FOR 50 mm PVC CONDUIT</b> Complete with 6 grommets for various cable sizes.		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04		

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<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> <b>Hardware &amp; Conduits</b>												MALCOR Document No.: ILK-AS-SD-8221-EL-001-0001-01 Rev No.: 03								
												ALSTOM Document No.: LCP-SOP-409-BOP-401-001-ML Rev No.: 03								
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Revisiting the Item	Comments		
										<b>PVC CONDUIT COUPLER FOR 100 mm PVC CONDUIT</b>										
5531	501	LCP	SOP	000	BOP	401	001	ML	5531	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
										<b>PVC TRANSITION COUPLER FOR 75 mm PVC CONDUIT TO 50 mm PVC CONDUIT</b>										
5533	501	LCP	SOP	000	BOP	401	001	ML	5533	unit(s)	As Req'd				ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
										<b>LIQUID-TIGHT CONDUIT 30 mm (1.25") NOM. DIAMETER</b>										
5535	501	LCP	SOP	000	BOP	401	001	ML	5535	unit(s)	As Req'd				ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
										<b>PVC CONDUIT 30 mm DIAMETER</b>										
5536	501	LCP	SOP	000	BOP	401	001	ML	5536	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
										<b>PVC CONDUIT 50 mm DIAMETER</b>										
5537	501	LCP	SOP	000	BOP	401	001	ML	5537	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
										<b>PVC CONDUIT 75 mm DIAMETER</b>										
5538	501	LCP	SOP	000	BOP	401	001	ML	5538	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
										<b>PVC CONDUIT 100 mm DIAMETER</b>										
5539	501	LCP	SOP	000	BOP	401	001	ML	5539	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
										<b>PVC TRANSITION COUPLER FOR 75 mm PVC CONDUIT TO 30 mm PVC CONDUIT</b>										
5542	501	LCP	SOP	000	BOP	401	001	ML	5542	unit(s)	As Req'd				ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
										<b>LIQUID-TIGHT CONNECTOR FOR 30 mm CONDUIT</b>										
5543	501	LCP	SOP	000	BOP	401	001	ML	5543	unit(s)	As Req'd				ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
										<b>PVC TRANSITION COUPLER FOR 30 mm PVC CONDUIT TO 30 mm LIQUIDTIGHT CONDUIT</b>										
5544	501	LCP	SOP	000	BOP	401	001	ML	5544	unit(s)	As Req'd				ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
										<b>PVC CONDUIT 50 mm DIAMETER</b>										
5550	501	LCP	SOP	000	BOP	401	001	ML	5550	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
										<b>PVC CONDUIT 75 mm DIAMETER</b>										
5551	501	LCP	SOP	000	BOP	401	001	ML	5551	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
										<b>PVC CONDUIT 100 mm DIAMETER</b>										
5552	501	LCP	SOP	000	BOP	401	001	ML	5552	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
										<b>PVC ELBOW 50 mm DIAMETER, R=600 mm</b>										
5555	501	LCP	SOP	000	BOP	401	001	ML	5555	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
										<b>PVC ELBOW 75 mm DIAMETER, R=600 mm</b>										
5556	501	LCP	SOP	000	BOP	401	001	ML	5556	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	
										<b>90° PVC ELBOW 100 mm DIAMETER, R=600 mm</b>										
5557	501	LCP	SOP	000	BOP	401	001	ML	5557	unit(s)	As Req'd			1LK-SN-CD-8000-EL-TS-0008-01	CIVIL CONTRACTOR		CD501	CIVIL CONTRACTOR	03	

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<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> Hardware & Conduits												NALCOR Document No.: LK-AS-SD-0221-EL-001-01 Rev No.: 04							
												ALSTOM Document No.: LCP-SOP-000-BOP-401-001-ML Rev No.: 04							
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
5565	501	LCP	SOP	000	BOP	401	001	ML	5565	unit(s)	As Req'd	PVC COATED STEEL PIPE STRAP 2 HOLES FOR 50 mm PVC PIPE Two holes PVC coated steel strap For 50 mm PVC pipe	LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5566	501	LCP	SOP	000	BOP	401	001	ML	5566	unit(s)	As Req'd	PVC COATED STEEL PIPE STRAP 2 HOLES FOR 75 mm PVC PIPE Two holes PVC coated steel strap For 75 mm PVC pipe	LK-SN-CD-8999-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5567	501	LCP	SOP	000	BOP	401	001	ML	5567	unit(s)	As Req'd	PVC COATED STEEL PIPE STRAP 2 HOLES FOR 100 mm PVC PIPE Two holes PVC coated steel strap For 100 mm PVC pipe	LK-SN-CD-8000-EL-TS-0008-01	ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5570	501	LCP	SOP	000	BOP	401	001	ML	5570	unit(s)	As Req'd	TRANSITION COUPLER FOR 50 mm CONDUIT Waterproof transition coupler For joining 50 mm PVC conduit to 50 mm liquid-tight conduit.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5571	501	LCP	SOP	000	BOP	401	001	ML	5571	unit(s)	As Req'd	TRANSITION COUPLER FOR 75 mm CONDUIT Waterproof transition coupler For joining 75 mm PVC conduit to 75 mm liquid-tight conduit.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5572	501	LCP	SOP	000	BOP	401	001	ML	5572	unit(s)	As Req'd	TRANSITION COUPLER FOR 100 mm CONDUIT Waterproof transition coupler 100 mm For joining 100 mm PVC conduit to 100 mm liquid-tight conduit.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5573	501	LCP	SOP	000	BOP	401	001	ML	5573	unit(s)	As Req'd	TRANSITION COUPLER/REDUCER 100 mm-50mm Waterproof transition coupler/reducer For joining 100 mm PVC conduit to 50 mm liquid-tight conduit.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5575	501	LCP	SOP	000	BOP	401	001	ML	5575	unit(s)	As Req'd	LIQUID-TIGHT CONDUIT 50 mm DIAMETER Liquid-tight flexible non metallic conduit. Diameter: 50 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5576	501	LCP	SOP	000	BOP	401	001	ML	5576	unit(s)	As Req'd	LIQUID-TIGHT CONDUIT 75 mm DIAMETER Liquid-tight flexible non metallic conduit. Diameter: 75 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5578	501	LCP	SOP	000	BOP	401	001	ML	5578	unit(s)	As Req'd	LIQUID-TIGHT CONDUIT 100 mm DIAMETER Liquid-tight flexible non metallic conduit. Diameter: 100 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5580	501	LCP	SOP	000	BOP	401	001	ML	5580	unit(s)	As Req'd	LIQUID-TIGHT CONNECTOR FOR 50 mm CONDUIT Liquid-tight connector for connecting 50 mm liquid-tight conduit to a junction box.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5581	501	LCP	SOP	000	BOP	401	001	ML	5581	unit(s)	As Req'd	LIQUID-TIGHT CONNECTOR FOR 75 mm CONDUIT Liquid-tight connector for connecting 75 mm liquid-tight conduit to a junction box.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5582	501	LCP	SOP	000	BOP	401	001	ML	5582	unit(s)	As Req'd	LIQUID-TIGHT CONNECTOR FOR 100 mm CONDUIT Liquid-tight connector for connecting 100 mm liquid-tight conduit to a junction box.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5585	501	LCP	SOP	000	BOP	401	001	ML	5585	unit(s)	As Req'd	STAINLESS STEEL STRAP Stainless steel strap 20 mm large for tying liquid-tight conduit and ground conductor to a steel structure. Complete with buckles.		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5590	501	LCP	SOP	000	BOP	401	001	ML	5590	unit(s)	As Req'd	ALUMINUM SINGLE SUPERSTRUT CHANNEL A 120 series single aluminum channel Dimensions: 41,3 mm x 41,3 mm Length: 6 m		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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														Lower Churchill Converters and Transition Compounds Project											
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT Hardware & Conduits														NALCOR Document No.: LK-AS-SD-8221-EL-091-001-01			Rev No.: 01								
														ALSTOM Document No.: LCP-SOP-090-BOP-401-001-ML			Rev No.: 01								
Item No.	Contractor Tag Number													Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BCN Rev updating the item	Comments
5592	501	LCP	SOP	090	BOP	401	001	ML	5592	units			As Req'd	GALVANIZED STEEL SINGLE SUPERSTRUT CHANNEL (not perforated) T&D #A1200 P A1200 series single galvanized steel channel Dimensions: 41,3 mm x 41,3 mm Length: 6 m		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04				
5593	501	LCP	SOP	090	BOP	401	001	ML	5593	units			As Req'd	GALVANIZED STEEL DOUBLE BACK TO BACK SUPERSTRUT CHANNEL (not perforated) T&D #A1202 P A1202 series double galvanized steel channel Dimensions: 82,6 mm x 41,3 mm Length: 6 m		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				
5595	501	LCP	SOP	090	BOP	401	001	ML	5595	units			As Req'd	ALUMINUM SINGLE SUPERSTRUT PVC END COVER PVC end cover for A1200 series single aluminum channel		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03				

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 <b>Lower Churchill Converters and Transition Compounds Project</b> SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT Bolts, Nuts & Washers												 MALCOR Document No. : ELK-A5-SD-0221-EL-G01-001-01 ALSTOM Document No. : LCP-SOP-000-BCP-401-001-ML		Rev No. : 03 Rev No. : 04					
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments	
5701	501	LCP	SOP	000	BCP	401	001	ML	5701	unit(s)	As Req'd	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=70 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 70 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5702	501	LCP	SOP	000	BCP	401	001	ML	5702	unit(s)	As Req'd	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=60 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 60 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5703	501	LCP	SOP	000	BCP	401	001	ML	5703	unit(s)	As Req'd	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=25 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 25 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5705	501	LCP	SOP	000	BCP	401	001	ML	5705	unit(s)	As Req'd	STAINLESS STEEL BOLT 15,9 mm DIAMETER, L=40 mm Hexagonal stainless steel bolt SS316 Diameter: 15,9 mm Length: 40 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5707	501	LCP	SOP	000	BCP	401	001	ML	5707	unit(s)	As Req'd	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=60 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 60 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5709	501	LCP	SOP	000	BCP	401	001	ML	5709	unit(s)	As Req'd	STAINLESS STEEL BOLT 12,7 mm DIAMETER, L=45 mm Hexagonal stainless steel bolt SS316 Diameter: 12,7 mm Length: 45 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5710	501	LCP	SOP	000	BCP	401	001	ML	5710	unit(s)	As Req'd	SILICON BRONZE BOLT 12,7 mm DIAMETER, L=45 mm Hexagonal silicon bronze bolt Diameter: 12,7 mm Length: 45 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5716	501	LCP	SOP	000	BCP	401	001	ML	5716	unit(s)	As Req'd	SILICON BRONZE BOLT 6,4 mm DIAMETER, L=25 mm Hexagonal silicon bronze bolt Diameter: 6,4 mm Length: 25 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5725	501	LCP	SOP	000	BCP	401	001	ML	5725	unit(s)	As Req'd	GALVANIZED STEEL BOLT 19 mm DIAMETER, L=85 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 19 mm Length: 85 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5726	501	LCP	SOP	000	BCP	401	001	ML	5726	unit(s)	As Req'd	GALVANIZED STEEL BOLT 12,7 mm DIAMETER, L=45 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 12,7 mm Length: 45 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5727	501	LCP	SOP	000	BCP	401	001	ML	5727	unit(s)	As Req'd	GALVANIZED STEEL BOLT 12,7 mm DIAMETER, L=25 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 12,7 mm Length: 25 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5729	501	LCP	SOP	000	BCP	401	001	ML	5729	unit(s)	As Req'd	GALVANIZED STEEL BOLT 22 mm DIAMETER, L=85 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 22 mm Length: 85 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5730	501	LCP	SOP	000	BCP	401	001	ML	5730	unit(s)	As Req'd	STAINLESS STEEL THREADED STUD 6 mm DIAMETER Stainless steel SS304 threaded stud for fastening to structural steel Thread: 6 mm x 30 mm long Shank: 6 mm long		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5731	501	LCP	SOP	000	BCP	401	001	ML	5731	unit(s)	As Req'd	STAINLESS STEEL 10 mm X 25 mm LONG SELF DRILLING WASHER HEAD SCREW Stainless steel 10mm x 25mm long self drilling washer head screw for fastening to structural steel		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT Bolts, Nuts & Washers												 MALCOR Document No. : ILK-A-S-SD-8221-EL-G01-0001-01 ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML		Rev No. : 03 Rev No. : 03					
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
5732	501	LCP	SOP	000	BOP	401	001	ML	5732	unit(s)	As Req'd	GALVANIZED STEEL BOLT 16,9 mm DIAMETER, L=80 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 16,9 mm Length: 80 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5735	501	LCP	SOP	000	BOP	401	001	ML	5735	unit(s)	As Req'd	GALVANIZED STEEL THREADED ROD 12,7 mm DIAMETER Galvanized steel threaded rod Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5736	601	LCP	SOP	000	BOP	401	001	ML	5736	unit(s)	As Req'd	STAINLESS STEEL THREADED ROD S316 Stainless steel threaded rod S316 Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5737	501	LCP	SOP	000	BOP	401	001	ML	5737	unit(s)	As Req'd	SILICON BRONZE NUT 6,4 mm DIAMETER Hexagonal silicon bronze nut Diameter: 6,4 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5740	501	LCP	SOP	000	BOP	401	001	ML	5740	unit(s)	As Req'd	STAINLESS STEEL NUT 12,7 mm DIAMETER Hexagonal stainless steel nut S304 Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5743	501	LCP	SOP	000	BOP	401	001	ML	5743	unit(s)	As Req'd	GALVANIZED STEEL NUT 16,9 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 16,9 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5744	501	LCP	SOP	000	BOP	401	001	ML	5744	unit(s)	As Req'd	SILICON BRONZE NUT 8 mm DIAMETER Hexagonal silicon bronze nut Diameter: 8 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5745	501	LCP	SOP	000	BOP	401	001	ML	5745	unit(s)	As Req'd	SILICON BRONZE NUT 12,7 mm DIAMETER Hexagonal silicon bronze nut Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5747	501	LCP	SOP	000	BOP	401	001	ML	5747	unit(s)	As Req'd	GALVANIZED STEEL RECTANGULAR REGULAR SPRING NUT 12,7 mm DIAMETER Galvanized steel rectangular regular spring nut for use with single superstrut channel Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5748	501	LCP	SOP	000	BOP	401	001	ML	5748	unit(s)	As Req'd	GALVANIZED STEEL NUT 12,7 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5749	501	LCP	SOP	000	BOP	401	001	ML	5749	unit(s)	As Req'd	GALVANIZED STEEL NUT 19 mm DIAMETER Hexagonal galvanized steel nut Grade 5 Diameter: 19 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5750	501	LCP	SOP	000	BOP	401	001	ML	5750	unit(s)	As Req'd	STAINLESS STEEL FLAT WASHER FOR 12,7 mm BOLT DIAMETER Stainless steel flat washer S316 For bolt diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5751	501	LCP	SOP	000	BOP	401	001	ML	5751	unit(s)	As Req'd	STAINLESS STEEL FLAT WASHER FOR 16,9 mm BOLT DIAMETER Stainless steel flat washer S316 For bolt diameter: 16,9 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5754	501	LCP	SOP	000	BOP	401	001	ML	5754	unit(s)	As Req'd	SILICON BRONZE FLAT WASHER FOR 8 mm BOLT DIAMETER Silicon bronze flat washer For bolt diameter: 8 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5755	501	LCP	SOP	000	BOP	401	001	ML	5755	unit(s)	As Req'd	SILICON BRONZE FLAT WASHER FOR 12,7 mm BOLT DIAMETER Silicon bronze flat washer For bolt diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5758	601	LCP	SOP	000	BOP	401	001	ML	5758	unit(s)	As Req'd	SILICON BRONZE FLAT WASHER FOR 6,4 mm BOLT DIAMETER Silicon bronze flat washer For bolt diameter: 6,4 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5759	501	LCP	SOP	000	BOP	401	001	ML	5759	unit(s)	As Req'd	GALVANIZED STEEL FLAT WASHER FOR 12,7 mm BOLT DIAMETER Galvanized steel flat washer For bolt diameter: 12,7 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> <b>Bolts, Nuts &amp; Washers</b>													MALCOR Document No.: ILK-A5-SD-8221-EL-G01-0001-01 Rev No.: 03							
													ALSTOM Document No.: LCP-SOP-000-BOP-401-001-ML Rev No.: 03							
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments	
5793	501	LCP	SOP	000	BOP	401	001	ML	5793	unit(s)		As Req'd	Stainless steel quick bolt SS316 Diameter: 12,7 mm Length: 45 mm Complete with nut, flat and lock washer		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5795	501	LCP	SOP	000	BOP	401	001	ML	5795	unit(s)		As Req'd	<b>STAINLESS STEEL QUICK BOLT 6 mm DIAMETER</b> Stainless steel quick bolt SS316 Diameter: 6 mm Length: 44 mm Threaded length: 16 mm Complete with nut, flat and lock washer		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5798	501	LCP	SOP	000	BOP	401	001	ML	5798	unit(s)		As Req'd	Stainless steel quick bolt SS316 Diameter: 12,7 mm Anchor length: 140 mm Complete with nut, flat and lock washer		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5798	501	LCP	SOP	000	BOP	401	001	ML	5798	unit(s)		As Req'd	<b>GALVANIZED STEEL BOLT 12,9 mm. DIAMETER, L=86 mm</b> Hexagonal galvanized steel bolt Grade 5 Diameter: 12,9 mm Length: 86 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5800	501	LCP	SOP	000	BOP	401	001	ML	5800	unit(s)		As Req'd	<b>GALVANIZED STEEL BOLT 20 mm DIAMETER, L=100 mm</b> Hexagonal galvanized steel bolt Grade 5 Diameter: 20 mm Length: 100 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5810	501	LCP	SOP	000	BOP	401	001	ML	5810	unit(s)		As Req'd	<b>GALVANIZED STEEL NUT 20 mm DIAMETER</b> Hexagonal galvanized steel nut Grade 5 Diameter: 20 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5811	501	LCP	SOP	000	BOP	401	001	ML	5811	unit(s)		As Req'd	<b>GALVANIZED STEEL FLAT WASHER FOR 20 mm BOLT DIAMETER</b> Galvanized steel flat washer For bolt diameter 20 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5812	501	LCP	SOP	000	BOP	401	001	ML	5812	unit(s)		As Req'd	<b>GALVANIZED STEEL LOCK WASHER FOR 20 mm BOLT DIAMETER</b> Galvanized steel lock washer For bolt diameter 20 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5813	501	LCP	SOP	000	BOP	401	001	ML	5813	unit(s)		As Req'd	<b>GALVANIZED STEEL BOLT 15,9 mm. DIAMETER, L=70 mm</b> Hexagonal galvanized steel bolt Grade 5 Diameter: 15,9 mm Length: 70 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	
5814	501	LCP	SOP	000	BOP	401	001	ML	5814	unit(s)		As Req'd	<b>GALVANIZED STEEL BOLT 30 mm DIAMETER, L=90 mm</b> Hexagonal galvanized steel bolt Grade 5 Diameter: 30 mm Length: 90 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5815	501	LCP	SOP	000	BOP	401	001	ML	5815	unit(s)		As Req'd	<b>GALVANIZED STEEL NUT 30 mm DIAMETER</b> Hexagonal galvanized steel nut Grade 5 Diameter: 30 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5816	501	LCP	SOP	000	BOP	401	001	ML	5816	unit(s)		As Req'd	<b>GALVANIZED STEEL FLAT WASHER FOR 30 mm BOLT DIAMETER</b> Galvanized steel flat washer For bolt diameter 30 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5817	501	LCP	SOP	000	BOP	401	001	ML	5817	unit(s)		As Req'd	<b>GALVANIZED STEEL LOCK WASHER FOR 30 mm BOLT DIAMETER</b> Galvanized steel lock washer For bolt diameter 30 mm		ELECTRICAL INSTALLATION CONTRACTOR		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																					
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> <b>Bolts, Nuts &amp; Washers</b>											HALCOR Document No. : ILK-AS-SD-9221-EL-G01-001-01 Rev No. : 04	ALSTOM Document No. : LCP-SOP-000-SOP-401-001-01 Rev No. : 04									
Item No.	Contractor Tag Number							Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
5818	501	LCP	SOP	000	SOP	401	001	ML	5818	unit(s)		As Req'd	GALVANIZED STEEL BOLT M16, L=25 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 16 mm Length: 25 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	
5821	501	LCP	SOP	000	SOP	401	001	ML	5821	unit(s)		As Req'd	GALVANIZED STEEL BOLT 16,0 mm DIAMETER, L=60 mm Hexagonal galvanized steel bolt Grade 5 Diameter: 16,0 mm Length: 60 mm		ELECTRICAL INSTALLATION CONTRACTOR			CD001	ELECTRICAL INSTALLATION CONTRACTOR	05	

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SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT										NALCOR Document No.: ILK-AS-SD-8221-EL-001-001-01	Rev No.: 01															
Valve Hall Connectors										ALSTOM Document No.: LCP-30P-406-BOP-401-001-NL	Rev No.: 01															
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments								
6101	501	LCP	SOP	000	BOP	401	001	ML	6101	unit(s)								Aluminum Alloy-Transformer Connector Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6102	501	LCP	SOP	000	BOP	401	001	ML	6102	unit(s)								Aluminum Alloy-Tripole-Flat-Terminal Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6103	501	LCP	SOP	000	BOP	401	001	ML	6103	unit(s)								Aluminum Alloy-Tripole-Flat-Terminal Um 422kV TO BE USED 250kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6104	501	LCP	SOP	000	BOP	401	001	ML	6104	unit(s)								Aluminum Alloy-T-Duplex Connector Um 422kV TO BE USED 250kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6105	501	LCP	SOP	000	BOP	401	001	ML	6105	unit(s)								Aluminum Alloy-T-Duplex Connector Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6106	501	LCP	SOP	000	BOP	401	001	ML	6106	unit(s)								Aluminum Alloy-Expansion Flat Terminal Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6106A	501	LCP	SOP	000	BOP	401	001	ML	6106A	unit(s)								Spacer	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6107	501	LCP	SOP	000	BOP	401	001	ML	6107	unit(s)								Aluminum Alloy-Expansion Flat Terminal Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6108	501	LCP	SOP	000	BOP	401	001	ML	6108	unit(s)								Aluminum Alloy-Tripole-Flat-Terminal Um 422kV TO BE USED 820kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6108A	501	LCP	SOP	000	BOP	401	001	ML	6108A	unit(s)								Aluminum Alloy-Tube-End cap Um 422kV TO BE USED 820kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6110	501	LCP	SOP	000	BOP	401	001	ML	6110	unit(s)								Aluminum Alloy-Tripole spacer Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6111	501	LCP	SOP	000	BOP	401	001	ML	6111	unit(s)								Aluminum Alloy-Straight-Tripole-Connector Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6112	501	LCP	SOP	000	BOP	401	001	ML	6112	unit(s)								Aluminum Alloy-Straight-Tripole-Connector Um 422kV TO BE USED 250kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6113	501	LCP	SOP	000	BOP	401	001	ML	6113	unit(s)								Aluminum Alloy-Bus Support Um 422kV TO BE USED 820kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6114	501	LCP	SOP	000	BOP	401	001	ML	6114	unit(s)								Aluminum Alloy-Transformer Connector Um 422kV TO BE USED 250kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6115	501	LCP	SOP	000	BOP	401	001	ML	6115	unit(s)								Aluminum Alloy-Expansion Flat Terminal Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6116	501	LCP	SOP	000	BOP	401	001	ML	6116	unit(s)								Aluminum Alloy-Expansion Flat Terminal Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6117	501	LCP	SOP	000	BOP	401	001	ML	6117	unit(s)								Aluminum Alloy-Expansion Flat Terminal Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6118	501	LCP	SOP	000	BOP	401	001	ML	6118	unit(s)								Aluminum Alloy-Straight-Tripole-Connector Um 550kV TO BE USED 820kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6119	501	LCP	SOP	000	BOP	401	001	ML	6119	unit(s)								Aluminum Alloy-T-Duplex Connector Um 422kV TO BE USED 820kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6120	501	LCP	SOP	000	BOP	401	001	ML	6120	unit(s)								Aluminum Alloy-Expansion Flat Terminal Um 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
6121	501	LCP	SOP	000	BOP	401	001	ML	6121	unit(s)								Aluminum Alloy-T-Terminal Um 422kV TO BE USED 820kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
7102	501	LCP	SOP	000	BOP	401	001	ML	7102	unit(s)								Hexaplate Um 675kV TO BE USED 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
7103	501	LCP	SOP	000	BOP	401	001	ML	7103	unit(s)								Aluminum Alloy-Intermediate Plate	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
7108	501	LCP	SOP	000	BOP	401	001	ML	7108	unit(s)								Insulator connector Plate Um 675kV TO BE USED 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
7109	501	LCP	SOP	000	BOP	401	001	ML	7109	unit(s)								Insulator connector Plate Um 675kV TO BE USED 422kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
7110	501	LCP	SOP	000	BOP	401	001	ML	7110	unit(s)								Aluminum Alloy-Insulator connector Plate Um 422kV TO BE USED 820kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two
7111	501	LCP	SOP	000	BOP	401	001	ML	7111	unit(s)								Suspension adaptor Um 245kV TO BE USED 250kV	GE (PES)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0046-01 For monopole, qty are divided by two

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																		
<b>SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT</b> DC Yard Connectors											NALCOR Document No. : ILK-AS-SD-3221-EL-001-0001-01 Rev No. : 03							
											ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML Rev No. : 05							
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
6201	501	LCP	SOP	000	BOP	401	001	ML	6201	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6204	501	LCP	SOP	000	BOP	401	001	ML	6204	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6205	501	LCP	SOP	000	BOP	401	001	ML	6205	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6206	501	LCP	SOP	000	BOP	401	001	ML	6206	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6207	501	LCP	SOP	000	BOP	401	001	ML	6207	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6208	501	LCP	SOP	000	BOP	401	001	ML	6208	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6209	501	LCP	SOP	000	BOP	401	001	ML	6209	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6210	501	LCP	SOP	000	BOP	401	001	ML	6210	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6212	501	LCP	SOP	000	BOP	401	001	ML	6212	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6213	501	LCP	SOP	000	BOP	401	001	ML	6213	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6214	501	LCP	SOP	000	BOP	401	001	ML	6214	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6215	501	LCP	SOP	000	BOP	401	001	ML	6215	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6217	501	LCP	SOP	000	BOP	401	001	ML	6217	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6218	501	LCP	SOP	000	BOP	401	001	ML	6218	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6219	501	LCP	SOP	000	BOP	401	001	ML	6219	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6220	501	LCP	SOP	000	BOP	401	001	ML	6220	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6221	501	LCP	SOP	000	BOP	401	001	ML	6221	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6222	501	LCP	SOP	000	BOP	401	001	ML	6222	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6223	501	LCP	SOP	000	BOP	401	001	ML	6223	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6224	501	LCP	SOP	000	BOP	401	001	ML	6224	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6225	501	LCP	SOP	000	BOP	401	001	ML	6225	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6226	501	LCP	SOP	000	BOP	401	001	ML	6226	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6227	501	LCP	SOP	000	BOP	401	001	ML	6227	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6228	501	LCP	SOP	000	BOP	401	001	ML	6228	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6229	501	LCP	SOP	000	BOP	401	001	ML	6229	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6230	501	LCP	SOP	000	BOP	401	001	ML	6230	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6232	501	LCP	SOP	000	BOP	401	001	ML	6232	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	
6233	501	LCP	SOP	000	BOP	401	001	ML	6233	unit(s)				CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01 For monopole qty are divided by two	

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																				
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT										NALCOR Document No. : ILK-AS-SD-8221-EL-001-0001-01		Rev No. : 04								
DC Yard Connectors										ALSTOM Document No. : LCP-SOP-000-BOP-401-001-ML		Rev No. : 04								
Item No.	Contractor Tag Number						Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments		
6234	501	LCP	SOP	000	BOP	401	001	ML	6234	unit(s)	7		T-CONNECTOR BUS TO TRIPLE FLEXIBLE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0047-01
6236	501	LCP	SOP	000	BOP	401	001	ML	6236	unit(s)	6		T CONNECTOR BUS TO FLEXIBLE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For monopole qty are divided by two For reference see ILK-AS-SD-8200-EL-F01-0047-01
6238	501	LCP	SOP	000	BOP	401	001	ML	6238	unit(s)	3		T BUS SUPPORT BUS AND TRIPLE FLEXIBLE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For monopole qty are divided by two For reference see ILK-AS-SD-8200-EL-F01-0047-01
6239	501	LCP	SOP	000	BOP	401	001	ML	6239	unit(s)	2		T BUS SUPPORT		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For monopole qty are divided by two For reference see ILK-AS-SD-8200-EL-F01-0047-01
6271	501	LCP	SOP	000	BOP	401	001	ML	6271	unit(s)	5		ALUMINUM PLATE		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For monopole qty are divided by two For reference see ILK-AS-SD-8200-EL-F01-0047-01
6272	501	LCP	SOP	000	BOP	401	001	ML	6272	unit(s)	55		CORONA RING		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For monopole qty are divided by two For reference see ILK-AS-SD-8200-EL-F01-0047-01
6273	501	LCP	SOP	000	BOP	401	001	ML	6273	unit(s)	12		END CAP		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For monopole qty are divided by two For reference see ILK-AS-SD-8200-EL-F01-0047-01
6274	501	LCP	SOP	000	BOP	401	001	ML	6274	unit(s)	90		SPACER		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For monopole qty are divided by two For reference see ILK-AS-SD-8200-EL-F01-0047-01

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Lower Churchill Converters and Transition Compounds Project



SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT  
Star-Delta Connectors

NALCOR Document No.: ILK-AS-SD-9221-EL-G01-0001-01  
ALSTOM Document No.: LCP-SOP-500-SOP-401-601-ML

Rev No.: 03

Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
8300	501	LCP	SOP	000	BOP	401	001	ML	6300	unit(s)	ALUMINUM ALLOY BOLTED T CONNECTOR 127 mm IPS PIPE TO NEMA 2 TERMINAL PAD For joining 127 mm IPS aluminum tube to NEMA 2 terminal pad One-wrench installation 1250 A Complete with stainless steel bolts, nuts and washers.		GE (SBC)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	03	For Monopole, Qties are divided by two	
8301	501	LCP	SOP	000	BOP	401	001	ML	8301	unit(s)	BUS SUPPORT Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8302	501	LCP	SOP	000	BOP	401	001	ML	6302	unit(s)	BUS SUPPORT Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8303	501	LCP	SOP	000	BOP	401	001	ML	6303	unit(s)	BUS SUPPORT Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8304	501	LCP	SOP	000	BOP	401	001	ML	6304	unit(s)	BUS SUPPORT Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8305	501	LCP	SOP	000	BOP	401	001	ML	6305	unit(s)	BUS SUPPORT Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8306	501	LCP	SOP	000	BOP	401	001	ML	6306	unit(s)	STRAIGHT TRIPLE FLAT TERMINAL Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8308	501	LCP	SOP	000	BOP	401	001	ML	6308	unit(s)	BUS TO TRIPLE FLEXIBLE Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8309	501	LCP	SOP	000	BOP	401	001	ML	8309	unit(s)	BUS SUPPORT Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8310	501	LCP	SOP	000	BOP	401	001	ML	8310	unit(s)	BUS TO TRIPLE FLEXIBLE Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8311	501	LCP	SOP	000	BOP	401	001	ML	8311	unit(s)	CONNECTOR Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8312	501	LCP	SOP	000	BOP	401	001	ML	6312	unit(s)	BUS SUPPORT Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8313	501	LCP	SOP	000	BOP	401	001	ML	6313	unit(s)	BUS SUPPORT PIPE TO TRIPLE FLEXIBLE Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8314	501	LCP	SOP	000	BOP	401	001	ML	6314	unit(s)	T-CONNECTOR Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8315	501	LCP	SOP	000	BOP	401	001	ML	6315	unit(s)	TRIPLEX SPACER Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8316	501	LCP	SOP	000	BOP	401	001	ML	6316	unit(s)	ANGLE TRIPLEX SUPPORT Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8317	501	LCP	SOP	000	BOP	401	001	ML	6317	unit(s)	90 Deg TRIPLEX TERMINAL Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8318	501	LCP	SOP	000	BOP	401	001	ML	6318	unit(s)	CORONA PROTECTION RING Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8319	501	LCP	SOP	000	BOP	401	001	ML	6319	unit(s)	END FLUG Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8320	501	LCP	SOP	000	BOP	401	001	ML	8320	unit(s)	END FLUG Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8321	501	LCP	SOP	000	BOP	401	001	ML	6321	unit(s)	CORONA PROTECTION RING Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8322	501	LCP	SOP	000	BOP	401	001	ML	6322	unit(s)	TUBE END CAP Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8323	501	LCP	SOP	000	BOP	401	001	ML	6323	unit(s)	END CAP Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8324	501	LCP	SOP	000	BOP	401	001	ML	6324	unit(s)	BUS SUPPORT Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8325	501	LCP	SOP	000	BOP	401	001	ML	8325	unit(s)	BUS SUPPORT Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8326	501	LCP	SOP	000	BOP	401	001	ML	6326	unit(s)	STRAIGHT TRIPLE FLAT TERMINAL Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8327	501	LCP	SOP	000	BOP	401	001	ML	6327	unit(s)	TRIPLEX SPACER Aluminum Alloy		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	
8328	501	LCP	SOP	000	BOP	401	001	ML	6328	unit(s)	STRAIGHT TRIPLEX CONNECTOR Tinned copper		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8300-EL-F01-0037-01 For Monopole, Qties are divided by two	

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 <b>Lower Churchill Converters and Transition Compounds Project</b>																				
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT Star-Delta Connectors										NALCOR Document No. : ILK-AS-SD-8221-EL-001-001-01 Rev No. : 01										
										ALSTOM Document No. : LCP-SOP-000-BOP-401-201-ML Rev No. : 05										
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
6329	501	LCP	SOP	000	BOP	401	001	ML	6329	unit(s)		4	BUS TO TRIPLE FLEXIBLE COPPER		OE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole, Qty's are divided by two
6330	601	LCP	SOP	000	BOP	401	001	ML	6330	unit(s)		2	T-CONNECTOR Aluminum Alloy		OE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0037-01 For Monopole, Qty's are divided by two

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nalcor energy		Lower Churchill Converters and Transition Compounds Project										BOM Rev updating the item								
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT												NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01		Rev No. : B4						
AC Filters Connectors												ALSTOM Document No. : LCP-SOP-006-BOP-401-001-ML		Rev No. : 05						
Item No.	Contractor Tag Number								Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the item	Comments
6401	501	LCP	SOP	000	BOP	401	001	ML	6401	unit(s)		55	Tube Support - Ring Type Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6402	501	LCP	SOP	000	BOP	401	001	ML	6402	unit(s)		24	Tube to stranded straight Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6403	501	LCP	SOP	000	BOP	401	001	ML	6403	unit(s)		97	T-Connector Tube to Stranded Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6404	501	LCP	SOP	000	BOP	401	001	ML	6404	unit(s)		76	Stranded to Palm Connector @90 Deg Aluminium Alloy MCAV (KV) :145kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6405A	501	LCP	SOP	000	BOP	401	001	ML	6405A	unit(s)		128	Stranded to Palm Connector Straight (Four Hole) Aluminium Alloy MCAV (KV) :145kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6405B	501	LCP	SOP	000	BOP	401	001	ML	6405B	unit(s)		7	Stranded to Palm Connector Straight (Single Hole) Aluminium Alloy MCAV (KV) :145kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6406	501	LCP	SOP	000	BOP	401	001	ML	6406	unit(s)		13	PALM TO TUBE Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6407	501	LCP	SOP	000	BOP	401	001	ML	6407	unit(s)		7	Double Tube Expansion Connector Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6408	501	LCP	SOP	000	BOP	401	001	ML	6408	unit(s)		13	90 Deg Tube to Tube horizontal connector Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6409	501	LCP	SOP	000	BOP	401	001	ML	6409	unit(s)		7	T-Duplex-Connector Aluminium Alloy MCAV (KV) :362kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6410	501	LCP	SOP	000	BOP	401	001	ML	6410	unit(s)		13	Straight Felix to flexi horizontal connector Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6411	501	LCP	SOP	000	BOP	401	001	ML	6411	unit(s)		80	End CAP with provision for installation of 1X1750MCM AAC (Ø 38.72mm) Conductor as damping cable Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6412	501	LCP	SOP	000	BOP	401	001	ML	6412	unit(s)		7	Earthing GY Cable 240 Sq mm, 500mm Length Copper Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6413	501	LCP	SOP	000	BOP	401	001	ML	6413	unit(s)		3	T-Flat Terminal Aluminium Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six
6414	501	LCP	SOP	000	BOP	401	001	ML	6414	unit(s)		5	Earthing GY Cable AWG 4/0 (120 Sq mm), 5000 mm Length Copper Alloy MCAV (KV) :110kV		GE (PES)		CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six

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 <b>Lower Churchill Converters and Transition Compounds Project</b> 																						
SOLDIERS POND CONVERTER STATION BILL OF MATERIAL - HIGH VOLTAGE EQUIPMENT AC Filters Connectors											NALCOR Document No. : ILK-AS-SD-8221-EL-G01-0001-01 Rev No. : 04											
											ALSTOM Document No. : LCP-SOP-900-BOP-401-001-ML Rev No. : 05											
Item No.	Contractor Tag Number										Unit	Equipment tag for Monopole system	Monopole Qty	Item Detail Description	LCP Specification Document / ALS Specification Document	Supplier	Manufacturer	Catalogue Number or Ordering Information	Supplied by Contract No.	Installed by	BOM Rev updating the Item	Comments
6415	501	LCP	SOP	000	BOP	401	001	ML	6415	unit(s)		68	Sheet with 44.5-55 mm Slot Copper -Aluminium Alloy MCAV (KV) :110kV		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six	
6416	501	LCP	SOP	000	BOP	401	001	ML	6416	unit(s)		0	90 Deg Support Copper -Aluminium Alloy MCAV (KV) :110kV		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six	
7401	501	LCP	SOP	000	BOP	401	001	ML	7401	unit(s)		7	Plate Adapter Plate for BPI Mounted SA) Aluminium Alloy MCAV (KV) :110kV		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six	
7402	501	LCP	SOP	000	BOP	401	001	ML	7402	unit(s)		7	Adapter to support two BPI Aluminium Alloy MCAV (KV) :110kV		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six	
7403	501	LCP	SOP	000	BOP	401	001	ML	7403	unit(s)		7	Plate For Bus connection Aluminium Alloy MCAV (KV) :110kV		GE (PES)			CD501	ELECTRICAL INSTALLATION CONTRACTOR	04	For reference see ILK-AS-SD-8200-EL-F01-0038-01 Monopole: Qty divided by 3 to assumed two filter over six	

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**Attachment C**

Agreement Number CD0501-001  
Exhibit 9  
Work and Milestone Schedule

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2



**EXHIBIT 9**  
**WORK AND MILESTONE SCHEDULE**

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ML

### Work and Milestone Schedule

<b>Item:</b>	<b>Key Milestones:</b>	<b>Date</b>
1	Contract award (may take form of Limited Notice to Proceed)	31-MAR-2014
2	Access to Muskrat Falls Converter Site	01-SEP-2014
3	Access to Soldiers' Pond Converter Site	01-NOV-2014
4	Access to Forteau Point Transition Compound Site – based on civil/foundations done by COMPANY to CONTRACTOR engineering documents	02-JUN-2016
5	Access to Shoal Cove Transition Compound Site – based on civil/foundations done by COMPANY to CONTRACTOR engineering documents	02-JUN-2016
6A	CONTRACTOR completion of static checks for Pole 1 – all sites	31-DEC-2017
6B	CONTRACTOR completion of static checks for Bi-pole – all sites	30-NOV-2018
7A	<b>Power available at Soldiers Pond (1.25 MVA @ 25 kV)</b>	8-JUL-2017
7B	<b>Power available at Churchill Falls @ 735kV (based on planned outages at CF(L)Co.)</b>	18-AUG-2017
7C	<b>Power available at Muskrat Falls @ 315kV (based on transmission line energization at Churchill Falls).</b>	15-OCT-2017
7D	<b>Power available at Fourteau Point @ 13.8kV</b>	01-JUL-2017
7E	<b>Power available at Shoal Cove @ 13.8kV</b>	15-JUL-2017
7F	<b>Contractor to provide 48Vdc to Company for Telecoms Soldiers Pond</b>	2-AUG-2017
7G	<b>Contractor to provide 48Vdc to Company for Telecoms at Muskrat Falls</b>	23-SEP-2017
7H	<b>Contractor to provide 48Vdc to Company for Telecoms at Fourteau Point</b>	20-AUG-2017
7I	<b>Contractor to provide 48Vdc to Company for Telecoms at Shoal Cove</b>	12-SEP-2017
7J	<b>COMPANY to provide CONTRACTOR with Telecom Communication Available at Muskrat Falls and Soldiers Pond</b>	27-OCT-2017
7K	<b>COMPANY to provide CONTRACTOR with Telecom Communication Available at Fourteau Point</b>	21-SEP-2017
7L	<b>COMPANY to provide CONTRACTOR with Telecom Communication Available at Shoal Cove</b>	20-OCT-2017
8A	CONTRACTOR Completion of Dynamic Commissioning at Low Power for Pole 1	31-DEC-2017
8B	CONTRACTOR Completion of Dynamic Commissioning at Low Power for Bi-pole	31-JAN-2019
9A	CONTRACTOR Completion of Trial Operation at Low Power	11-MAR-2018

Part 2  
 Exhibit 9R01 (31-Mar-2017)  
 Work and Milestone Schedule  
 Package Number: CD0501

	for Pole 1	
9B	CONTRACTOR Completion of Trial Operation at Low Power for Bi-pole	30-APR-2019
10	CONTRACTOR Substantial Completion	30-APR-2019
11	CONTRACTOR start of Burn-in Period. Estimated duration = 3 consecutive months after substantial completion; May be interrupted and/or waived if Dynamic Commissioning at High Power is started prior to or during the burn-in period	30-APR-2019 to 15-JUL-2019
12	CONTRACTOR start of Dynamic Commissioning at High Power. Estimated duration = 2 months -Start Date, provided in JUN-2017	To be Confirmed
13	CONTRACTOR start of Trial Operation at High Power. Estimated duration = 1 month, maximum 3 months - Start Date, provided in JUN-2017	To be Confirmed

*97 w [signature]*

**Attachment D**

Agreement Number CD0502-001  
Exhibit 9  
Work and Milestone Schedule

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2

*John*  
*27/01*  
*ML*

**EXHIBIT 9**

**SCHEDULE**

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Schedule

Item	Milestone	Date
1	Power available at Soldiers Pond (1.25 MVA @ 25 kV)	8-JUL-2017
2	Power available at Churchill Falls @ 735kV (based on planned outages at CF(L)Co.)	18-AUG-2017
3	Power available at Muskrat Falls @ 315kV (based on transmission line energization at Churchill Falls)	15-OCT-2017
4	Substantial Completion – All Sites	30-Nov-2017

*27 Jul*

**Attachment E**

Form of Change Orders  
CD0501 and CD0502

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2

*July*  
*27* *W*  
*W*

<b>LOWER CHURCHILL PROJECT</b>	<b>CHANGE ORDER Between Company and Contractor</b>
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Agreement No:	CD0501-001	CHO No. (Aconex No.)	CHO-CD0501001-0026
Agreement Title:	Supply and Install Converter Stations and Transition Compounds	Rev. No:	0
Company:	Labrador-Island Link Limited Partnership	CHR No. (Aconex No.)	N/A
Contractor:	Grid Solutions Canada Inc.	Date:	1-Apr-2017
Change Title:	Amendment #5 - Phased Approach		

**Description of Change:**

As part of the Phased Approach solution and as specified in sections 10, 11, 12 and 16 of Amendment 05, this Change Order is issued as full and final compensation for all costs and schedule impacts, including without limiting the foregoing, all direct, impact and indirect costs, incurred or claimed by Contractor or Company for:

- Change Requests;
- Extensions of time;
- Back charges;
- Credits associated with concessions;
- Damages for delay; and
- Liquidated damages

arising out of the performance or non-performance of Parties' obligations up to and including 02-Feb-2017, including but not limited to the following:

- Muskrat Falls (MFA) DC yard Soil Conditions - Engineering Costs
- MFA DC yard Soil Conditions - Construction Costs
- AC Yard unsuitable material at Soldiers Pond (SOP) and MFA
- Temporary road for transformer delivery at MFA
- Change to the DC Capacitor bank at the Transition Compound
- Engineering Impacts due to Change of Layouts
- Grounding Grid quantities variations
- Site Leveling difference
- Standalone septic system
- Water tanks at MFA
- Assembling and Installing Surge arrestors
- Tagging of the Equipment
- Protest at MFA
- Extra Security costs at TC incurred by Company
- 
- MFA Accommodations
- Extra security during protests
- Agreed Concession Requests to process
- Concession Requests to Negotiate
- Acceleration costs for Subcontractors due to alleged changes
- Additional engineering effort by Contractor and its Subcontractors due to changes to site layouts and reduced engineering period
- Contractor site team mobilized during winter time
- Acceleration and Winter Work for Building Services
- Foundation size impact of weak soil in MFA P4 and P5 compared to contract conditions
- Overtime spent in optimization and reengineering of HVdc

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Invoicing of 100% of the Change Order amount as per Article 12 of the Agreement shall be done after signature of Amendment 05 and Change Order CHO-CD0501001-0026.

<b>LOWER CHURCHILL PROJECT</b>	<b>CHANGE ORDER Between Company and Contractor</b>
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Agreement No:	CD0501-001	CHO No. (Aconex No.)	CHO-CD0501001-0026
Agreement Title:	Supply and Install Converter Stations and Transition Compounds	Rev. No:	0
Company:	Labrador-Island Link Limited Partnership	CHR No. (Aconex No.)	N/A
Contractor:	Grid Solutions Canada Inc.	Date:	1-Apr-2017
Change Title:	Amendment #5 - Phased Approach		

Supporting information that forms part of this Change Order:

- Amending Agreement #5

<p><b>Prime Agreement</b></p> <p>Change Includes: <input checked="" type="checkbox"/> Price <input checked="" type="checkbox"/> Schedule</p> <p>Adjustment Type: <input checked="" type="checkbox"/> Lump Sum <input type="checkbox"/> Unit Rate</p> <p><input type="checkbox"/> Fixed Amount <input type="checkbox"/> Estimate</p> <p><input type="checkbox"/> Reimbursable</p>	<p><b>Adjustment to Contract Price</b></p> <table style="width:100%;"> <tr> <td>Original Contract Price</td> <td style="text-align: right;">\$369,648,625.20</td> </tr> <tr> <td>Previous Change Orders Price</td> <td style="text-align: right;">\$84,244,439.14</td> </tr> <tr> <td>This Change Order Price</td> <td style="text-align: right;">\$12,166,141.10</td> </tr> <tr> <td><b>Total Contract Price to Date</b></td> <td style="text-align: right;"><b>\$466,059,205.44</b></td> </tr> </table>	Original Contract Price	\$369,648,625.20	Previous Change Orders Price	\$84,244,439.14	This Change Order Price	\$12,166,141.10	<b>Total Contract Price to Date</b>	<b>\$466,059,205.44</b>
Original Contract Price	\$369,648,625.20								
Previous Change Orders Price	\$84,244,439.14								
This Change Order Price	\$12,166,141.10								
<b>Total Contract Price to Date</b>	<b>\$466,059,205.44</b>								

Impact on Control Schedule: Included as part of Amending Agreement #5  
 Revised Finished Date: As mentioned in Amending Agreement #5

This Change Order shall form and be read and construed as an integral part of the above-noted Agreement. The above adjustment to the Contract Price constitutes full compensation (including all impact costs) to the Contractor for the above Change.

APPROVAL	
<p>Issued by Company:</p> <p>Supply Chain Manager or Delegate Name: Pat Hussey</p> <p>Signature: _____ Date: _____</p> <p>Company Representative Name: Stephen Follett</p> <p>Signature: _____ Date: _____</p>	<p>Acknowledgement of Contractor Receipt:</p> <p>Signature: _____</p> <p>Name: _____</p> <p>Date: _____</p>

<b>LOWER CHURCHILL PROJECT</b>	<b>CHANGE ORDER Between Company and Contractor</b>
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Agreement No:	CD0502-001	CHO No. (Aconex No.):	CHO-CD0502001-0032
Agreement Title:	Construction of AC Substations	Rev. No:	0
Company:	LTC and LILLP	CHR No. (Aconex No.):	N/A
Contractor:	Grid Solutions Canada Inc.	Date:	1-Apr-2017
Change Title:	Amendment #2 - Phased Approach		

**Description of Change:**

As part of the Phased Approach solution and as specified in sections 10, 11, 12 and 16 of Amendment #2, this Change Order is issued as full and final compensation for all costs and schedule impacts, including without limiting the foregoing, all direct, impact and indirect costs, incurred or claimed by Contractor or Company for:

- Change Requests;
- Extensions of time;
- Back charges;
- Credits associated with concessions;
- Damages for delay; and
- Liquidated damages

arising out of the performance or non-performance of Parties' obligations up to and including 02-Feb-2017, including but not limited to the following:

- Grounding Grid quantities variations
- Site Leveling difference
- Protest at Muskrat Falls (MFA)
- MFA Accommodations
- Extra security during protests
- Impacts due to organic material and additional geotechnical work at Churchill Falls (CFA)
- Relocation of revenue meter connections from SMCS network
- Agreed Concession Requests
- Acceleration and winter work related to bedrock in CFA, bedrocks in SOP, and additional shifts for Gas Insulated Switchgear (GIS) foundation repairs
- Additional Subcontracting effort
- Additional engineering and procurement effort due to unnecessary revisions
- Contractor site team mobilized during winter time
- Acceleration and winter work for Building Services

**Invoicing and Payment:**

Item	SPV	Description	QTY	Unit	Unit Price (\$CDN)	Total (\$CDN)
6e	LTC	Amendment #2 - Phased Approach	1	LS	\$4,411,142.84	\$4,411,142.84
6f	LIL	Amendment #2 - Phased Approach	1	LS	\$1,422,316.06	\$1,422,316.06

Invoicing of 100% of the Change Order amount as per Article 12 of the Agreement shall be done after signature of Amendment #2 and Change Order CHO-CD0502001-0032.

Section 12.4, Contractor will not be required to submit a separate invoice or Payment Certificate for this Change Order.

Supporting information that forms part of this Change Order:

- Amendment #2

<b>LOWER CHURCHILL PROJECT</b>	<b>CHANGE ORDER Between Company and Contractor</b>
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Agreement No:	CD0502-001	CHO No. (Aconex No.):	CHO-CD0502001-0032
Agreement Title:	Construction of AC Substations	Rev. No:	0
Company:	LTC and LILLP	CHR No. (Aconex No.):	N/A
Contractor:	Grid Solutions Canada Inc.	Date:	1-Apr-2017
Change Title:	Amendment #2 - Phased Approach		

<b>Prime Agreement</b> Change Includes: <input checked="" type="checkbox"/> Price <input checked="" type="checkbox"/> Schedule Adjustment Type: <input checked="" type="checkbox"/> Lump Sum <input type="checkbox"/> Unit Rate <input type="checkbox"/> Fixed Amount <input type="checkbox"/> Estimate <input type="checkbox"/> Reimbursable	<b>Adjustment to Contract Price</b> Original Contract Price                      \$187,411,577.33 Previous Change Orders Price                      \$24,483,751.26 This Change Order Price                      \$5,833,458.90 Total Contract Price to Date <u>\$217,728,787.49</u>
<b>Civil Works Baseline</b> Change Includes: <input type="checkbox"/> Price <input type="checkbox"/> Schedule Adjustment Type: <input type="checkbox"/> Lump Sum <input type="checkbox"/> Unit Rate <input type="checkbox"/> Fixed Amount <input type="checkbox"/> Estimate <input type="checkbox"/> Reimbursable <input checked="" type="checkbox"/> N/A	<b>Adjustment to Civil Works Baseline</b> Original CW Baseline Price                      \$80,052,846.00 Previous Change Orders Price <u>(\$25,128,113.81)</u> This Change Order Price                      \$0.00 Total CW Baseline Price to Date <u>\$54,924,732.19</u>

Impact on Control Schedule: Included as part of Amending Agreement #2.

Revised Finished Date: As mentioned in Amending Agreement #2.

This Change Order shall form and be read and construed as an integral part of the above-noted Agreement. The above adjustment to the Contract Price constitutes full compensation (including all impact costs) to the Contractor for the above Change.

**APPROVAL**

Issued by Company: Supply Chain Manager or Delegate Name: Pat Hussey Signature: _____ Date: _____ Company Representative Name: Stephen Follett Signature: _____ Date: _____	Acknowledgement of Contractor Receipt:  Signature: _____  Name: _____  Date: _____
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**Attachment F**  
**Engineering Deliverables**

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2

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Contractor shall submit for Company review and Approval (Code 02) Engineering deliverables as part of the phased approach change order. As a minimum the following deliverables shall be considered and may constitute part of the change order following Company and Contractor agreement. Contractor is responsible to include any additional documentation required for the construction and operation of phased approach.

Phased Approach - Attachment F -sdr

	Contractor Reference	Customer Reference	Description	Revision	Status	Comments
1. Ac filter Rating study for operation during Special Considerations						
	LCP-COM-LCC-PES-260-021-TN	TBC	Common AC Filter Rating & Performance during Special Considerations			New Document -ILK to be obtained Discussed with Nalcor twice and final review planned next week
2. Ac filter Performance study for operation during Special Considerations						
	LCP-COM-LCC-PES-260-021-TN	TBC	Common AC Filter Rating & Performance during Special Considerations			New Document -ILK to be obtained Discussed with Nalcor twice and final review planned next week
3. Steady State Load Flow & Short Circuit Study with Pole 1 and special considerations ac system conditions						
		ILK-AS-SD-8200-EL-H99-0012-03	Transient PSSE study for Monopole			New Document Transient Stability only
4. Reactive power exchange verification with all proposed ac filter and ac system configurations						
						New requirement - Not planned to be provided
5. Dynamic performance testing (PSCAD & PSSE) as follows:						
a) Modification of PSCAD and PSSE HVdc models as required to reflect Pole 1 control implementation (if required) for Phased Approach	LCP-COM-LCC-PES-052-009-DR	ILK-AS-SD-8000-EL-H99-0011-01	PSCAD Dynamic Performance Study Report	B1	Code 1	a) PSCAD & PSSE - to be submitted as per agreed Test & Commissioning specification.
b) Dynamic performance studies (ac/dc fault recovery, stability, TOV, voltage step on filter switching, etc.) for all expected ac system conditions						b) Dynamic performance studies (ac/dc fault recovery only, stability, TOV, voltage step on filter switching, etc.) Reviewed with Nalcor and under preparation for final version
6. HVdc Control & Protection as follows:						
a) GE's "reduced functionality" HVdc control strategy development (e.g. reduced voltage operation as an offline function only, etc.)	LCP-COM-LCC-PES-310-017-TD	ILK-AS-SD-8200-EL-M19-0007-01	Common - Converter Station - HVDC Bipole Control Cubicles FAT Report	A1	not yet submitted	a) Reduced voltage mode is applicable only in Offline mode. During DC Line Fault Last Restarts will be in Normal/Prevailing Voltage . No of Restarts will remain but no restart in reduced voltage
b) Implementation of HVdc runback due to ac filter trip or other system conditions (if required)						b) Filter Power limit as Part of RPC ( Refer Phased Approach High Level Performance requirement- iii (b) PDO/Runback function will not be in Monopole
c) Modification of sequences as a result of reduced ac filter redundancy (if required)						c) after Nalcor confirmation of above Filter study activities (1. and 2.)
d) Pole 1 HVdc C&P Factory system testing (FST)						d) internal activity, will not be submitted, ATCO is planning to stay in Stafford during FST and FAT
e) Pole 1 HVdc C&P Factory Acceptance Testing						OK
7. Mirror platform						
a) Specifications for the Supply of mirror platform cubicles						a) specifications are same as for contractual cubicles, not to be submitted. If layout of the cubicles have changed these can be updated to reflect new mirror cubicles, Red-marks can be provided
b) Detailed Installation Plan for mirror platform cubicles/hardware at the simulator facility (including details relating to the relocation of GE's factory)						Will not be supplied
c) Hardware testing procedures and testing report(s) for mirror platform cubicles/hardware						Test reports can be provided, where necessary

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d) Modified FAT #3 test plan explaining exactly how these mirror platform panels will be integrated into the existing test plan						N/A No modification is planned
e) Detailed disassembly, packaging, shipping details of mirror platform cubicles/hardware						Can be sent to Nalcor, when option is confirmed on final location of the mirror cubicles
8. Auxiliary power modifications details, Single Line Diagram (SLDs), and plan						
						a-Overall Layouts and HV SLD done and signed version attached to the contract - To be submitted via Aconex (Marked up documents) b-Aux services to come - no modifications expected but priorities will be indicated with color code
LCP-MFA-000-BOP-101-002-SL		ILK-AS-SD-821N-EL-E03-0001-01	Muskrat Falls Converter station Overall Single line diagram AC yard pole 2	B3	Code 1	Marked up signed off
LCP-MFA-000-BOP-101-003-SL		ILK-AS-SD-8210-EL-E03-0004-01	Muskrat Falls - Converter Station Overall Single Line Diagram - DC Yard	B3	Code 1	Marked up signed off
LCP-MFA-000-BOP-101-001-SL		ILK-AS-SD-821A-EL-E03-0001-01	Muskrat Falls Converter Station Overall Single line diagram AC yard pole 1	B3	Code 1	Marked up signed off
LCP-SOP-000-BOP-101-001-SL		ILK-AS-SD-822A-EL-E03-0001-01	Soldiers Pond converter station Overall Single line diagram AC Yard Pole 1	B3	Code 1	Marked up signed off
LCP-SOP-000-BOP-101-002-SL		ILK-AS-SD-822N-EL-E03-0001-01	Soldiers Pond Converter Station Overall Single Line Diagram - AC Yard Pole 2	B3	Code 1	Marked up signed off
LCP-SOP-000-BOP-101-003-SL		ILK-AS-SD-8220-EL-E03-0003-01	Soldiers Pond Converter Station Overall Single Line Diagram - DC Yard	B3	Code 1	Marked up signed off
LCP-SOC-LCC-BOP-101-001-SL		ILK-AS-SD-8520-EL-E03-0001-01	Shoal Cove Transition compound Overall single line diagram DC yard	B3	Code 1	Marked up signed off
LCP-FPT-LCC-BOP-101-001-SL		ILK-AS-SD-8510-EL-E03-0001-01	Forteau Point Transition compound Overall single line diagram DC yard	B2	Code 1	Marked up signed off
LCP-SOP-000-BOP-701-001-GA		ILK-AS-SD-8220-EL-B01-0001-01	Soldiers Pond Converter Station General Layout Plan View	B2	Code 1	Marked up signed off
LCP-MFA-000-BOP-701-001-GA		ILK-AS-SD-8210-EL-B01-0001-01	Muskrat Falls Converter station General layout Plan view	B3	Code 1	Marked up signed off
LCP-SOC-000-BOP-701-001-GA		ILK-AS-SD-8520-EL-B01-0001-01	Shoal Cove Transition Compound General Layout Plan View	B4	Code 1	HSS By Pass to be implemented
LCP-SOP-ACA-BOP-102-001-SL		ILK-AS-SD-8225-EL-E03-0005-01	Soldiers Pond Converter Station - Auxiliary Services AC Single Line Diagram	A4	Code 1	Marked up with Priority 1 Highlighted
LCP-SOP-DCA-BOP-102-001-SL		ILK-AS-SD-8225-EL-E03-0007-01	Soldiers Pond Converter Station - Auxiliary Services - 125 Vdc Single Line Diagram	A3	Code 1	Marked up with Priority 1 Highlighted
LCP-SOP-DCA-BOP-102-002-SL		ILK-AS-SD-8225-EL-E03-0001-01	Soldiers Pond Converter Station - Auxiliary Services - 48V DC Single Line Diagram	C1	Code 2	Marked up with Priority 1 Highlighted

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LCP-MFA-ACA-BOP-102-001-SL		ILK-AS-SD-8215-EL-E03-0001-01	Muskrat Falls Converter Station - Auxiliary Services AC Single Line Diagram	A4	Code 1	Marked up with Priority 1 Highlighted
LCP-MFA-DCA-BOP-102-001-SL		ILK-AS-SD-8215-EL-E03-0002-01	Muskrat Falls Converter Station - Auxiliary Services 125 Vdc Single Line Diagram	A3	Code 1	Marked up with Priority 1 Highlighted
LCP-MFA-DCA-BOP-102-002-SL		ILK-AS-SD-8215-EL-E03-0003-01	Muskrat Falls Converter Station - Auxiliary Services 48 Vdc Single Line Diagram	C1	Code 2	Marked up with Priority 1 Highlighted
9. Schedule, test procedure and test report for Dynamic Commissioning of Pole 1						
						See Overall schedule, no separate schedule to be provided. GE will provide Site Test Procedure Test reports will be available at the end of commissioning
10. Grounding Study which analyses the Phased Approach connection sequences and associated expected short circuit levels to ensure that the entire system can be placed online safely.						
						N/A, the grounding mesh must be fully completed for monopole energisation
11. Reliability, Availability, Maintainability (RAM) study for operation during the Phased Approach						
						RAM study for Monopole is not required....as already agreed in Phased Approach High Level Performance requirement

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**Attachment G**  
**Cubicle Specification**

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2

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13-Apr-2017

**Phase Approach – Duplicate Control Cubicles – Bill of Materials (BOM)**

Item	Purpose	Total Qty	MFA End	SOP End	TC End	Lab
CCP Cubicle	Converter Control and Protection	4	2	2		
CCPI Cubicle- Lane 1	Interface cubicle between CCP and Plant	2	1	1		
CCPI Cubicle- Lane 2	Interface cubicle between CCP and Plant	2	1	1		
Change Over Unit -CCPI Lane 2	Enables operator to switch between active and standby lanes (redundancy)	2	1	1		
Bipole Cubicle - Lane 1	Common area control functions that perform filter switching (reactive power control)	2	1	1		
Bipole Cubicle - Lane 2	Common area control functions that perform filter switching (reactive power control)	2	1	1		
Change Over Unit -Bipole & Station Lane 1	Enables operator to switch between active and standby lanes (redundancy)	2	1	1		
Change Over Unit -Bipole & Station Lane 2	Enables operator to switch between active and standby lanes (redundancy)	2	1	1		
Control Room Equipment	2 x Engineering Interface (EI) Workstations and Monitors, 4 x Redfox Layer 3 Ethernet Switches and 1 x D-Link Ethernet Switch: 1 off	1	All	All	All	All
HMI Equipment -DS Agile	Provides HMI communication, AC control functions, HMI interface for DC, transition compound switchgear control: 2 x C264 BCU 4 x ACP 4340(A520) Industrial computers 6 x ACP 4320(A507Q) industrial computers 2 x Switch Board H152 4 x LCD Screen E243Wmi 6 x Intel 82576 PCi Board 2 x Cubicle Enclosures	1	All	All	All	All
<b>Optional</b> RTDS (6 subracks) - Standard RTDS racks PB5 from MHRC, Canada	Real time Digital Simulator which emulate clients network - this cubicle is for lab use and not installed at site	1				1

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13-Apr-2017

Item	Purpose	Total Qty	MFA End	SOP End	TC End	Lab
GPE	Generic Plant Emulator, including RTDS interface cards - emulates Profibus cubicles, measurement cubicles, and conventional AC CT's and VT's, incorporates VBE Simulator for valve firing - This specific cubicle is for lab use only.	1				1
Cables & Fibres	Interconnection cables and fibers between each cubicle	1	All	All	All	All

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**Attachment H**  
**Testing and Commissioning**

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2

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## LOWER CHURCHILL PROJECT

### CD0501

## TESTING AND COMMISSIONING

# ENGINEERING TECHNICAL SPECIFICATION

Prepared by: \_\_\_\_\_  
Jeff Coady

Checked by: \_\_\_\_\_  
Ali Dariani

Approved by: \_\_\_\_\_  
Peter Kuffel

Approved by: \_\_\_\_\_  
Sherry Power

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**REVISION LIST**

Revision					Remarks
N°	By	Chec.	Appr.	Date	
D2	JC	AD	SP	30-Mar-2017	Updated to include specific requirements for Phased Approach.
D1	DD	AD	SS	13-Jun-2014	Issued for Design This is a functional specification that clearly defines the Company's requirements for the Contractor to design, procure, construct, commission and deliver the systems and equipment as described herein.

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**1 GENERAL**

The present Specification outlines, from a technical point-of-view, the requirements applicable to the design, manufacture and testing of the equipment and systems to be installed in the HVdc Converter Stations and Transition Compounds.

This Specification describes the requirements for testing and commissioning of equipment, materials and systems that are being provided as part of this Agreement. It also includes the specific minimum requirements for shipping, Preservation, Trial Operation, Burn-In Period and Turnover Acceptance.

**2 APPLICABLE DOCUMENTS**

**2.1 Codes and Standards**

- IEC 61975-ed1.0 2010                      High Voltage direct current (HVdc) Installations System Test
- IEEE Std 1378-1997                      IEEE Guide for Commissioning High-Voltage direct current (HVdc) Converter Stations and Associated Transmission Systems

**2.2 Terms and Definitions**

- DPT    Dynamic Performance Testing
- FPT    Functional Performance Testing
- IEC    International Electrotechnical Commission
- IEEE    Institute of Electrical and Electronic Engineers
- LIL    Labrador Island Link
- MF    Muskrat Falls
- SP    Soldiers Pond
- QC    Quality Control
- Burn-In Period                              A period of up to a maximum of ninety (90) days to allow for the typical period of unreliable operation starting immediately after Trial Operation at Low Power where the Performance Guarantee

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Assessment Period is not in effect.

Commissioning Check List (CCL)

The documentation Accepted by Engineer to record all Commissioning Static Checks and the results carried out during commissioning.

Commissioning Procedure (CPR)

Detailed step by step description of relevant multi-discipline, Dynamic Commissioning / System Commissioning activities, carried out to prove the design and suitability for operation of a system or part system.

Commissioning Static Checks (CSC)

Shall mean all testing prior to connection of the HVdc system(s) to the ac power system(s) that are carried out after a section of work has reached Mechanical Completion. These shall be completed in compliance with the Specifications at Contractors' facilities, factory tests, and during installation and/or construction as soon as it's safe for Commissioning Static Checks to commence initially on a single discipline basis.

Commissioning Supervisor

Shall mean the person(s) appointed by Contractor in accordance with section 10.4

Completions

Shall mean all activities involved in Mechanical Completion, Preservation, handover for commissioning, commissioning and turnover to operations.

Dispatch Dossier

Shall mean those documents required, as a minimum, to accompany goods released to Site from Contractor Procured goods shall not be dispatched without a Dispatch Dossier.

Dynamic Commissioning /Systems Commissioning (DC)

Shall mean commissioning activities which confirm, prove and verify operations of a complete system or a part system. These tests shall, as near as possible, be at full operating condition in order to carry out operational performance tests to verify that the system / equipment performs in accordance with the design criteria (specifically those

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provisions stated in the Performance Requirements Technical Specification), together with the recording of such tests. Such Dynamic Commissioning / Systems Commissioning shall be sufficient to allow systems, part systems and/or equipment to be certified, turned over to Operations by the RFO team and rapidly brought into operational service by Operations, if not already operational. By definition, anytime high voltage (HV) equipment is tied into the existing ac power system(s), this work shall be considered Dynamic Commissioning (i.e. initial energisation of converter transformers, ac filters, and converter valves shall be considered examples of Dynamic Commissioning). DC shall be under the control of the RFO.

Dynamic Commissioning at High Power (DCHP)

Shall mean Dynamic Commissioning / System Commissioning necessary to prove the performance requirements of the HVdc link, carried out above 225 MW up to maximum rated power (including overloads).

Dynamic Commissioning at Low Power (DCLP)

Shall mean Dynamic Commissioning / System Commissioning necessary to prove the specified performance requirements of the HVdc link, carried out to a maximum power of up to 225 MW. This includes the specific testing of all features, functions, operating modes and the verification of all possible dc responses that can be verified at these lower power dispatch levels. It also includes the verification of the loss of pole power transfer function and the HVdc submarine cable switching operation. Through detailed system studies, Contractor shall determine the maximum power that may be transmitted during this commissioning phase without sacrificing ac system stability for a single contingency event.

Dynamic Commissioning for Pole 1

Shall mean the Dynamic Commissioning / System Commissioning necessary to prove the specified performance requirements of the monopole HVdc link, carried out to a maximum power of up to 225 MW on Pole 1, as set out in Phased Approach High Level Performance Requirements. This includes the specific testing of all

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the provided features, functions, operating modes and the verification of all possible dc responses that can be verified at these lower power dispatch levels. Through detailed system studies, Contractor shall determine the maximum power that may be transmitted during this commissioning phase without sacrificing ac system stability for a single contingency event. Specifically, this is the Dynamic Commissioning of Pole 1 required for the Phased Approach Agreement.

Inspection Test Records (ITR)

The documentation Accepted by Engineer that defines all procedures, checks, and tests to be carried out by Contractor during Mechanical Completion.

Livening Up Notice (LUN)

A notification to all involved parties at site that energisation of equipment will start, and that all further work on a particular system or part system shall be subject to permit to work procedures. The LUN shall contain descriptions and marked up drawings of the particular system or part system that will become live during commissioning. The method of work permit shall be Company, or Contractor's Project Safety Management Plan, if Contractor's plan requirements exceed Company's.

MC Handover

The formal transfer of MC documentation and responsibility for part systems, systems, areas / buildings or the complete facility defined on the MCC.

Mechanical Completion (MC)

Shall reflect non live / non energised completion of specified systems and part systems in the Technical Specifications and during installation or construction to the latest design drawings, specifications and standards.

Mechanical Completion Certificate (MCC)

Issued by Contractor upon successful MC of a single discipline within a system or part system, thus allowing commencement of Commissioning Static Checks. Requires Engineer notice and review,

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- Ready for Operations (RFO)      A team, led by Company or its Affiliate, consisting of qualified personnel from company or its affiliate and Contractor, who shall provide commissioning services of systems and part systems under technical supervision and the direction of Company or its Affiliate.
- RFO Turnover      The formal transfer of documentation and responsibility for operations and maintenance of part systems, systems, equipment, areas / buildings or a complete facility defined on the TOC, from RFO to Operations
- Specification Compliance Sign Off List (SCL)      An itemized list prepared by Contractor, for each system or part system, highlighting all its technical design parameters and specifications needed for ease in verification and sign off by Engineer and RFO.
- Trial Operation at Low Power      A thirty (30) to ninety (90) day period after DCLP, where Company can evaluate the system operating in its typical mode of operation and environment at loads up to maximum load tested to during DCLP.
- Trial Operation of Pole 1 at Low Power      A twenty (20) to seventy (70) day period after Dynamic Commissioning for Pole 1, where Company can evaluate the system operating in its typical mode of operation and environment at loads up to the maximum load tested during Dynamic Commissioning for Pole 1.
- Trial Operation at High Power      A thirty (30) to ninety (90) day period after DCHP, where Company can evaluate the system operating in its typical mode of operation and environment at loads up to maximum load tested to during DCHP.
- Turnover and Commissioning Package (TCP)      A detailed document outlining all testing procedures and functional requirements for each system or part system, which is completed or near completion, to verify its performance in accordance with design

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specifications.

Turnover Acceptance Certificate (TOC)

Issued by Company to Contractor as a condition of Substantial Completion, following a successful Trial Operation period. To be issued twice, one for Trial Operations at Low Power complete and one for Trial Operation at High Power complete.

Pole 1 Temporary Acceptance Certificate

Issued by Company to Contractor as a condition of Phased Approach, following a successful Trial Operation of Pole 1 at Low Power. To be issued for Trial Operation of Pole 1 at Low Power complete.

Work Protection Code (WPC)

A code of practice outlining principles and methods of safe work on electrical, mechanical, and associated equipment, which provides formal assurance that all sources of hazardous electrical and/or mechanical energy on specified equipment have been isolated and de-energised. It is designed to constitute a set of minimal recommended procedural and safety requirements for a safe working environment for all workers authorized to perform work on electrical, mechanical or associated equipment.

**3 QUALITY ASSURANCE**

**3.1 General**

Refer to Exhibit 7 "Quality Requirements".

**4 TESTING SCHEDULE NOTIFICATION REQUIREMENTS**

Contractor shall provide detailed manufacturing schedules, quality control and testing procedures for Acceptance of Engineer, and shall keep such schedules up-to-date. A complete schedule of tests will be provided in one schedule so that Company can understand if there are multiple witness days in the same period, regardless of where the tests are taking place.

Contractor shall submit to Engineer for Acceptance a test program comprised of a list of tests with a preliminary time schedule for system tests and acceptance tests. The system tests program (including

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the test items and test procedures) proposed by Contractor shall be provided to Engineer within the time mentioned as follows:

Factory Acceptance Test

Contractor shall submit request for a witness and shall include the Accepted test plan procedure to Company Representative at least three (03) months in advance.

Test Plan and Procedure

Contractor shall submit to the Engineer the proposed test plan for review and Acceptance at least one (01) year in advance. The test plan shall include Inspection Test Records, procedures, schedules and other documents which Contractor considers relevant for the Dynamic Commissioning (which includes both DCLP and DCHP).

Company reserves the right, in collaboration with Contractor, to make any necessary alterations to any proposed test program.

Commissioning Static Check (CSC)

Contractor shall submit request for a witness and shall include the Accepted test plan procedure to Company Representative at least four (04) weeks in advance.

Dynamic Commissioning (DC)

This paragraph pertains to the Dynamic Commissioning for Pole 1, DCLP and DCHP. Contractor, on-site, shall submit request for a witness and shall include the Accepted test plan procedure to Company Representative at least twelve (12) weeks in advance. This should be scheduled on the Primavera schedule.

**5 SUBMITTAL – FOR REVIEW/ACCEPTANCE**

Refer to Exhibit 4 "Supplier Document Requirements List".

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**6 TESTING RESULTS AND REPORTS**

**6.1 Factory Testing**

Contractor shall make available Contractor’s non-Conformance report(s) (or similar, as described in Contractor’s Quality Plan) which includes a description of all tests that were completed and a detailed description of any failures or abnormalities that occurred while performing the factory tests, even if the test resumed after the failure. Instrument calibration certificates shall also be included in the final report for any applicable testing equipment used during the testing and commissioning process.

The test certificates shall be written in English and shall show the results and real conditions of the tests performed.

All results of specified factory testing shall be submitted in the form of a report for the review and Acceptance of Engineer. The results of all the tests shall be documented in the reports containing all the necessary information to enable verification of compliance with the present specification.

All technical information such as photographs, videos, waveform plots, and events record logs shall be captured and included in each report for each particular equipment, sub-system and system.

No later than two weeks after having performed the tests, Contractor shall submit four (04) copies of the report of all tests to Engineer. The report must include the test results of all the equipment accessories that are part of the system being tested.

In the event that Contractor is proposing past type tests, reports containing all the information detailed in this section are required along with a description of how the three criteria for accepting past type tests are met (as described in Section 8.5.2).

**6.2 On-Site Testing**

Certified copies of test reports and/or Material Safety Data Sheet (MSDS) documents for chemical analysis, mechanical and electrical properties shall be available to Engineer. Copies of the documents shall be provided upon request.

The test data shall be completed, including drawings which may be referred to for the test data, and shall clearly state the performance results, date of the tests, and any other important related

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information. Instrument calibration certificates shall also be included in the final report for any applicable test equipment used during the testing and commissioning process.

Waveform plots and event record logs shall be captured and included in each report for each particular equipment, sub-system and system.

In the event of a failure, incident or abnormal operation of any system while performing any phase of the testing and commissioning process, Contractor shall initially prepare a preliminary report with a description of the event that occurred. Finally, Contractor shall submit a complete final report which shall include, but shall not be limited to, detailed sequence of events, description of the event/failure/failed test, its overall impact to the rest of the schedule/system/commissioning process, root-cause analysis, other technical details, supplementary information, schemes, drawings, pictures and videos. The preliminary report shall be delivered to Engineer within twenty four (24) hours of the initiating event or incident and the final report shall be delivered to Engineer within two (02) weeks of the initiating event or incident.

**7 GENERAL REQUIREMENTS**

All equipment, sub-systems and systems within the scope of Work of Contractor shall be comprehensively tested in order to demonstrate that they meet the specified requirements.

As a minimum, all equipment and systems shall be tested in accordance with applicable standards, stated in section 2 of this Specification, and with specific requirements detailed elsewhere in the Specification unless otherwise stated.

Contractor is responsible for the performance of the tests required for equipment, sub-systems and systems and for putting the equipment into operation based on their individual Technical Specifications and complemented with this Specification.

The tests shall be conducted at a sufficiently early stage so that either clarification or rectification of possible non-conformities will not delay completion of the Work.

Contractor shall establish and make available the measuring points necessary for the testing and commissioning, within the Scope of Supply.

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Contractor shall provide all temporary works, instruments, equipment, first fills and wirings required for testing. Instruments and instrument transformers used by Contractor shall be previously calibrated against accepted standards. Proof of these calibrations shall be provided to Engineer before applicable testing begins with copies of calibration certificates included as part of the final report as detailed in section 6.1 and section 6.2 of this Specification.

Contractor shall test and commission the equipment under the most onerous conditions which may not necessarily be the ones that Contractor considers the most desirable. If specific environmental or ac power system configurations are required to perform certain required tests, Contractor shall schedule these tests appropriately to avoid delays.

Contractor shall provide a fully qualified Commissioning Supervisor and other staff as required for commissioning. Before starting commissioning, Engineer shall Approve the proposed staff.

Engineer reserves the right, without additional cost to Company to add to the commissioning procedures any tests that may be needed to prove correct performance of the equipment or systems.

As a result of limitations of the connecting ac power system(s), the number of interfaces involved in the Lower Churchill Project (LCP) and upon detailed analysis of the overall LCP Integrated Project Schedule (IPS), it is required that the Dynamic Commissioning of the HVdc link will need to be broken down into the following three independent commissioning phases:

1. Dynamic Commissioning for Pole 1
2. Dynamic Commissioning at Low Power (DCLP)
3. Dynamic Commissioning at High Power (DCHP)

Specific requirements for each of these DC phases are further detailed in Sections 11, 14 and 18 of this Specification, respectively.

Ultimately, the entire testing and commissioning process from manufacturing to Trial Operation is divided into the following phases:

- a) Factory process
- b) Shipping process

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- c) Mechanical Completion (MC)
- d) Commissioning Static Checks (CSC)
- e) Dynamic Commissioning for Pole 1
- f) Trial Operation of Pole 1 at Low Power
- g) Pole 1 Temporary Acceptance
- h) Dynamic Commissioning (DC) at Low Power
- i) Trial Operation at Low Power
- j) Turnover Acceptance at Low Power
- k) Burn-in period (if required)
- l) Dynamic Commissioning at High Power
- m) Trial Operation at High Power

Each of these phases (except MC which is being left to Contractor) is described in the following sections, and Appendix B shows a scheme of the overall process for reference.

Ultimately, over the course of testing and commissioning, Company requires that each component be tested to their maximum ratings or most onerous operating condition, unless limited to do so by the capabilities of the connecting ac power system(s). It is critical to prove that the HVdc system supplied meets all requirements and power ratings as specified. Failure of Labrador Island Link components resulting in complete loss of supply is not acceptable. Any provisions necessary to reduce the potential of this occurrence (including simulations to identify both the ac system limitations and the anticipated HVdc system response) shall be undertaken by Contractor.

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## 8 FACTORY PROCESS

### 8.1 General

All individual components and systems shall, without any additional cost to Company, be tested at the factory. As a minimum, the tests shall include all the design, type tests, special tests, operational tests and routine tests specified under the corresponding equipment Technical Specifications, the applicable IEC (or IEEE) standards, and as further specified herein.

### 8.2 Documentation Required

The following documentation shall be submitted and Accepted by Engineer prior to starting the Factory Testing on a specific piece of equipment or system:

1. All applicable engineering and manufacturing QA/QC related documents
2. All applicable up-to-date shop and/or factory engineered drawings and / or specifications revised to, "Approved for Construction" or "As-Built" status.
3. A complete test program for the applicable piece of equipment being tested, which includes, but shall not be limited to, the following:
  - a) Item to be tested
  - b) Track code and description
  - c) Accepted procedure and test method
  - d) Test objective
  - e) Required pre-test conditions or other requirements (as applicable)
  - f) Calibration certificates for measuring instruments used during testing
  - g) Results expected
  - h) Acceptance criteria
  - i) Proposed date and location of test

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All required documentation listed above shall be made available by Contractor during the testing, if requested.

**8.3 Quality Control**

Contractor shall adhere to the requirements of Exhibit 7 "Quality Requirements".

**8.4 Requirements**

Contractor shall test, in the factory or in an internationally accredited independent laboratory, the individual items of equipment.

Engineer reserves the right to be present at any of the tests. If required, the test shall be repeated, witnessed and Accepted by Engineer. Engineer's or Company's personnel may be involved during factory performance testing for training purposes.

If any equipment fails to pass any tests, it shall be repaired and the defective parts replaced or redesigned as necessary, and the equipment re-tested at no cost to Company. If the equipment fails to pass the repeat test, Company reserves the right to reject the equipment and require a re-design which will be subject to the requirement of the same tests.

Each piece of equipment shall be functionally tested at the factory to ensure full compliance with requirements of the Technical Specifications. The tests shall involve the complete operation of Contractor supplied hardware and software and shall use input and output devices as required to simulate actual in-service field devices. This shall be a complete functional test.

The equipment to be tested must be assembled as much as possible for an inspection before the test begins.

The units to be assembled in the factory (i.e. panels, cabinets, and control cabinets) shall be assembled, wired, adjusted and tested in the factory, as much as possible, under the same service conditions that will prevail at the site of installation, to ensure the accuracy of the wiring and the correct operation of the equipment.

**8.5 Factory Acceptance Tests**

For this phase of testing, Contractor shall furnish detailed testing procedures and a detailed test plan which will be reviewed and Accepted by Engineer.

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### 8.5.1 Routine Tests

The routine tests are intended to reveal any defective material or manufacture non-conformity, and shall be performed on all equipment supplied.

All equipment to be supplied under the Contract shall be subject to the specified routine tests as required by the individual equipment Technical Specifications, relevant standards and as required by Contractor's quality control, without additional cost to Company.

All routine tests shall be performed in the presence of Engineer, unless authority to proceed with the tests in its absence is received from Company in writing.

### 8.5.2 Type Tests

Type tests are intended to verify and determine the characteristics of the equipment. Normally, type tests shall be performed on one apparatus of each type with the specific design and rating used for the project. Type test programs on items of equipment that are identical or functionally equivalent for the specific test being performed, may be consolidated by type testing only the item having the worst-case of a particular parameter. Whenever possible, this rationalization of the type testing is intended to optimize and avoid unnecessary type tests as per international standards and industry practices. Contractor to propose such consolidation, and shall provide ample proof for consolidation, to Engineer for validation and Acceptance.

For certain equipment (except for thyristor valves and converter transformers), type tests proved by certified test reports on tests previously performed on a component with identical design and rating may be accepted as type tests. Past-type tests would be acceptable under the following three criteria:

1. Equipment is identical or functionally equivalent for the specific test being performed;
2. Equipment must meet or exceed the test requirements for operation of the Lower Churchill Project - HVdc Link.
3. The tests were performed using the same standard and edition, etc. as the one identified herein, unless Contractor can prove that there has been no change to the test aspect of the standard between the latest applicable edition and the one referenced on the past type test certificate.

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If Contractor proposes past type tests, Contractor shall describe how the above three criteria are met. Unless past type tests are Accepted by Engineer, type tests shall be performed at no additional cost to Company.

The specific minimum type tests to be performed shall be conducted as specified in the individual equipment technical specifications, and are not listed herein. Special and operational tests are to be considered as type tests and shall follow the specific testing criteria identified herein.

If other type tests, in addition to the minimum testing requirements specifically listed within the individual technical specifications, that are deemed necessary to prove the performance of the equipment, shall be included at no additional cost to Company.

All type testing shall be conducted as per the latest edition of the standard unless stated otherwise, whenever a standard is referenced. In addition, all type tests shall be performed in the presence of Engineer, unless authority to proceed with the tests in its absence is received from Company in writing.

**8.5.3 Factory Performance Tests**

Performance Tests are a scaled demonstration of the capability to operate at maximum and minimum power. All HVdc functions shall be verified as per IEEE Standard 1378 Section 5. Therefore, Contractor shall:

- Present to Engineer a verification plan covering time, place, and functions to be verified.
- Produce verification procedures covering step-by-step activities for each function to be verified.

During Performance Testing, Contractor shall complete both Functional Performance Testing (FPT) and Dynamic Performance Testing (DPT) as required to fully prove the complete functionality of the control and protection systems and the HVdc Link’s interaction with the existing ac power system(s). The FPT shall focus on the overall functionality of the HVdc scheme including all operating modes, system configurations, switching sequences, steady state performance as well as active power ramps and reactive power controls whereas the aim of the DPT shall be to analyze the interaction between the ac and dc systems as well as to verify the proper converter control and protection behaviour under dynamic and transient conditions.

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While completing these performance tests, a real time digital simulator shall be used to implement all FPT tests and some aspects of the DPT as deemed required by Contractor in consultation with Engineer. The remaining DPT will be done using computer based PSCAD or PSSE software simulation packages. At the start of the DPT testing, comparisons shall be completed to verify or prove the simulation results and applicable models of both the offline and real time simulations. During this phase, the use of system equivalents or reduced system models, as recommended by Contractor, shall be subject to Engineer's Approval.

Factory system testing of the complete control and protection system shall be performed by Contractor to ensure that the control and protection hardware and software meet all requirements of Company.

Verification of actual control and protection hardware and software shall be performed by running the real control systems together with a real time simulator implementing a network equivalent together with the HVdc model and other system components. In order to verify the conformance with Performance Requirements, recordings of all simulated FPT and DPT tests that use the real time simulator, shall be made using the Contractor supplied Transient Fault Recorder and supplemented by simulator traces as applicable. The test results for the FPT and the DPT shall be planned and organized in such a way that they can be used during Dynamic Commissioning as a comparison with onsite test results. In addition, all Performance Testing (FPT and DPT) that will be completed using the real time simulator shall be implemented using the original control and protection cabinets and hardware prior to being shipped to site. Upon a certain stage of Performance Testing and if necessary to avoid delays, consideration shall be given to concluding control system testing using Contractor's modular base simulation (MBS) devices. The decision to use the MBS and to ship the control cabinets to Site before the final conclusion of this testing shall be at the sole discretion of Engineer. This decision shall be based on the degree of comfort that Engineer has in Contractor proposed solution and the amount of testing remaining to be completed.

To facilitate the Phased Approach, an additional set of Series V control and protection cabinets shall be furnished by Contractor. These mirror platform cabinets shall be identical to the original hardware being supplied and will serve as a means to allow bipole testing to proceed in Stafford while the control and protection cabinets have already been shipped to Site.

Due to ac power system limitations, it is expected that during Dynamic Commissioning it will not be possible to test all the different system configurations, faults and power transfer levels. As a result, a

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number of specific model benchmarking tests shall be performed by Contractor for the purposes of verification of the Real Time Digital Simulator (RTDS), PSCAD™ and PSS/E™ models used during this phase. These tests shall be performed using ac power system configurations and loads expected to be available during both Dynamic Commissioning field testing phases (Dynamic Commissioning for Pole 1, DCLP and DCHP) and shall be repeated on RTDS during each phase of Dynamic Commissioning as necessary (using the same system configurations and power levels) to provide Engineer with reassurance that the actual system(s) provided meets all requirements as specified. After the RTDS models have been thoroughly benchmarked against the actual system, it is expected that these models can be applied with confidence to study any future tests that may be required outside of the initial scheduled dynamic performance period. Any updates to the models, will be submitted as required and as mutually agreed between Company and Contractor.

Tests to be performed by Contractor as part of Factory Performance Testing shall include, but are not limited to, the following:

- Protection performance proved by staged fault tests;
- Converter Station fault on line side of smoothing reactor;
- dc line faults (low impedance and high impedance ground fault);
- Single phase to ground faults on ac system side;
- Three phase faults on ac power system side;
- Loss of generators, synchronous condenser and transmission lines (as applicable) in ac power system;
- Electrode line faults (open circuit and fault to ground);
- Inversion of power direction;
- Tap changer module controller characteristic;
- RPC (Reactive Power Control) – controller characteristic;
- Converter valve faults including flashover across a valve;

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- Fault to ground on secondary of converter transformer feeding highest voltage section of twelve pulse valve group;
- Loss of pole - power transfer functionality;
- Online cable switching at the transition compounds;
- Run-up and run-back system response requirements;
- Network special protection system (SPS) functionality (if required); and
- Interaction of the LIL HVdc link with the Maritime HVdc Link (as required).

**8.5.4 Special Tests**

In addition to special tests required specifically in other sections of this Specification Contractor shall perform the following special test:

- Controller Characteristic – Rectifier side (Control Ignition Angle, Idc-control, VDCOL, Idc-min, Alpha-min). See scheme A-1 in Appendix A
- Controller Characteristic – Inverter side (Gamma constant control, Idc-control, VDCOL, Idc-min). See scheme A-2 in Appendix A

**8.6 Completion**

Contractor shall submit a full detailed test report to Engineer within two weeks following the factory testing.

Only equipment with Engineer Accepted factory test reports (or equipment deemed acceptable by Engineer to ship) will be authorised to be shipped from the factory.

**9 SHIPPING PROCESS**

Contractor shall ensure that documents such as special handling requirements, Preservation plans, MSDS, and packing lists are completed and dispatched with consigned products.

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**9.1 Documentation Required**

A dispatch dossier for the equipment being shipped is required to accompany all freight being delivered to Site. Also, before shipping any equipment from the factory, Contractor shall verify that the factory test reports for the equipment being shipped have been Accepted by Engineer.

Contractor shall also ensure the following items are in place prior to shipping any freight from the factory:

1. An Engineer Accepted Logistics and Transportation Strategy is in place and appropriate sections or requirements of this program are included in the dispatch dossier to ensure proper shipping, handling, freight forwarding, receiving, warehousing and site issuing logistics shall be properly managed by Contractor;
2. All supplied loose parts, materials, special testing apparatuses or tooling requirements are included in the shipment along with their applicable certifications, regulatory approvals, and licenses (as required);
3. All factory applicable material handling activities described within Engineer Accepted Preservation plan are completed and are supported with the appropriate documentation;
4. All packing, transportation and receiving activities described within Engineer Accepted Preservation plan and as detailed within the dispatch dossier are completed and have been adequately communicated with and/or well understood with all stakeholders involved the shipping process, and are supported with appropriate documentation.

**9.2 Requirements**

Contractor shall furnish a Logistics and Transportation Strategy and a Preservation plan which shall be submitted for review and Acceptance by Engineer.

All packaging and protective materials shall be new, shall maintain integrity, and shall perform intended functions whilst being transported, handled, and stored. Packaged products showing any damage, defect or shortage resulting from improper packaging, packaging materials or packing procedure;

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having concealed damage or being short at the time of unpacking shall be subject to rejection and shall be replaced at Contractor's cost.

Contractor shall ensure the equipment and/or products being shipped are preserved in accordance with the accepted Preservation plan and procedures and are suitably protected and packaged to prevent corrosion during handling, transport and storage. Items such as bearings, drive components, machined surfaces and electrical components etc. shall be protected against the possibility of coming in contact with corrosive or harmful substances.

Fragile or critical equipment, such as converter transformers, valves, etc. shall require impact sensors or shock recorders to be placed in strategic locations to detect and to record any acceleration that may be applied to the equipment during transportation to its final destination. Should a shock recorder record any severe acceleration, Contractor shall analyze the data and shall visually inspect the equipment to determine the severity of impact during transport and the level of damage expected to internal components. Depending on the results of this analysis, Contractor in consultation with Engineer shall decide if further action is required.

Contractor shall ensure all products are packed to avoid personal injury and damage to equipment and property. Also, Contractor shall verify the integrity of all equipment shipped immediately upon receipt at each site and shall demonstrate due-diligence by ensuring that any damage that may occur during the shipping process is detected as early as possible to avoid delays.

Additional requirements as specified in document No. ILK-SN-CD-8000-EL-DB-0002-01 "General Technical Requirements" are also applicable.

**9.3 Reports**

Any damage to goods received or other incidents or abnormalities during the shipping process shall be reported to Engineer in the manner outlined in the last paragraph of section 6.2 of this Specification.

**10 COMMISSIONING STATIC CHECKS (CSC)**

**10.1 Documentation Required**

Prior to starting this activity, Contractor shall submit, for Engineer's review and Acceptance, the following documentation:

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- Mechanical Completion Certificate (MCC);
- Inspection Test Records (ITR);
- Detailed Testing procedures;
- Detailed Testing program;
- Up-to-date 'as built' drawings; and
- Site test organization chart.

All required documentation listed above shall be made available by Contractor during the testing, if requested. Engineer shall prepare a Punch List within ten (10) days of the scheduled date for the completion of Commissioning Static Checks.

**10.2 Quality Control**

Contractor shall adhere to the requirements of Exhibit 7 "Quality Requirements".

**10.3 Testing Results and Reports**

Any failure or abnormal event during the CSC shall be reported to Engineer. Section 6.2 of this Specification is also applicable.

**10.4 Requirements**

All procedures shall be furnished by Contractor for review and Acceptance by Engineer.

If any item of equipment furnished by Contractor fails to pass any of the tests or shows any signs of damage or failure, it shall be repaired and defective parts replaced or re-designed. The equipment shall then be re-tested without additional cost to Company. The re-testing shall include the test under which the failure occurred, as well as all of the tests already completed, which might be affected by the faulted equipment, or as required by Engineer.

During the CSC Contractor shall appoint a Commissioning Supervisor who shall be in charge and be responsible for the equipment being commissioned.

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Wherever possible, Contractor shall perform a complete test of the system using actual field input/output devices.

All special equipment necessary to simulate devices or switching sequences and required for testing shall be provided by Contractor.

Before starting with commissioning static check activities, Contractor shall complete the following works:

- The facility is clean and construction equipment is removed from Site
- The equipment is conveniently labelled in accordance with the operation numbering system and the facility's operation manuals

One commissioning form shall be generated for each piece of equipment and/or sub-system for each pole at each site.

Individual equipment that requires testing includes, but shall not be limited to the following:

1. Converter Station Equipment

- Thyristor valve units;
- Earth switches;
- Busbar and connectors;
- dc surge arrester;
- Fibre optics;
- Sensor devices (pressure, temperature and others);
- Cooling plant;
- Ground fault detector;
- HV bushing (tap);
- dc bushing (HV and neutral);
- HVAC system; and

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- Interlocks.

## 2. Control and Protection Systems

- Control system;
- Protection system;
- Transient fault recorder;
- Protective relays;
- Energy meters;
- Telecommunications systems;
- Fault locator;
- Sequence of events;
- Computers; and
- Control and protection changeover system.

## 3. Auxiliary Services

- MV disconnect switches;
- Ground switches;
- MV circuit breakers;
- MV power cables;
- Station services transformers;
- Emergency generator sets;
- Automatic transfer system;
- ac/dc distribution panels, switchgear, switchboards or MCCs (as applicable);
- Batteries;
- Battery chargers;

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- Inverters;
- Bypass switches;
- Lighting;
- VT and CT transformers;
- Protection relays;
- Arc flash Maintenance switch logic (if required);
- Transfer switches and control scheme; and
- HVAC system.

4. ac Switchyard

- Ground grid;
- Flexible, rigid buses and shielding;
- HV disconnect switches;
- Ground switches;
- HV circuit breakers;
- Converter transformers (including cooling system);
- Current transformers;
- Voltage transformers;
- ac Surge arresters (HV and MV);
- ac filters and reactive banks (capacitor, reactors, resistor, arresters);
- PLC filters;
- Structures;
- Junction boxes;
- Lighting; and

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- HV bushing (tap).

#### 5. dc Switchyard

- dc disconnecter switches;
- dc earthing switches;
- Metallic Return Transfer Breaker (MRTB) (Priority 2);
- Ground Return Transfer Switch (GRTS);
- High speed switches
- Neutral Bus Ground Switch (NBGS);
- Ground grid;
- dc current transformer;
- dc voltage divider;
- dc surge arrester (HV, neutral);
- Smoothing reactor;
- Surge capacitors (if required); and
- dc Filters (arrester, reactor, capacitor, resistor) (if required).

#### 6. Control Building

- Lighting;
- Access security system;
- HVAC;
- LV electric system; and
- Communication System.

#### 7. Interfaces

- Intertrip / Interlock;

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- Breaker failure;
- Analog channels;
- Digital input / outputs;
- Ready to de-block;
- Telecommunications system; and
- OPGW/ADSS connection.

#### 8. Fire Protection

- Fire detection system;
- Air sampling system;
- Arc detector; and
- Interface scheme with protection and control system;

#### 9. Transition Compound

- All applicable items listed in previous sections;
- dc disconnecter switches;
- dc earthing switches;
- High speed switches (Not required for Pole 1 Phased Approach)
- Ground grid;
- dc current transformer;
- dc voltage divider (if required);
- dc surge arrester (HV, neutral); and
- dc bushing.
- dc capacitors

#### 10. Electrode Station

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- Line Fault Location Equipment (as appropriate) (Not required for Pole 1 Phased Approach).

11. All control, protection and indication interfaces (as required)

- HV Cable interfaces;
- Ac switchyard interfaces;
- Synchronous Condenser interfaces; and
- ECC/BCC interfaces (including verification of all I/O points from field device to ECC as per agreed protocol with Company).

Tests to be conducted at site shall be performed as per manufacturer recommendations. Appendix C shows a table of additional tests that shall be taken into consideration for the preparation of Contractor proposed test procedure.

**10.5 Completion**

Contractor shall submit the Commissioning Check List (CCL) upon the successful Commissioning Static Check (CSC) of a single discipline within a system or part system. The CCL shall be signed by Contractor and Company Representative.

**11 DYNAMIC COMMISSIONING FOR POLE 1**

**11.1 General**

.For this phase of Dynamic Commissioning, Contractor shall furnish detailed Commissioning Procedures (CPR) for review and Acceptance by Engineer. The CPR shall be organized in a well-planned and efficient manner such that re-testing and/or manipulation of the ac power systems is minimized as much as possible. Transient Fault Recorder (TFR) – will be delivered to site as part of the phased approach and will therefore not be available for FAT in Strafford. Contractor will issue a concession request regarding FAT testing requirements.

Contractor shall ensure that all previous tests that could have been completed without being connected to the ac power system(s) have been completed, and if completed, that the installation has been returned to normal operating condition and can be safely energised. The equipment, sub-system or system shall be energised in accordance with the method previously defined within the CPR.

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During this phase, control of the Dynamic Commissioning sequence shall be by the RFO to ensure that the proper coordination is always in place between Contractor, Operations personnel at Energy Control Centre(ECC) and Backup Control Centre(BCC), members from other work groups or packages, etc. In addition, a brief meeting shall be held on a daily basis (or upon any change of scope or change to previously discussed activities) between Contractor’s Commissioning Supervisor, representatives of Company and the RFO at each Site. The purpose of this meeting is to discuss and detail the activities of the previously accepted CPR for the following day with respect to what tests shall be performed, what inspections will be required, which switching and safety procedures will be requested and to plan any upcoming testing activities.

During the Dynamic Commissioning (or earlier as required), Contractor shall prepare and submit a Livening Up Notice (LUN), which shall serve as a notification to all personnel at Site that Dynamic Commissioning shall start and that all further work on a particular system or sub-system shall be subject to permit to work procedures or Work Protection Code (WPC). The Livening Up Notice (LUN) shall contain descriptions and marked-up drawings indicating precisely which particular system or part system shall become live during commissioning. Following the issuance of a LUN, if further isolations are required for personal protection, the method of work permit shall be the WPC established by Engineer, unless Contractor method of isolation exceeds the WPC. Also, when energising any equipment, from the ac power system or from other portable energy sources, Contractor shall install protective work zone barriers, warnings signs or any other appropriate safety equipment required to ensure that all site personnel are made aware of the energised work zone and any other required restrictions associated with it.

The energisation process shall be led by Contractor in continuous consultation with the RFO. Before energisation, Contractor and the RFO shall jointly carry out pre-energisation inspections and checks in order to ensure that the equipment can be safely energised (i.e. there are no temporary grounds, tools, test equipment (other than necessary for system tests), or any abnormalities which may result in an equipment flashover on energisation or during subsequent operation). Upon successful completion of the inspections, the RFO shall contact ECC/BCC seeking permission to place equipment online. Once the ac power system is properly configured and permission is granted, Contractor shall proceed with energising equipment as detailed in the accepted CPR. All energisation and switching procedures shall be prepared and directed by Contractor, via coordination with the RFO to allow for proper grid authorization and work permit control.

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Visual inspection and/or testing after any energisation will be carried out by Contractor as necessary to ensure that the installation is operating properly. Discussions with Company Representative and the RFO personnel regarding performance of system operation checks after energisation, which may affect the system operation, will take place as required.

Contractor's Commissioning Supervisor shall be responsible for ensuring that suitably qualified personnel are available at all required sites during the period of the system tests to ensure that any abnormal behaviour can be immediately identified and corrective action taken as required.

During any tests that require active and/or reactive power to be exchanged with the ac power system(s), Contractor shall provide, prior to any individual test, predicted values of these expected power exchanges.

All commissioning activities shall be coordinated with the RFO and Company's ECC operators to ensure the electrical ac power systems are configured correctly for the test being performed.

The system tests listed in this section shall commence only when the RFO is satisfied that the CSC of equipment, sub-system and system have been successfully completed. Additionally, Contractor shall ensure the following:

- Sequence of Events Recorder is cleared of all previous alarms and events.
- All applicable relays are cleared of any excess information stored.
- All alarms and events are reset locally and remotely to ECC/BCC.

Under exceptional circumstances due to constraints of equipment availability during the installation and commissioning program, it is permissible for the Commissioning Supervisor, on written agreement with Company Representative, to waive or deviate from specific sub-sections of the previously accepted Commissioning Procedure (CPR). The circumstances and justification for this deviation must be fully recorded in the CPR test results documentation. Also, the Commissioning Supervisor shall ensure that any deviations from the accepted CPR are adequately communicated to all necessary individuals or groups including the representatives of Company, the RFO and ECC/BCC.

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The Commissioning Supervisor will record the satisfactory completion of each test or commissioning stage. This will be in the form of signature and date, and where appropriate, recorded values, and will complete the permanent record of the work having been completed.

In addition, the Commissioning Supervisor will maintain a detailed log of the tests performed, which will include any relevant background information which may be useful at a later date during any investigation of the circumstances surrounding a particular test. This will provide the details of observed performance, test results, local and remote alarm or event descriptions, and any mis-operation and corrective actions taken.

Each day the Sequence of Events Recorder (SER) record and applicable trends shall be saved as a separate file. Where instruction is given to endorse the recorded data results, the Commissioning Supervisor will record in this document the time and date the test took place. The time stamp of the SER information shall be periodically checked to ensure that it is still correct. In addition, remote alarms and indications to ECC/BCC shall also be verified during the testing procedure.

All equipment mis-operation or suspect events will be investigated before proceeding with the system tests to ensure the safety of the personnel, ac power system reliability and that the station equipment is not subject to unnecessary risk or failure.

For any equipment that is being re-energised, after being isolated for maintenance purposes, Contractor shall perform a second inspection (similar to the pre-energisation inspection described above) to ensure that there the equipment is fully restored for normal operation.

The circumstances surrounding any continuing or on-going work (e.g. work on another non-needed filter) shall be subjected to careful scrutiny by Contractor, representatives of Company and the RFO to ensure that there is no risk to personnel and that these activities cannot corrupt the tests or influence the behaviour of any performance requirements or protection circuits, etc. In making this assessment, Contractor shall take into account any temporary facilities or equipment required to be in use for such work.

Commissioning Supervisor(s) will investigate any alarms relating to any equipment which are annunciated and adjudicate jointly with Engineer to decide whether it is safe to proceed with testing. All alarms which remain un-cleared at the commencement of any energised tests shall be recorded, and documented together with an investigation report for each individual alarm.

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**11.2 Documentation Required**

Prior to starting this activity, Contractor shall submit, for Engineer’s review and Acceptance, the following documentation:

- Completed Commissioning Check List (CCL);
- Accepted Commissioning Procedures (CPR);
- Operating single line diagrams of the portion of system(s) being energised;
- Site test organization chart;
- Documentation showing Punch List “A” items are cleared;
- Updated list of all outstanding Punch List “B” items;
- Results of simulations for models requiring benchmark (as described in Section 8.5.3 for Pole 1 Dynamic Commissioning only);
- Specification Compliance Sign Off List (SCL) to be completed during this phase;
- Turnover and Commissioning Package (TCP) to be completed during this phase; and
- System Studies required to support planned testing program.

All required documentation listed above shall be made available to Engineer by Contractor during the testing, if requested.

**11.3 Quality Control**

Contractor shall adhere to the requirements of Exhibit 7 “Quality Requirements”.

**11.4 Testing Results and Reports**

Any failure or abnormal event during Dynamic Commissioning shall be immediately reported to the representatives of Company and to the RFO who will be in continuous contact with representatives at the ECC/BCC as required. Section 6.2 of this Specification is also applicable.

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**11.5 Requirements**

**11.5.1 Optional Requirements - N/A**

**11.5.2 Mandatory Requirements**

The Low Power Testing and Commissioning phase involves transmission of low power from Labrador, through the Labrador Island Transmission Link (LITL) to the Island ac power system. This phase of commissioning is intended to allow preliminary commissioning of the HVdc link before hydro generation becomes available in Muskrat Falls and potentially before high inertia synchronous condensers become available in Soldiers Pond. Preliminary system studies which have been performed by Company, which shall be confirmed by Contractor detailed design, have indicated that the maximum power that can be transmitted over the LIL HVdc link without compromising existing ac power system stability in the event of a fault during this phase is as follows:

1. A maximum of 225 MW may be exported from Labrador over the LITL without reactive power support from the Muskrat Falls Hydro Generating Facility. Loading the HVdc link beyond this limit would likely result in unacceptable post-fault recovery voltages which could result in the loss of the HVdc link and ultimately loss of ac power system stability in Newfoundland.
2. An export of 225 MW from Labrador over the LITL would result in an import of approximately 220 MW at Soldiers Pond. Preliminary load flow and transient stability analysis indicate that the import of 220 MW is acceptable for conditions where the Hydro Transmission System on the Island of Newfoundland is loaded in excess of 1250 MW.
3. For conditions where the Hydro Transmission System on the Island of Newfoundland is loaded below 1250 MW, import to the Island over the LIL should be limited in accordance with the following table which will prevent the shedding of loads set to trip at 58.0 Hz:

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Table 10-1 – Guideline for Maximum Unit Loading  
(as per Hydro Operating Instruction T-068)

System Generation	Maximum Unit Loading
816	175
794	170
772	167
750	162
728	157
706	152
684	146
662	142
640	137
618	134
596	130
574	124
552	120
530	115
508	111
486	106
464	101
442	97
420	92
398	87
376	83
354	78
332	73

It should be noted that the analysis described above is preliminary. It is recommended that results be confirmed and that a more comprehensive analysis be performed by Contractor during the final design stages of the LIL and during operational studies. Until confirmed by detailed studies, Contractor shall assume that a maximum of 175 MW can be transmitted over the HVdc link without units in Muskrat Falls or in Soldiers Pond.

Ultimately, during this phase of commissioning and testing, it is required that each component, sub-component and associated systems be energised and tested to their maximum ratings and/or most onerous operating condition(s), as permitted by the ac power system(s). It is also critical to prove that the HVdc systems provided function as they were designed to do so and that all supplied equipment meets or exceeds all requirements as specified. During this phase, it is also critical that Contractor verifies or benchmarks the simulation models used during the Factory Performance Testing as described in Section 8.5.3.

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Finally, tests to be performed as required by standards identified within Section 2.1 shall include, but not necessarily be limited to, the following (by mutual agreement some of these tests may be completed during the DCLP or DCHP phases):

- Intertrips, interlocks, blocking/unblocking signals and trip test;
- dc system configuration and in operation – (monopolar ground return (Priority 2), monopolar metallic return);
- High voltage energisation (converter busbar, filters busbar);
- ac filters and reactive power compensation energisation;
- Converter transformer energisation;
- Open line test (converter and converter-transmission line-cable, rectifier side and inverter side);
- Start and stop sequences;
- Steady state operation at minimum power transfer;
- Protective blocking and tripping sequences;
- Power and current ramping;
- Steady state operation test;
- Reactive power control (as loads permit);
- Overload test/temperature rise measurements (monopolar configuration) (as loads permit);
- Harmonic performance and filter components rating (as loads permit);
- Tap changer control set;
- Rated voltage to reduced voltage transfer (Note: offline capability only for Phased Approach);

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- dc – Switchgear operation – transferring power (monopolar ground return (Priority 2), monopolar metallic return, pole isolate/connect, single electrode line operation (Priority 2));
- Offline cable switching activities;
- ac/dc auxiliary services changeover and/or failure;
- Main switching equipment (ac filters, dc filters (if required));
- Control function (operator control, remote control, remote access, local control);
- Dynamic performance testing (Step response);
- Control modes transfer (power control to current control, and others);
- Commutation failures (Induced);
- Electromagnetic compatibility;
- Electromagnetic interference;
- Electrode line protection test (Priority 2);
- Online and offline fault location accuracy test on HV lines and electrode line (as required noting that electrode lines are Priority 2);
- Loss of telecom, auxiliaries or redundant equipment;
- Ac power system interaction / control (frequency control (Priority 2), reactive power regulation, temporary overvoltage control);
- Operation at minimum current;
- Power ceiling limiters;
- Sub-synchronous oscillation damping controls (if required noting that UIF study results indicate that control feature is not required);

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- Loss of ac-feed to converter (if required);
- Reduced Voltage operation;
- Paralleling of overhead transmission lines during monopole operation (Priority 2); and
- All other performance testing necessary to prove that the HVdc system provided meets or exceeds all performance requirements as specified and as applicable to the load levels being transmitted.

Additionally, if possible (depending on results of FAT simulations), Contractor shall demonstrate the protection system performance by staged fault tests. Tests to be performed shall include, but not necessarily be limited to, the following:

- Fault within the pole differential zone
- Fault within the line differential zone (with/without telecommunications), including dc line faults, cable faults, and electrode line faults
- Fault on the ac power system side

Should Company be unable to arrange for any of the above staged faults for ac power system stability reasons, then Contractor shall demonstrate by alternate means the following performance parameters:

- a) Selectivity (correct identification of the zone under fault)
- b) Stability (correct protection sequence to clear the faulty zone)
- c) Reliability (main and backup system of the control and protection system are properly coordinated)

If possible, Contractor shall also demonstrate, in a similar manner as above, the correct protection performance of all protection functions including the following faults that cannot be staged:

- i. Converter valve faults including flashover across a valve
- ii. Fault to ground on secondary of converter transformer feeding highest voltage section of twelve pulse valve group

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**11.6 Special Considerations**

It shall be noted that the ac parameters currently provided within the General Technical Requirements (document No. ILK-SN-CD-8000-EL-DB-0002-01) are representative of the ac power system once the LCP project is fully commissioned and placed into service. For example, in Soldiers Pond, the extreme minimum short circuit level for design purposes is 2,849MVA, which assumes that only one High Inertia Synchronous Condenser is in service at Soldiers Pond whereas in Muskrat Falls, the extreme minimum short circuit level for design purposes is 2,236MVA, which assumes that one hydro unit is online in Muskrat Falls.

During commissioning, special consideration shall be given for the case where the HVdc system is placed into service before units are available at Muskrat Falls or at Soldiers Pond. During this operating condition (which could potentially last for a number of months or years during construction of the other assets affiliated with the LCP project and other Island upgrades) special consideration short circuit levels at Muskrat Falls and Soldiers Pond are 1,625MVA and 2,237MVA, respectively. It should be noted that when operating at these reduced "special consideration" short circuit levels, the control system response requirements, as specified, will be relaxed whilst ensuring that the HVdc link operates in a stable manner up to power dispatch levels equal to those tested to during Dynamic Commissioning of Pole 1 and DCLP.

As a result, Contractor shall complete system studies as required to determine the impact of placing a filter or reactive bank in service when no rotating units are available in either MF or in SP to provide dynamic support. With limited reactive support available from the ac power system to maintain ac voltages, Contractor shall propose for Engineer review and Acceptance a plan to commission each bank and to operate the converter without exceeding maximum acceptable voltage levels at any locations within the respective ac power system. It should be noted that when operating at "special consideration" short circuit levels, higher than normal voltages could be experienced at the Muskrat Falls bus when filters are placed online.

Also, without dynamic support available in MF, the Labrador converter station would be connected to Churchill Falls through two 315kV ac transmission lines. In the event that one of these lines are out of service for maintenance and the second line experienced a single pole reclose, higher than specified negative sequence levels would be experienced. This could potentially require increased ac filter ratings at the MF converter station to account for higher 3<sup>rd</sup> harmonic. If required, this would be considered outside the design requirements specified and shall be handled as a Change. It should also

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be noted that under this circumstance, other alternative operational strategies (such as blocking single pole reclosing on the 315kV ac line or blocking the converters) may be considered by Company.

In addition, special consideration is required to identify the impact to the harmonic impedance study resulting from the contingencies associated with the special conditions of low short circuit levels discussed above. Any adverse implications on the harmonic impedance search areas specified due to the special conditions of low short circuit levels discussed above shall be evaluated by Engineer during detail design and if required, handled as a Change.

**11.7 Completion**

Contractor shall submit to the Engineer the completed Specification Compliance Sign Off List (SCL) upon the successful Dynamic Commissioning of Pole 1. The SCL shall be signed by Contractor, Engineer and the RFO and shall include a note that further verification and testing is required during the DCLP and DCHP phases. It shall also include the maximum power level that Pole 1 has been proven to reliably transmit.

Also, Contractor shall submit an updated Turnover and Commissioning Package (TCP) to the Engineer upon the successful Dynamic Commissioning of Pole 1. The updated TCP shall include any changes accepted by Engineer that were made to any of the testing procedures or equipment requirements during the Dynamic Commissioning of Pole 1 phase.

**12 TRIAL OPERATION OF POLE 1 AT LOW POWER**

**12.1 General**

The Trial Operation of Pole 1 at Low Power is the testing phase prior to Pole 1 Temporary Acceptance Certificate following successful completion of the Trial Operation of Pole 1 at Low Power.

Its purpose is to allow Company to evaluate Pole 1 operating in its typical mode of operation and environment at loads up to maximum load tested to during Dynamic Commissioning of Pole 1.

During the phase of commissioning, the care and custody of the equipment, system and facility remain with Contractor while any arising isolations requiring worker protection will be completed under the jurisdiction of Company's WPC through Contractor requested RFO coordination.

**12.2 Documentation Required**

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Prior to starting this activity, Contractor shall submit, for Engineer’s review and Acceptance, the following documentation:

- Completed Commissioning Procedure (CPR);
- Turnover and Commissioning Package (TCP);
- Work Protection Code (WPC) forms closed;
- Pole 1 documentation – Final form or, red line mark-ups,
- All As-Built drawings applicable for Pole 1 within ninety days (90 days) upon the completion of the Pole 1 Trial Operation.
- All reports (as described in Section 6.2) that detail failure/abnormal operation events;
- Documentation showing Punch list “B” items are cleared (Punch List “A” items have been cleared since before Dynamic Commissioning of Pole 1);
- If necessary, certain Punch List “B” items may be carried through this phase, providing written agreement from Company is obtained and a date for the clearance is provided.

All required documentation listed above shall be made available by Contractor during the phase, if requested.

**12.3 Scheduling**

The Trial Operation of Pole 1 at Low Power period shall begin directly following the successful completion of the Dynamic Commissioning of Pole 1 phase. Upon the start of this phase, Contractor shall successfully demonstrate Trial Operations of the system during a period of not less than 20 consecutive days. To allow for field tuning, calibration and/or adjustments of the system Contractor shall be permitted 70 days to complete this demonstration. It should however be noted that any field modification and/or adjustment performed during this testing phase may result in further quality, CSC and/or DC testing and commissioning checks.

**12.4 Successful Trial Operation Defined**

Trial Operation of Pole 1 at Low Power shall be a 70 days period where during this period, an uninterrupted period of normal operation of not less than 20 days is required, during which the all equipment and facilities provided in this package shall be fully operational up to maximum power

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transfer levels proven during the Dynamic Commissioning of Pole 1 phase. Should the Trial Operation of Pole 1 be interrupted by any action which is not expected, planned or coordinated then the Trial Operation of Pole 1 shall be repeated as required. Interruptions outside of Contractor control attributable to connecting ac power system requirements shall not be considered as an interruption to the trial operation.

The Trial Operation of Pole 1 at Low Power shall demonstrate the following:

- The system provided by Contractor meets or exceeds the requirements as specified in the document No. ILK-SN-CD-8000-EL-DC-0001-01 "Performance Requirements" and associated Amendments (noting that some requirements may not be met as described in section 11.6, some requirements may require high power and the availability and reliability performance shall be demonstrated during the Pole 1 Performance Guarantee Assessment Period and during the Performance Guarantee Assessment Period);
- No main circuit equipment malfunctions or faults;
- No stall or malfunction of RTUs or input/output modules;
- No Contractor supplied communication equipment malfunctions;
- No ac and dc protection malfunctions;
- Stable operation for all system configurations and operation modes;
- No failure or malfunction of SCADA equipment;
- No failures or major alarms of any kind;
- No functional, system and/or unintended operational limitation or issue;
- No event that requires any type of manual intervention from operators (other than those already agreed to form part of Phased Approach).

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**12.5 Mitigation Measures Resulting from an Unsuccessful Trial Operation Period**

If Contractor is unable to demonstrate a successful Trial Operation of Pole 1 in the permitted 70 day window, for any reason, there will be a formal and documented design review process completed by

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Contractor, at no additional cost to Company.

The resulting analysis shall be delivered formally as a presented report to Engineer for review and Acceptance, within 5 calendar days of the final failed Trial Operation of Pole 1 attempt. This analysis will include and/or address, as a minimum, the following:

- General system operational overview;
- General review all MC, CSC, and DC testing results;
- All Trial Operations of Pole 1 events noticed;
- All results deemed successful;
- All results deemed unsuccessful;
- Root cause analysis of the issue(s);
- Available mitigation options and pros/cons of each option;
- Detailed risk assessment of the above options, with specific attention paid to any work resulting in retesting and/or re-commissioning activities;
- Detailed mitigation plan outlining Contractor recommended option to correct the issue(s), including the following:
  - Scope of Work to implement changes required;
  - Detailed schedule to design, document, implement, and test changes and re-test effected equipment and/or subsystems;
  - Resource required to implement Work;
  - Changes in any quality and/or performance specifications; and
  - Estimated duration of any outages required to complete the Work.

**12.6 Testing Results and Reports**

Any failure or abnormal event during Trial Operation of Pole 1 at Low Power shall be reported to Engineer,

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### 13 POLE 1 TEMPORARY ACCEPTANCE

Once the Trial Operation of Pole 1 at Low Power has been successfully completed, Contractor shall submit a request for the Pole 1 Temporary Acceptance Certificate to be issued by Company. At this stage all commissioning spare parts shall be re-stocked (or a plan shall be in place to restock within acceptable timeframes), all final documentation submitted, and site restored for normal operations (except for equipment, facilities etc. that have been Accepted to by Engineer as being required for the DHLP or DCHP phases).

Pole 1 Temporary Acceptance shall be the formal transfer of documentation and responsibility for the operation and maintenance of the Pole 1 system and associated facilities as defined on the Pole 1 Temporary Acceptance Certificate.

The Pole 1 Temporary Acceptance Certificate shall address, but shall not be limited to, the following subjects:

1. All pertinent documentation shall be included, but not limited to;
  - a. The Accepted complete QA/QC documentation packages;
  - b. All Accepted testing and commissioning documentation identified within this specification;
  - c. Red mark ups / finalised documentation as per agreement.
  - d. The history docket with current Punch List, Preservation records, Interface management plan and record, change management procedures and records, equipment id and tagging indexes;
  - e. The Operations and Maintenance manual with all required information to run and maintain the system (i.e. start up procedures, preventative maintenance procedures and intervals, recommended spares, etc.);
  - f. Backup 'As Built' electronic copies of all software files, programs, models, simulation software, logic files, etc. that are running on equipment provided in this package;
2. Transfer of documents as per latest Supplier Document Register (SDRL Item A01);

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3. Spare parts as defined in agreement.
4. Transfer of keys, permits, authorisations, native software application files, licences, etc.;

Punch List with remaining Work that shall be performed during Warranty period, this list shall be agreed between Engineer and Contractor.

**14 DYNAMIC COMMISSIONING AT LOW POWER (DCLP)**

**14.1 General**

For this phase of Dynamic Commissioning, Contractor shall furnish detailed Commissioning Procedures (CPR) for review and Acceptance by Engineer. The CPR shall be organized in a well-planned and efficient manner such that re-testing and/or manipulation of the ac power systems is minimized as much as possible.

Contractor shall ensure that all previous tests that could have been completed without being connected to the ac power system(s) have been completed, and if completed, that the installation has been returned to normal operating condition and can be safely energised. The equipment, sub-system or system shall be energised in accordance with the method previously defined within the CPR.

During this phase, control of the Dynamic Commissioning sequence shall be by the RFO to ensure that the proper coordination is always in place between Contractor, Operations personnel at Energy Control Centre(ECC) and Backup Control Centre(BCC), members from other work groups or packages, etc. In addition, a brief meeting shall be held on a daily basis (or upon any change of scope or change to previously discussed activities) between Contractor's Commissioning Supervisor, representatives of Company and the RFO at each Site. The purpose of this meeting is to discuss and detail the activities of the previously accepted CPR for the following day with respect to what tests shall be performed, what inspections will be required, which switching and safety procedures will be requested and to plan any upcoming testing activities.

During the Dynamic Commissioning (or earlier as required), Contractor shall prepare and submit a Livening Up Notice (LUN), which shall serve as a notification to all personnel at Site that Dynamic Commissioning shall start and that all further work on a particular system or sub-system shall be subject to permit to work procedures or Work Protection Code (WPC). The Livening Up Notice (LUN) shall contain descriptions and marked-up drawings indicating precisely which particular system or part

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system shall become live during commissioning. Following the issuance of a LUN, if further isolations are required for personal protection, the method of work permit shall be the WPC established by Engineer, unless Contractor method of isolation exceeds the WPC. Also, when energising any equipment, from the ac power system or from other portable energy sources, Contractor shall install protective work zone barriers, warnings signs or any other appropriate safety equipment required to ensure that all site personnel are made aware of the energised work zone and any other required restrictions associated with it.

The energisation process shall be led by Contractor in continuous consultation with the RFO. Before energisation, Contractor and the RFO shall jointly carry out pre-energisation inspections and checks in order to ensure that the equipment can be safely energised (i.e. there are no temporary grounds, tools, test equipment (other than necessary for system tests), or any abnormalities which may result in an equipment flashover on energisation or during subsequent operation). Upon successful completion of the inspections, the RFO shall contact ECC/BCC seeking permission to place equipment online. Once the ac power system is properly configured and permission is granted, Contractor shall proceed with energising equipment as detailed in the accepted CPR. All energisation and switching procedures shall be prepared and directed by Contractor, via coordination with the RFO to allow for proper grid authorization and work permit control.

Visual inspection and/or testing after any energisation will be carried out by Contractor as necessary to ensure that the installation is operating properly. Discussions with Company Representative and the RFO personnel regarding performance of system operation checks after energisation, which may affect the system operation, will take place as required.

Contractor's Commissioning Supervisor shall be responsible for ensuring that suitably qualified personnel are available at all required sites during the period of the system tests to ensure that any abnormal behaviour can be immediately identified and corrective action taken as required.

During any tests that require active and/or reactive power to be exchanged with the ac power system(s), Contractor shall provide, prior to any individual test, predicted values of these expected power exchanges.

All commissioning activities shall be coordinated with the RFO and Company's ECC operators to ensure the electrical ac power systems are configured correctly for the test being performed.

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The system tests listed in this section shall commence only when the RFO is satisfied that the CSC of equipment, sub-system and system have been successfully completed. Additionally, Contractor shall ensure the following:

- Sequence of Events Recorder is cleared of all previous alarms and events.
- All applicable relays are cleared of any excess information stored.
- All alarms and events are reset locally and remotely to ECC/BCC.

Under exceptional circumstances due to constraints of equipment availability during the installation and commissioning program, it is permissible for the Commissioning Supervisor, on written agreement with Company Representative, to waive or deviate from specific sub-sections of the previously accepted Commissioning Procedure (CPR). The circumstances and justification for this deviation must be fully recorded in the CPR test results documentation. Also, the Commissioning Supervisor shall ensure that any deviations from the accepted CPR are adequately communicated to all necessary individuals or groups including the representatives of Company, the RFO and ECC/BCC.

The Commissioning Supervisor will record the satisfactory completion of each test or commissioning stage. This will be in the form of signature and date, and where appropriate, recorded values, and will complete the permanent record of the work having been completed.

In addition, the Commissioning Supervisor will maintain a detailed log of the tests performed, which will include any relevant background information which may be useful at a later date during any investigation of the circumstances surrounding a particular test. This will provide the details of observed performance, test results, local and remote alarm or event descriptions, and any mis-operation and corrective actions taken.

Each day the Sequence of Events Recorder (SER) record and applicable trends shall be saved as a separate file. Where instruction is given to endorse the recorded data results, the Commissioning Supervisor will record in this document the time and date the test took place. The time stamp of the SER information shall be periodically checked to ensure that it is still correct. In addition, remote alarms and indications to ECC/BCC shall also be verified during the testing procedure.

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All equipment mis-operation or suspect events will be investigated before proceeding with the system tests to ensure the safety of the personnel, ac power system reliability and that the station equipment is not subject to unnecessary risk or failure.

For any equipment that is being re-energised, after being isolated for maintenance purposes, Contractor shall perform a second inspection (similar to the pre-energisation inspection described above) to ensure that there the equipment is fully restored for normal operation.

The circumstances surrounding any continuing or on-going work (e.g. work on another non-needed filter) shall be subjected to careful scrutiny by Contractor, representatives of Company and the RFO to ensure that there is no risk to personnel and that these activities cannot corrupt the tests or influence the behaviour of any performance requirements or protection circuits, etc. In making this assessment, Contractor shall take into account any temporary facilities or equipment required to be in use for such work.

Commissioning Supervisor(s) will investigate any alarms relating to any equipment which are annunciated and adjudicate jointly with Engineer to decide whether it is safe to proceed with testing. All alarms which remain un-cleared at the commencement of any energised tests shall be recorded, and documented together with an investigation report for each individual alarm.

#### 14.2 Documentation Required

Prior to starting this activity, Contractor shall submit, for Engineer's review and Acceptance, the following documentation:

- Completed Commissioning Check List (CCL);
- Accepted Commissioning Procedures (CPR);
- Operating single line diagrams of the portion of system(s) being energised;
- Up-to-date 'as built' drawings;
- Site test organization chart;
- Documentation showing Punch List "A" items are cleared;

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- Updated list of all outstanding Punch List “B” items;
- Results of simulations for models requiring benchmark (as described in Section 8.5.3);
- Specification Compliance Sign Off List (SCL) to be completed during this phase;
- Turnover and Commissioning Package (TCP) to be completed during this phase; and
- System Studies required to support planned testing program.

All required documentation listed above shall be made available to Engineer by Contractor during the testing, if requested.

**14.3 Quality Control**

Contractor shall adhere to the requirements of Exhibit 7 “Quality Requirements”.

**14.4 Testing Results and Reports**

Any failure or abnormal event during Dynamic Commissioning shall be immediately reported to the representatives of Company and to the RFO who will be in continuous contact with representatives at the ECC/BCC as required. Section 6.2 of this Specification is also applicable.

**14.5 Requirements**

**14.5.1 Optional Requirements**

The option of completing Back-to-Back and/or Loop Power Testing (as defined below) is available to Contractor as a means to reduce project risk associated with schedule and equipment with long lead delivery times and/or to stress equipment to power levels beyond that available during this phase of testing. If Back-to Back or Loop Power Testing is deemed a desirable option for Contractor to complete, the following notes shall apply:

- **Back-to-Back Testing:** This testing mode involves taking each of the two poles at the converter station(s) and arranging one pole to operate as a rectifier and the other to operate as an inverter with their high voltage terminals shorted outside the converter station. The advantage of this mode is that it allows the long lead converter station components (such as valves, transformers, cooling system, etc.) to be stressed without the need for a dc transmission line. Conceivably, while operating in this mode, each pole can be loaded to a Contractor determined maximum

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nominal power level, while ensuring that no components are overloaded or suffer any increased loss of life. This could allow for testing of various protection, control and alarm systems without major disruptions to the ac power system(s) or grid(s). This could be done at each converter station independently or depending on availability of duplicate resources, in parallel. The power levels that could be expected to be reached would depend upon the amount of reactive power support available at each station. Pending confirmation by Contractor during detailed design, if two high inertia synchronous condensers (HISC) are in service at Soldiers Pond (SP), it is likely that enough reactive power will be available for maximum steady-state power testing at that converter station. Once again pending confirmation by Contractor during detailed design, at Muskrat Falls (MF), at least two MF generators will likely be required to provide sufficient reactive power to enable full load testing. Harmonic constraints and consideration to other technical issues such as self-excitation of nearby units would also need to be addressed by Contractor if this testing mode is considered.

- Loop Power Testing:** This testing mode was originally conceived to allow the converters to circulate current over the link to reduce ice adhesion on the overhead transmission lines during icing periods when the link is lightly loaded. From a commissioning standpoint, as long as the dc transmission lines, including the HV cables, are available for service, and the grid is connected at the ac switchyards at Muskrat Falls and at Soldiers Pond, then loop power commissioning can proceed. This test mode would allow equipment located at each converter station and transition compound, including the overhead transmission lines and the cables to be stressed. This mode will require similar system reactive power requirements as those described in the Back-to-Back testing mode discussed above; however, this mode will require additional real power contributions from the ac power system to offset the losses expected while operating in this mode. The HVdc control system shall be configured such that the losses can be provided from either the Labrador or from the island ac power systems and the need for a special cross tripping protection scheme shall be evaluated by Contractor to ensure that in the event of the loss of one pole, the system will not inadvertently result in unplanned power transfers beyond those identified in the previously accepted CPR.

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**14.5.2 Mandatory Requirements**

The Low Power Testing and Commissioning phase involves transmission of low power from Labrador, through the Labrador Island Transmission Link (LITL) to the Island ac power system. This phase of

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commissioning is intended to allow preliminary commissioning of the HVdc link before hydro generation becomes available in Muskrat Falls and potentially before high inertia synchronous condensers become available in Soldiers Pond. Preliminary system studies which have been performed by Company, which shall be confirmed by Contractor detailed design, have indicated that the maximum power that can be transmitted over the LIL HVdc link without compromising existing ac power system stability in the event of a fault during this phase is as follows:

1. A maximum of 225 MW may be exported from Labrador over the LITL without reactive power support from the Muskrat Falls Hydro Generating Facility. Loading the HVdc link beyond this limit would likely result in unacceptable post-fault recovery voltages which could result in the loss of the HVdc link and ultimately loss of ac power system stability in Newfoundland.
2. An export of 225 MW from Labrador over the LITL would result in an import of approximately 220 MW at Soldiers Pond. Preliminary load flow and transient stability analysis indicate that the import of 220 MW is acceptable for conditions where the Hydro Transmission System on the Island of Newfoundland is loaded in excess of 1250 MW.
3. For conditions where the Hydro Transmission System on the Island of Newfoundland is loaded below 1250 MW, import to the Island over the LIL should be limited in accordance with the following table which will prevent the shedding of loads set to trip at 58.0 Hz:

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Table 10-1 – Guideline for Maximum Unit Loading  
(as per Hydro Operating Instruction T-068)

System Generation	Maximum Unit Loading
816	175
794	170
772	167
750	162
728	157
706	152
684	146
662	142
640	137
618	134
596	130
574	124
552	120
530	115
508	111
486	106
464	101
442	97
420	92
398	87
376	83
354	78
332	73

It should be noted that the analysis described above is preliminary. It is recommended that results be confirmed and that a more comprehensive analysis be performed by Contractor during the final design stages of the LIL and during operational studies. Until confirmed by detailed studies, Contractor shall assume that a maximum of 175 MW can be transmitted over the HVdc link without units in Muskrat Falls or in Soldiers Pond.

Ultimately, during this phase of commissioning and testing, it is required that each component, sub-component and associated systems be energised and tested to their maximum ratings and/or most onerous operating condition(s), as permitted by the ac power system(s). It is also critical to prove that the HVdc systems provided function as they were designed to do so and that all supplied equipment meets or exceeds all requirements as specified. During this phase, it is also critical that Contractor verifies or benchmarks the simulation models used during the Factory Performance Testing as described in Section 8.5.3.

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Finally, tests to be performed as required by standards identified within Section 2.1 shall include, but not necessarily be limited to, the following (by mutual agreement some of these tests may be completed during the DCHP phase):

- Intertrips, interlocks, blocking/unblocking signals and trip test;
- dc system configuration and in operation – (bipolar, monopolar ground return, monopolar metallic return);
- High voltage energisation (converter busbar, filters busbar);
- ac filters and reactive power compensation energisation;
- Converter transformer energisation;
- Open line test (converter and converter-transmission line-cable, rectifier side and inverter side);
- Start and stop sequences;
- Steady state operation at minimum power transfer;
- Protective blocking and tripping sequences;
- Power and current ramping;
- Steady state operation test;
- Reactive power control (as loads permit);
- Overload test/temperature rise measurements (bipolar and monopolar configuration) (as loads permit);
- Harmonic performance and filter components rating (as loads permit);
- Tap changer control set;
- Rated to reduced voltage transfer;

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- dc – Switchgear operation – transferring power (bipolar, monopolar ground return, monopolar metallic return, pole isolate/connect, single electrode line operation);
- Online and offline cable switching activities;
- ac/dc auxiliary services changeover and/or failure;
- Main switching equipments (ac filters, dc filters (if required));
- Control function (operator control, remote control, remote access, local control);
- Dynamic performance testing (Step response);
- Control modes transfer (power control to current control, and others);
- Commutation failures (Induced);
- Electromagnetic compatibility;
- Audible noise (test in DCHP only);
- Electromagnetic interference;
- Electrode line protection test;
- Online and offline fault location accuracy test on HV lines and electrode line (as required);
- Loss of telecom, auxiliaries or redundant equipment;
- Ac power system interaction / control (frequency control, reactive power regulation, temporary overvoltage control);
- Round power/Loop Power/circulating-power tests (IEEE Standard 1378-1997 Section 9.3);
- Operation at minimum current;
- Power ceiling limiters;
- Sub-synchronous oscillation damping controls (if required);

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- Loss of ac-feed to converter (if required);
- Reduced Voltage operation;
- Loss of pole - power transfer functionality;
- Paralleling of overhead transmission lines during monopole operation; and
- All other performance testing necessary to prove that the HVdc system provided meets or exceeds all performance requirements as specified and as applicable to the load levels being transmitted.

Additionally, if possible, Contractor shall demonstrate the protection system performance by staged fault tests. Tests to be performed shall include, but not necessarily be limited to, the following:

- Fault within the pole differential zone
- Fault within the line differential zone (with/without telecommunications), including dc line faults, cable faults, and electrode line faults
- Fault on the ac power system side

Should Company be unable to arrange for any of the above staged faults for ac power system stability reasons, then Contractor shall demonstrate by alternate means the following performance parameters:

- d) Selectivity (correct identification of the zone under fault)
- e) Stability (correct protection sequence to clear the faulty zone)
- f) Reliability (main and backup system of the control and protection system are properly coordinated)

If possible, Contractor shall also demonstrate, in a similar manner as above, the correct protection performance of all protection functions including the following faults that cannot be staged:

- iii. Converter valve faults including flashover across a valve

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- iv. Fault to ground on secondary of converter transformer feeding highest voltage section of twelve pulse valve group

**14.6 Special Considerations**

It shall be noted that the ac parameters currently provided within the General Technical Requirements ( document No. ILK-SN-CD-8000-EL-DB-0002-01) are representative of the ac power system once the LCP project is fully commissioned and placed into service. For example, in Soldiers Pond, the minimum short circuit level for design purposes is 2,771MVA, which assumes that only one High Inertia Synchronous Condenser is in service at Soldiers Pond whereas in Muskrat Falls, the minimum short circuit level for design purposes is 2,730MVA, which assumes that three hydro units are online in Muskrat Falls and one 315 kV transmission line out of service between Muskrat Falls and Churchill Falls.

During commissioning, special consideration shall be given for the case where the HVdc system is placed into service before units are available at Muskrat Falls or at Soldiers Pond. During this operating condition (which could potentially last for a number of months during construction of the other assets affiliated with the LCP project and other Island upgrades) minimum short circuit levels at Muskrat Falls and Soldiers Pond are 1,560MVA and 1,984MVA, respectively. It should be noted that when operating at short circuit levels below those as specified in the General Technical Requirements document No. ILK-SN-CD-8000-EL-DB-0002-01, the control system response requirements as specified will be relaxed whilst ensuring that the HVdc link operates in a stable manner up to power dispatch levels equal to those tested to during DCLP. During this time, it is also recognized by Engineer that features such as the frequency controllers etc. will need to be tuned as required to ensure acceptable response with the rest of the system(s).

As a result, Contractor shall complete system studies as required to determine the impact of placing a filter or reactive bank in service when no rotating units are available in either MF or in SP to provide dynamic support. With limited reactive support available from the ac power system to maintain ac voltages, Contractor shall propose for Engineer review and Acceptance a plan to commission each bank and to operate the converter without exceeding maximum acceptable voltage levels at any locations within the respective ac power system. It should be noted that when operating at short circuit levels below those as specified in the General Technical Requirements document No. ILK-SN-CD-8000-EL-DB-0002-01, higher than normal voltages could be experienced at the Muskrat Falls bus when

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filters are placed online. If deemed necessary, any additional equipment (such as reactor, etc.) required to keep voltages within acceptable maximum limits to allow for energisation of the individual filters, shall be handled as a Change.

Also, without dynamic support available in MF, the Labrador converter station would be connected to Churchill Falls through two 315kV ac transmission lines. In the event that one of these lines are out of service for maintenance and the second line experienced a single pole reclose, higher than specified negative sequence levels would be experienced. This could potentially require increased ac filter ratings at the MF converter station to account for higher 3<sup>rd</sup> harmonic. If required, this would be considered outside the design requirements specified and shall be handled as a Change. It should also be noted that under this circumstance, other alternative operational strategies (such as blocking single pole reclosing on the 315kV ac line or blocking the converters) may be considered by Company.

In addition, special consideration is required to identify the impact to the harmonic impedance study resulting from the contingencies associated with the special conditions of low short circuit levels discussed above. Any adverse implications on the harmonic impedance search areas specified due to the special conditions of low short circuit levels discussed above shall be evaluated by Engineer during detail design and if required, handled as a Change.

**14.7 Completion**

Contractor shall submit to the Engineer the completed Specification Compliance Sign Off List (SCL) upon the successful Dynamic Commissioning at Low Power (DCLP). The SCL shall be signed by Contractor, Engineer and the RFO and shall include a note that further verification and testing is required during the DCHP phase. It shall also include the maximum power level that the converters have been proven to reliably transmit.

Also, Contractor shall submit an updated Turnover and Commissioning Package (TCP) to the Engineer upon the successful Dynamic Commissioning at Low Power (DCLP). The updated TCP shall include any changes accepted by Engineer that were made to any of the testing procedures or equipment requirements during the DCLP phase.

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## 15 TRIAL OPERATION AT LOW POWER

### 15.1 General

The Trial Operation at Low Power is the testing phase prior to Substantial Completion and issuance of the first Turnover Acceptance Certificate (TOC) following successful completion of the Trial Operation at Low Power.

Its purpose is to allow Company to evaluate the system operating in its typical mode of operation and environment at loads up to maximum load tested to during DCLP.

The care and custody of the equipment, system and facility remain with Contractor, until Substantial Completion while any arising isolations requiring worker protection will be completed under the jurisdiction of Company's WPC through Contractor requested RFO coordination.

### 15.2 Documentation Required

Prior to starting this activity, Contractor shall submit, for Engineer's review and Acceptance, the following documentation:

- Completed Commissioning Procedure (CPR);
- Turnover and Commissioning Package (TCP);
- Work Protection Code (WPC) forms closed;
- Up-to-date 'as built' drawings;
- All reports (as described in Section 6.2) that detail failure/abnormal operation events;
- Documentation showing Punch list "B" items are cleared (Punch List "A" items have been cleared since before Dynamic Commissioning);
- If necessary, certain Punch List "B" items may be carried through this phase, providing written agreement from Company is obtained and a date for the clearance is provided.

All required documentation listed above shall be made available by Contractor during the phase, if requested.

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**15.3 Scheduling**

The Trial Operation at Low Power period shall begin directly following the successful completion of the DCLP phase. Any delay in the start of Trial Operation shall be notified by Company and handled in accordance with the Articles. Upon the start of this phase, Contractor shall successfully demonstrate Trial Operations of the system during a period of not less than 30 consecutive days. To allow for field tuning, calibration and/or adjustments of the system Contractor shall be permitted 90 days to complete this demonstration. It should however be noted that any field modification and/or adjustment performed during this testing phase may result in further quality, CSC and/or DC testing and commissioning checks.

**15.4 Successful Trial Operation Defined**

Trial Operation at Low Power shall be a 90 days period where during this period, an uninterrupted period of normal operation of not less than 30 days is required, during which the all equipment and facilities provided in this package shall be fully operational up to maximum power transfer levels proven during the DCLP phase. Should the Trial Operation be interrupted by any action which is not expected, planned or coordinated then the Trial Operation shall be repeated as required. Interruptions outside of Contractor control attributable to connecting ac power system requirements shall not be considered as an interruption to the trial operation.

The Trial Operation at Low Power shall demonstrate the following:

- The system provided by Contractor meets or exceeds the requirements as specified in the document No. ILK-SN-CD-8000-EL-DC-0001-01 "Performance Requirements" (noting that some requirements may not be met as described in section 11.6, some requirements may require high power and the availability and reliability performance shall be demonstrated during the Performance Guarantee Assessment Period);
- No main circuit equipment malfunctions or faults;
- No stall or malfunction of RTUs or input/output modules;
- No Contractor supplied communication equipment malfunctions;
- No ac and dc protection malfunctions;

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- Stable operation for all system configurations and operation modes;
- No failure or malfunction of SCADA equipment;
- No failures or major alarms of any kind;
- No functional, system and/or operational limitation or issue;
- No event that requires any type of manual intervention from operators.

**15.5 Mitigation Measures Resulting from an Unsuccessful Trial Operation Period**

If Contractor is unable to demonstrate a successful Trial Operation in the permitted 3 month window, for any reason, there will be a formal and documented design review process completed by Contractor, at no additional cost to Company.

The resulting analysis shall be delivered formally as a presented report to Engineer for review and Acceptance, within 5 calendar days of the final failed Trial Operation attempt. This analysis will include and/or address, as a minimum, the following:

- General system operational overview;
- General review all MC, CSC, and DC testing results;
- All Trial Operations events noticed;
- All results deemed successful;
- All results deemed unsuccessful;
- Root cause analysis of the issue(s);
- Available mitigation options and pros/cons of each option;
- Detailed risk assessment of the above options, with specific attention paid to any work resulting in retesting and/or re-commissioning activities;
- Detailed mitigation plan outlining Contractor recommended option to correct the issue(s), including the following:

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- o Scope of Work to implement changes required;
- o Detailed schedule to design, document, implement, and test changes and re-test effected equipment and/or subsystems;
- o Resource required to implement Work;
- o Changes in any quality and/or performance specifications; and
- o Estimated duration of any outages required to complete the Work.

**15.6 Testing Results and Reports**

Any failure or abnormal event during Trial Operation at Low Power shall be reported to Engineer, Company Representative and to the RFO who will be in continuous contact with representatives at the ECC/BCC as required. Section 6.2 of this Specification is also applicable.

**16 TURNOVER ACCEPTANCE AT LOW POWER**

Once the Trial Operation at Low Power has been successfully completed, Contractor shall submit a request for the Turnover Acceptance Certificate (TOC) For Low Power to be issued by Company. At this stage all commissioning spare parts shall be re-stocked (or a plan shall be in place to restock within acceptable timeframes), all final documentation submitted, and site restored for normal operations (except for equipment, facilities etc. that have been Accepted to by Engineer as being required for the DCHP phase).

Turnover Acceptance shall be the formal transfer of documentation and responsibility for the operation and maintenance of the complete HVdc system and associated facilities as defined on the Turnover Acceptance Certificate.

The Turnover Acceptance Certificate (TOC) For Low Power shall address, but shall not be limited to, the following subjects:

5. All pertinent documentation shall be included, but not limited to;
  - a. The Accepted complete QA/QC documentation packages;
  - b. All Accepted testing and commissioning documentation identified within this specification;

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- c. The final 'As Built' drawings, equipment specifications, and other required project documentation;
  - d. The history docket with current Punch List, Preservation records, Interface management plan and record, change management procedures and records, equipment id and tagging indexes;
  - e. The Operations and Maintenance manual with all required information to run and maintain the system (i.e. start up procedures, preventative maintenance procedures and intervals, recommended spares, etc.);
  - f. Backup 'As Built' electronic copies of all software files, programs, models, simulation software, logic files, etc. that are running on equipment provided in this package;
6. Transfer of documents as per latest Supplier Document Register (SDRL Item A01);
  7. Transfer of spare parts from Contractor to Company with Preservation procedures applied to idle equipment and spare parts;
  8. Transfer of keys, permits, authorisations, native software application files, licences, etc.;
  9. Punch List with remaining Work that shall be performed during Warranty period, this list shall be agreed between Engineer and Contractor.

**17 BURN-IN PERIOD (IF REQUIRED)**

Once the Turnover Acceptance Certificate (TOC) For Low Power has been signed by Engineer, Contractor shall be granted a period of up to a maximum of ninety (90) days to allow for equipment Burn-In. It should be noted that in the event that the Dynamic Commissioning at High Power commissioning phase begins before this period ends, the Burn-In period shall end at the start of the Dynamic Commissioning at High Power commissioning phase.

Once this Burn-In period is complete, the Performance Guarantee Assessment Period as defined within the Articles and as further described within document No. ILK-SN-CD-8000-EL-DC-0001-01 "Performance Requirements" shall begin. Also, once this Burn-In period is complete, the HVdc Link will continue to be dispatched as required, at loads up to those tested to during DCLP, by Company to supply energy to the Island ac power system.

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**18 DYNAMIC COMMISSIONING AT HIGH POWER (DCHP)**

**18.1 General**

After the HVdc link and associated equipment has been successfully proven at power levels below 175-225MW (i.e. maximum load tested to during DCLP), the next mode of testing would involve transmission of up to maximum rated power, including overloads, from Labrador, through the LIL into the island ac power system. This mode of operation is intended to allow final testing and commissioning of the entire HVdc link (including the integrated system), assumes power levels up to 900MW are available to be transmitted and that short circuit levels of the system(s) are as specified in the General Technical Requirements document No. ILK-SN-CD-8000-EL-DB-0002-01. Before transmitting power above the low power limitations described previously in the Section 11, it is assumed that all components of the HVdc system have been thoroughly tested and proven and that all testing that could have been done during a previous testing phase has been completed with satisfactory results. It also assumes that the cable switching operations and that the loss of pole - power transfer operability has been adequately tested and proven. Finally, it assumes that before entering this phase of commissioning, that the system and HVdc models used during FAT testing (RTDS, PSCAD, PSS/E) have been benchmarked or verified and that similar system responses have been observed during the low power testing phase.

Other general description and requirements as detailed in Section 11.1 are also applicable.

**18.2 Documentation Required**

Prior to starting this activity, Contractor shall submit, for Engineer's review and Acceptance, all applicable documentation as stated in Section 11.2 in addition to the following:

- Dynamic Commissioning at Low Power (DCLP) commissioning report;
- Signed Specification Compliance Sign Off List (SCL) from DCLP; and
- Updated Turnover and Commissioning Package (TCP) from DCLP.

All required documentation listed above shall be made available to Engineer by Contractor during the testing, if requested.

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**18.3 Quality Control**

Contractor shall adhere to the requirements of Exhibit 7 "Quality Requirements".

**18.4 Testing Results and Reports**

As described in section 11.4.

**18.5 Requirements**

During the course of Dynamic Commissioning at High Power (DCHP), it is expected that each component be tested to their maximum ratings and/or most onerous operating condition(s), unless limited to do so by the capabilities of the ac power system(s). It is also critical to prove that the HVdc system supplied meets all requirements and power ratings as specified.

During the high power testing phase, Contractor, in conjunction with the RFO, shall always ensure that ac power system stability is never placed at undue risk. This means that when operating at loads beyond those that could result in loss of stability of the island ac power system, that the other pole shall always be in service (and ready to take over power transfer in the event of a pole trip) and that all redundant components shall be in service such that no single contingency will result in the loss of more than one pole or cable. It shall also be required that all testing to be completed during this phase be previously proven using offline testing methods such as FPT or DPT to verify expected system responses. If at any time the responses differ from what is expected, Contractor shall investigate to confirm the reason for the discrepancy before continuing with further testing.

During this phase of commissioning, it is required that Contractor provide a thorough Commissioning Plan and detailed schedule to the RFO in order to ensure that the ac power system is available and properly configured to support such testing. During this phase, it is also to be expected by Contractor that additional integrated system testing will be required to ensure the entire system (including components and other systems that have not been provided by Contractor) function as they are intended. Contractor is expected to fully support these commissioning requirements where appropriate to do so. Integrated system commissioning will be led by the RFO in conjunction with Contractor as required.

All other requirements and specific tests required as detailed in section 11.5 are also applicable. However, it should be noted that there is no need to repeat specific tests that have been previously

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proven during Dynamic Commissioning at Low Power (DCLP) unless differing results could be expected due to the increased loads available during this phase.

During this phase, it is also critical that Contractor analyse and test the interaction of the LIL HVdc link with the Maritime HVdc Link. Testing during this phase shall include any testing necessary to prove the operability of the system with both links in service and the associated run-up and run-back functions associated with each link.

Other general description and requirements as detailed in Section 11.5 are also applicable.

**18.6 Completion**

Contractor shall submit to the Engineer the completed final Specification Compliance Sign Off List (SCL) upon the successful Dynamic Commissioning at High Power (DCHP). The SCL shall be signed by Contractor, Company Representative and the RFO.

Also, Contractor shall submit to the Engineer an updated Turnover and Commissioning Package (TCP) upon the successful Dynamic Commissioning at High Power (DCHP). The final TCP shall be updated to reflect any changes that were made to any of the testing procedures or equipment requirements during the DCHP phase.

**19 TRIAL OPERATION AT HIGH POWER**

**19.1 General**

The Trial Operation at High Power is the final testing phase prior to the issuance of the second Turnover Acceptance Certificate (TOC) following successful completion of the Trial Operation at High Power.

Its purpose is to allow Company to evaluate the system operating in its typical mode of operation and environment at loads up to maximum rated (including overloads).

The care, custody and control of the equipment, system and facility shall be with the RFO. It is however expected that Contractor provide on-site support, as required, during this phase.

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**19.2 Documentation Required**

Prior to starting this activity, Contractor shall submit, for Engineer’s review and Acceptance, all applicable documentation as stated in section 12.2 in addition to the following:

- Turnover Acceptance Certificate For Low Power
- Validated RTDS, PSCAD and PSS/E models.

All required documentation listed above shall be made available to the Engineer by Contractor during the testing, if requested.

**19.3 Scheduling**

The Trial Operation at High Power period shall begin directly following the successful completion of the DCHP phase. Any delay in the start of Trial Operation shall be notified by Company and handled in accordance with the Articles. Upon the start of this phase, Contractor shall successfully demonstrate Trial Operations of the system during a period of not less than 30 consecutive days. To allow for field tuning, calibration and/or adjustments of the system Contractor shall be permitted 90 days to complete this demonstration. It should however be noted that any field modification and/or adjustment performed during this testing phase shall remain to be governed and controlled by Contractor’s Change Control Program, and may result in further quality, CSC and/or DC testing and commissioning checks.

**19.4 Successful Trial Operation Defined**

Trial Operation at High Power shall be a 90 day period where during this period, an uninterrupted period of normal operation of not less than 30 days is required, during which the all equipment and facilities provided in this package shall be fully operational up to maximum rated power including overloads. Should the Trial Operation be interrupted by any action which is not expected, planned or coordinated then the Trial Operation shall be repeated as required. Interruptions outside of Contractor control attributable to connecting ac power system requirements shall not be considered as an interruption to the Trial Operation.

The Trial Operation at High Power shall demonstrate the following:

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- The system provided by Contractor meets or exceeds the requirements as specified in the document No. ILK-SN-CD-8000-EL-DC-0001-01 "Performance Requirements". (noting that the availability and reliability performance shall be demonstrated during the Performance Guarantee Assessment Period);
- No main circuit equipment malfunctions or faults;
- No stall or malfunction of RTUs or input/output modules;
- No Contractor supplied communication equipment malfunctions;
- No ac and dc protection malfunctions;
- Stable operation for all system configurations and operation modes;
- No failure or malfunction of SCADA equipment;
- No failures or major alarms of any kind;
- No functional, system and/or operational limitation or issue; and
- No event that requires any type of manual intervention from operators.

**19.5 Mitigation Measures Resulting from an Unsuccessful Trial Operation Period**

As described in section 12.5.

**19.6 Testing Results and Reports**

Any failure or abnormal event during Trial Operation at High Power shall be reported to Company Representative and to the RFO who will be in continuous contact with representatives at the ECC/BCC as required. Section 6.2 of this Specification is also applicable.

**20 TURNOVER ACCEPTANCE AT HIGH POWER**

Once the Trial Operation at High Power has been successfully completed, Contractor shall submit a request for the Turnover Acceptance Certificate (TOC) For High Power to be issued by Engineer. At this stage all commissioning spare parts shall be re-stocked (or a plan shall be in place to restock within acceptable timeframes), all final documentation submitted, and site restored for normal operations.

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Turnover Acceptance shall be the formal transfer of documentation and responsibility for the operation and maintenance of the complete HVdc system and associated facilities as defined on the Turnover Acceptance Certificate.

The Turnover Acceptance Certificate (TOC) For High Power shall address, but shall not be limited to, the same items identified in section 13.

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**APPENDIX A**  
**Special Tests**

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**Special Tests for HVdc Systems**

Contractor shall implement the following tests in order to verify the static characteristic of the rectifier and inverter side of the HVdc controllers. The static characteristic shown below is only a typical characteristic; the supplier shall use for this purpose the final characteristic results from the design. The scheme shown herein is intended to provide only a guideline, and not a design criterion.

The following are the special tests to be considered:

- a. Special Test 1: Controller Characteristic – Rectifier side (Control Ignition Angle, I<sub>dc</sub>-control, VDCOL, I<sub>dc</sub>-min, Alpha-min).
- b. Special Test 2: Controller Characteristic – Inverter side (Gamma constant control, I<sub>dc</sub>-control, VDCOL, I<sub>dc</sub>-min).

**Special Test 1**: Controller Characteristic – Rectifier side (Control Ignition Angle, I<sub>dc</sub>-control, VDCOL, I<sub>dc</sub>-min, Alpha-min).

The purpose of the test is to verify the static characteristic of the rectifier side. The dc voltage in the inverter side shall be kept fix for any point to be recorded and changed for the other point on the static characteristic defined as Ed1, Ed2, Ed3, Ed4, Ed5, Ed6, and Ed7. The reactive power and harmonic level must be considered carefully during the test. This test verifies the alpha minimum characteristic, the I<sub>dc</sub>-control performance, the VDCOL characteristic, I<sub>dc</sub>-MIN characteristic and control modes transfer.

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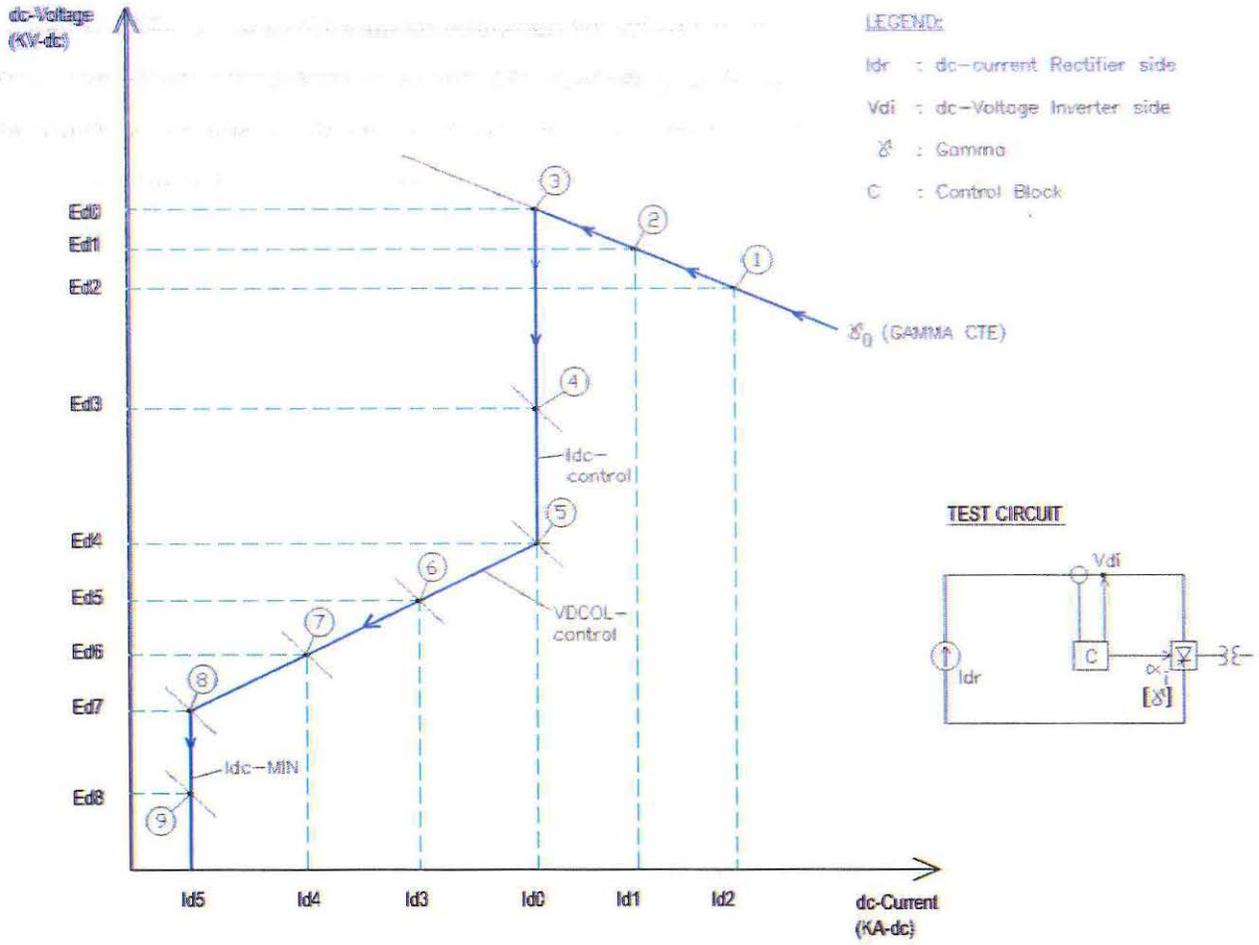
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**Special Test 2:** Controller Characteristic – Inverter side (Gamma constant control, Idc-control, VDCOL, Idc-min).

The purpose of the test is to verify the static characteristic of the inverter side. The dc current in the rectifier side shall be kept fixed for any point to be recorded and changed for the other point on the static characteristic defined as Id0, Id1, Id2, Id3, Id4, and Id5. The reactive power and harmonic level must be considered carefully during the test. This test verified the gamma constant characteristic, the Idc-control performance, the VDCOL characteristic and Idc-MIN characteristic and control modes transfer.

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**Scheme A-2: Static Characteristic of Inverter Side of HVdc System**

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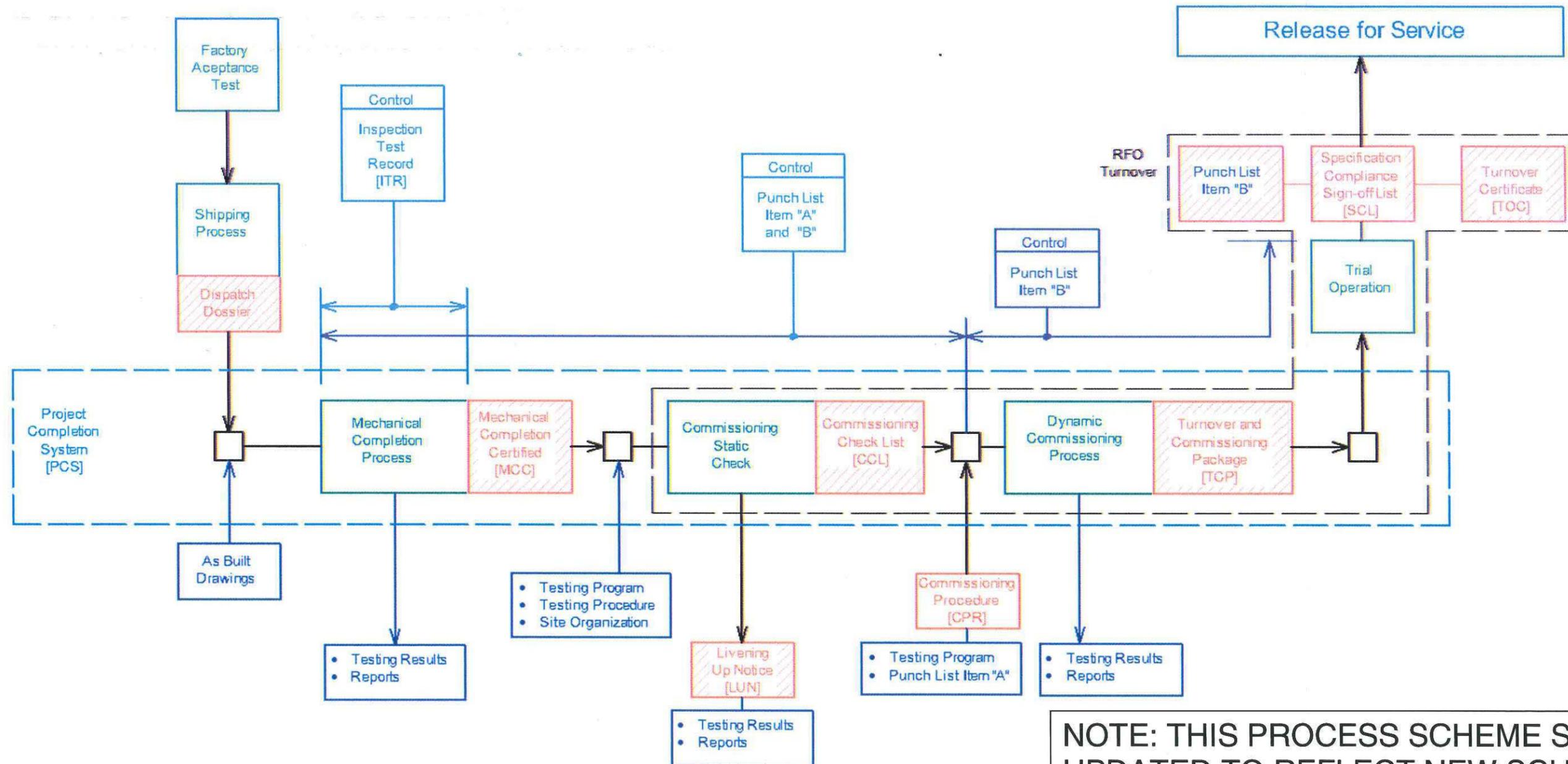
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**APPENDIX B**

**Testing and Commissioning Process Scheme**

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**NOTE: THIS PROCESS SCHEME SHALL BE UPDATED TO REFLECT NEW SCHEME DESCRIBED WITHIN THIS DOCUMENT AND WILL BE PROVIDED LATER.**

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**APPENDIX C**

**Electromechanical Equipment Inspection and Tests**

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Item	Individual Equipment to be Tested at Site as per Manufacturer's Recommendation	Additional Tests to be Considered
<b>1 Valve Hall</b>		
1.1	Thyristor Valve Units	Coolant hydraulic pressure tests Individual thyristor level tests inc. interface to control system
1.2	Earth Switches	Measure resistance of main contacts
1.3	Busbar and Connectors	Joint resistance measurements
1.4	dc Surge Arrester	Test external insulation
1.5	Fibre Optics	Fibre optic loss measurements
1.7	Cooling Plant	Pressure tests; leakage tests; motor tests; running tests; water conductivity measurements
1.8	Ground Fault Detector	Check settings by current injection
1.9	HV Bushing (Tap)	Test external insulation with insulation power factor test and capacitance measurement
1.10	dc Bushing (HV And Neutral)	Test external insulation with insulation power factor test
<b>2 Control And Protection System</b>		
2.1	Control System	Test I/O (including spares) from source to destination Functional tests
2.2	Transient Fault Recorder	Test all channels and triggering
2.3	Protective Relay	Test communication channels and tripping according to the protection function Test I/O from source to destination Functional tests (current injection); stability test for differential protection; secondary injection from ct terminal block (readings)
2.4	Energy Meters	Test communication channels Functional tests (voltage and current injection)
2.5	Telecommunications System	
2.6	Fault Locator	Functional tests (voltage and current injection)
2.7	Sequence of Events	Test channels and triggering
<b>3 Auxiliary Services</b>		
3.1	MV Disconnect Switches	Test insulation
3.2	Ground Switches	Check MV terminals and tightening Measure resistance of main contacts
3.3	MV Circuit Breakers	Measure the resistance of main contacts Test insulation

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3.4	MV Power Cables	Measure resistance, inductance and capacitance Test cable insulation with Megger ac testing at nominal voltage for 24 Hrs
3.5	Emergency Generator Sets	Emergency generator set will include tests of motor and generator protection system and manual and automatic control Speed/frequency at no-load and on-load charge Voltage regulation at no-load and on-load charge Electrical protection tests (over-current, differential, frequency, etc.) Mechanical protection tests (over-speed, temperature, oil low pressure, vibration, etc.) Record at no-load frequency, voltage, oil pressure, temperature
3.6	Batteries	Test of Ah capacity for 10 hours. An Ah-versus-time chart will be recorded Check electrolyte level and density
3.7	Battery Chargers	Test all alarms outputs by faults simulation
<b>4 ac Switchgear</b>		
4.1	Ground Grid	The resistance of converter station grounding grid will be measured in order to verify the compliance with calculated values. If the measured value of the grid resistance is higher than specified values, Contractor shall take actions to reduce this resistance to specified or calculated values. The following parameters will be calculated and/or measured: Grid resistance Touch voltage Step voltage Mesh voltage
4.2	Flexible, Rigid Buses and Shielding	Check clearances, supports, sag, etc. (values shall be corrected for temperature) Test insulation Check material compatibility of connector
4.3	HV Disconnect Switches	Test insulation
4.4	Ground Switches	Measure resistance of main contacts
4.5	HV Circuit Breakers	Test insulation
4.6	Converter Transformers	Record vacuum drying and oil tests during filling Re-check oil sample Test relay Buchholtz (injection of high pressure gas) Test insulation with insulation power factor test; measure capacitance value.
4.7	Current Transformers	Test magnetisation curves (of all CT's); and others typical

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	<b>TESTING AND COMMISSIONING</b> <b>Engineering Technical Specification</b>	Revision		
	Nalcor Doc. No. ILK-SN-CD-8000-EL-TS-0013-01	D1	Date	Page
	SLI Doc. No. 505573-8000-47ES-9000	02	13-Jun-2014	C-3

		parameter for Class: TPS, TPX, TPY, TPZ.
4.8	Voltage Transformers	Capacitances measurement
4.9	ac Surge Arresters (HV and MV)	Test external insulation
4.10	ac Filters	Test insulation resistance; Measure capacitance, reactance, resistance value of each element and record serial numbers Impedance Vs Frequency curve
4.11	Plc Filters	Check the condition of resistor, capacitor, coupling box Measure reactor value Measure capacitance value of each capacitor and record serial numbers
4.12	Lighting (Outdoor and Emergency)	Check illumination levels as per specifications.

**5 dc Switchgear**

5.1	dc Disconnecter Switches	Measure resistance of main contacts Test insulation
5.2	dc Earthing Switches	Set and test interlock device Measure resistance of main contacts
5.3	Metallic Return Transfer Breaker (MRTB)	Measure the resistance of main contacts Test insulation capacitance, reactance, resistance values
5.4	Ground Grid	The resistance of converter station grounding grid will be measured in order to verify the compliance with calculated values. If the measured value of the grid resistance is higher than specified values, Contractor shall take actions to reduce this resistance to specified or calculated values. The following parameters will be calculated and/or measured: Grid resistance Touch voltage Step voltage Mesh voltage
5.5	dc Voltage Divider	Check installation, grounding, type, ratings, etc., as per nameplate, drawings and specifications Check conditions and tightening of primary terminals Test ratio
5.6	dc Surge Arrester (HV, Neutral)	Test external insulation
5.7	dc Filters	Test insulation resistance Measure capacitance, reactance, resistance values of each element and record serial numbers Impedance vs. frequency curve

**6 Fire Protection**

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 <b>SNC-LAVALIN</b>	<b>TESTING AND COMMISSIONING</b>		<b>Revision</b>		
	<b>Engineering Technical Specification</b>				
	Nalcor Doc. No. ILK-SN-CD-8000-EL-TS-0013-01		D1	Date	Page
SLI Doc. No. 505573-8000-47ES-9000		02	13-Jun-2014	C-4	

**7 Transition Compound**

7.1	dc Disconnect Switches	Measure resistance of main contacts Test insulation
7.2	dc Earthing Switches	Measure resistance of main contacts Test insulation
7.3	High Speed Switches	Measure resistance of main contacts Test insulation

**8 Transition Compound**

		The resistance of converter station grounding grid will be measured in order to verify the compliance with calculated values. If the measured value of the grid resistance is higher than specified values, Contractor shall take actions to reduce this resistance to specified or calculated values.
8.1	Ground Grid	The following parameters will be calculated and/or measured: Grid resistance Touch voltage Step voltage Mesh voltage
8.2	dc Surge Arrester (HV, Neutral)	Test external insulation

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**Attachment I**  
**Performance Requirements**

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2

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### "Phased Approach" High Level Performance Requirements

These Phased Approach performance requirements are meant to create the Performance Requirements for Pole 1 operation. Performance Requirements shall come into effect as soon as the Bipole Dynamic Commissioning Complete milestone is reached pursuant to Exhibit 9, as that Exhibit is revised in this Amendment.

All other performance requirements not detailed below remain as per the Agreement.

Contractor shall design, supply, install and commission the necessary equipment to satisfy the following performance requirements for the Phased Approach:

- i. During Pole 1 Operation the system shall be capable of reliably transmitting up to 225MW (measured at Muskrat Falls dc transmission line terminals), at approximately +350 kV.
- ii. All performance and ratings requirements as specified in the Performance Requirements shall be met for the short circuit levels as currently specified in document no. ILK-SN-CD-8000-EL-DB-0002-01 "General Technical Requirements", including associated Engineering Change Notices. Except that the exclusions and dispensations detailed in section 11.6 of document no. ILK-SN-CD-8000-EL-TS-0013-01 shall remain applicable to the performance during operation under conditions of "special considerations", i.e. the reduced levels of 1625MVA in MFA and 2237MVA in SOP. For this Phased Approach and the conditions of "special considerations", the Contractor and Company shall work as follows.
  - a. During factory dynamic performance testing (FAT), Contractor shall demonstrate that all ac and dc fault recovery performance is reasonably met for conditions of special considerations during monopole operation with HVdc power transfers up to 225MW. If the recovery performance is far from the requirement, then the Contractor shall then demonstrate the ac and dc fault performance that can be achieved at all minimum short circuits levels during monopole operations with HVdc power transfers up to 900MW. The purpose of this requirement is to prove that the system being installed meets specification requirements when the short circuit levels are within the specified levels and deviations to the specified performance are attributed only to the reduced short circuit levels associated with special considerations.
  - b. If the results of the Contractors' study programme (offline and online using PSSE, PSCAD, and RTDS) for these conditions of "special considerations" show any responses that are not in accordance with the specified performance requirements, Contractor shall arrange for a review with Company to determine if any of these responses can be accepted or to consider what other alternatives are available. This review will also consider whether any mutually agreed improvements can reasonably be made given both the functional constraints associated with this type of work and the time constraints of the agreed project schedule.

iii. Harmonic performance and rating requirements during Pole 1 Operation:

- a. It must be reminded that the ac filter design already exists and is based on the short circuit and operation requirements as per the contract. Contractor therefore must conduct an assessment of the performance and rating (including the revised background distortions given in item iv) based on these special considerations and the above already known constraints.
- b. If redundant ac filter sub-banks are installed, then all harmonic performance requirements as specified in the Performance Requirements shall be evaluated and rating requirements as specified in the Performance Requirements shall be met with any one redundant filter out of service.

If redundant ac filter sub-banks are not installed, then all harmonic performance and rating requirements as specified in the Performance Requirements shall be evaluated with all ac filter sub-banks installed available in service. If harmonic performance and / or rating requirements as specified in the Performance Requirements cannot be met, Contractor shall identify the conditions under which these cannot be met, the level of harmonic performance and rating violation, and identify the HVdc power transfer level at which harmonic performance and harmonic rating requirements are met. If harmonic performance and / or rating requirements cannot be met with one ac filter sub-bank out of service, Contractor shall consider an automatic HVdc power run-back to a level which can be adjusted by Company. This and other feasible technical alternatives, including allowing the specified harmonic performance to be exceeded, shall be reviewed and mutually agreed upon by Contractor and Company once the results of the ac filter performance and rating studies are available and considering what can reasonably be achieved given both the functional constraints and the time constraints of the agreed project schedule.

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- iv. AC filters shall be rated according to existing criteria specified in the originally agreed Performance Requirements. However, during Pole 1 operation, background harmonic levels at each Converter Station shall be adjusted, for ac filter rating purposes only, as follows:

Harmonic Number	Muskrat Falls Converter Station		Soldiers Pond Converter Station	
	Currently Specified Levels	Background Levels to be used for Phased Approach ac Filter Ratings	Currently Specified Levels	Background Levels to be used for Phased Approach ac Filter Ratings
2	1.00	0.24	1.50	0.04
3	0.80	0.84	2.00	2.12
4	0.50	0.12	1.00	0.16
5	1.00	0.5	2.00	2.84
6	0.20	0.08	0.50	0.06
7	1.00	0.32	2.00	1.04
8	0.20	0.04	0.40	0.02
9	0.50	0.08	1.00	0.4
10	0.20	0.06	0.40	0
11	0.80	0.12	1.50	0.2
12	0.20	0.04	0.30	0
13	0.80	0.18	1.50	0.72
14	0.20	0.04	0.30	0.02
15	0.30	0.02	0.80	0.02
16	0.20	0.02	0.30	0.02
17	0.50	0.08	1.00	0.1
18	0.20	0.04	0.30	0.02
19	0.50	0.06	1.00	0.06
20	0.20	0.02	0.30	0.02
21	0.20	0.02	0.50	0.02
22	0.20	0.04	0.30	0
23	0.30	0.04	0.70	0.1
24	0.20	0.02	0.30	0.02
25	0.30	0.04	0.70	0.14
26	0.20	0.02	0.30	0
27	0.20	0.02	0.20	0.02
28	0.20	0.02	0.30	0
29	1.00	0.02	0.60	0.04
30	0.20	0.02	0.30	0
31	0.90	0.02	0.60	0.02
32	0.20	0	0.30	0
33	0.20	0.02	0.20	0
34	0.20	0.02	0.30	0
35	0.80	0.02	0.60	0.02
36	0.20	0	0.30	0
37	0.80	0.02	0.50	0.02
38	0.20	0	0.30	0
39	0.20	0	0.20	0
40	0.20	0	0.30	0
41	0.70	0.02	0.50	0.02
42	0.20	0	0.30	0
43	0.70	0	0.50	0
44	0.20	0	0.30	0
45	0.20	0	0.20	0
46	0.20	0	0.30	0
47	0.60	0	0.50	0
48	0.20	0	0.30	0
49	0.60	0.02	0.50	0
50	0.20	0	0.30	0

- v. During Pole 1 operation, the HVdc controls shall provide reliable and stable power transmission. In addition they shall help stabilise the ac system response following disturbances on the dc and ac systems as far as can reasonably be achieved as set-out in item ii above.
- vi. The HVdc controls shall be provided with a (Priority 1) continuous reduced dc voltage operating mode that allows for operation at a selectable voltage level from 100% down to 80% of nominal dc voltage. Contractor shall provide this as an operating mode that is only selectable whilst the scheme

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is off-line. Contractor shall identify the dc voltage level and corresponding power transfer levels that can be accommodated while ensuring that all harmonic performance and rating criteria are met based on the number of available ac filter sub-banks. Implementation of an online sequence that allows for operation at a reduced dc voltage adjustable in the range from 80% to 100% of nominal without the need to block shall be a Priority 2 item.

- vii. During Pole 1 operation, Contractor shall identify the voltage change on switching. If the voltage change on switching criteria in the Performance Requirements cannot be met under all ac system short circuit levels including those of special considerations, Contractor shall identify the ac system short circuit levels at which the criteria can be met. Contractor shall ensure stable operation at all short circuit levels down to, and including those of special considerations.
- viii. During Pole 1 operation, the reliability and availability of the complete Monopole shall be guaranteed by Contractor. The period over which the guarantees are to be in effect shall be referred to as the "Pole 1 Operation, Phased Approach Performance Guarantee Assessment Period". This period shall commence after the successful completion of trial operation and shall continue until the beginning of Bipole Dynamic Commissioning at Low Power. The operation of the monopole will be continuously monitored during the Pole 1 Phased Approach Performance Guarantee Assessment Period to determine whether it meets the guarantees.

During the Pole 1 Phased Approach Performance Guarantee Assessment Period:

- a. Scheduled outages, above and beyond those specifically approved by the Company, shall not be permitted, except for those scheduled outages required for the commissioning of Pole 2 ( where Pole 1 must be off) and for the purpose of integration of Pole 1 and Pole 2 to form a Bipole scheme.
- b. Contractor shall guarantee that the following reliability and availability criteria, using definitions and criteria as currently defined within the existing Specifications, will be met:

Parameter	Maximum Permissible Design Value
Pole Forced Outage Rate	≤ 8.0 per pole per year
Forced Energy Unavailability	≤ 2.25% per year <sup>1</sup>

Note 1 – Calculated assuming a maximum continuous capacity (Pm) of 225MW during Pole 1 Phased Approach Performance Guarantee Assessment Period.

- c. If the number of forced outage occurrences or the forced energy unavailability calculated over the Pole 1 Phased Approach Performance Guarantee Assessment Period, proves at any time throughout the period to be above the guaranteed values, Contractor shall correct all design deficiencies and equipment defects at no cost to Company.

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**Attachment J**  
**Milestone Payment Schedule**  
**CD0501**

Agreement No.: CD0501 Amendment No.:5  
Agreement No.: CD0502 Amendment No.:2

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EXHIBIT 2 - APPENDIX A2

CD0501-001 MILESTONE PAYMENT SCHEDULE

Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
1.01 – 1.04	Overall	24,090,308		0	0	Engineering deliverables including: 1) Engineering Studies; 2) Detailed Engineering including As-Builts; 3) Engineering FAT Tests and 4) Engineering Documentation (as per SDR)	<p>Progressed using the following rules of credit:</p> <ul style="list-style-type: none"> <li>a) 50% upon 1<sup>st</sup> submission of document by Contractor to Company</li> <li>b) 20% upon 2<sup>nd</sup> submission of document by Contractor to Company (if required)</li> <li>c) Remaining amount of document payment upon Accepted by Company</li> </ul> <p>Payment to a maximum of 90% of combined Line Item Values. Balance upon Approval by Company of ALL engineering deliverables.</p>	<p>Supplier Document Register submitted with each invoice, noting status of each deliverable. Payment on individual Line Item Value:</p> <ul style="list-style-type: none"> <li>a) Milestone achieved when document received by Company for first time</li> <li>b) Milestone achieved when document received by Company for second time</li> <li>c) Milestone achieved when document returned Accepted by Company</li> </ul>
1.05 – 1.08	Overall	12,889,264	167,844	0	0	Project Management and Controls, QA/QC, HSE and Mobilization/Demobilization (St. John's Office)	<p>For CAD: \$592,488 payable in 3 equal instalments for the first 3 months. The remaining amount at 1.634% (based upon 55 months duration July 2014 to January 2019) of remaining Line Items Value per calendar month.</p> <p>For GBP: Full amount payable in 3 equal instalments for the first 3 months</p>	<p>Payment on total value of all Line Item Values. Payable per calendar month upon the later of the Effective Date or Contract Execution</p>
1.10	Overall	99,464	0	0	0	Training	<p>100% payment upon completion of Item scope of work</p>	<p>Milestone achieved at Completion of scope of work as described in Exhibit 1 Scope of Work, Section 2.7</p>
1.11	Overall	636,197	0	0	0	Operation and Maintenance	<p>8.33% (based upon 12 months duration) of Line Item Value per calendar month only applicable for bi-pole</p>	<p>Milestone achieved at Completion of first 12 months of scope of work as described in Exhibit 1 Scope of Work, Section 2.8</p>
1.12	Overall	5,803,719	0	0	0	Warranty Cost	<p>60 % payment upon completion of Trial Operation of Pole 1 at Low Power and 40% payment upon Substantial Completion</p>	<p>Payment of 60% upon Approval of Company that Trial Operation of Pole 1 at Low Power has been completed. Payment of 40% upon issuance of Substantial Completion Certificate.</p>

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3-Apr-2017 (Rev 1)

Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
1.13	Overall	158,568	0	0	0	Cost of Insurance	100% payment upon receipt by Company of all insurance certificates	Milestone achieved upon receipt of all insurance certificates by Company
1.14	Overall	3,607,241	0	0	0	Performance Bond	100% payment upon receipt by Company of Performance Bond in accordance with Article 7 of this Agreement and Exhibit 14 – Performance Security	Milestone achieved upon receipt by Company of Performance Bond in accordance with Article 7 of this Agreement and Exhibit 14 – Performance Security
1.15 / 1.16	Overall	1,489,850	0	0	0	Letter of Credit	100% payment upon receipt by Company of Letter of Credit in accordance with Article 7 of this Agreement and Exhibit 14 – Performance Security	Milestone achieved upon receipt by Company of Letter of Credit in accordance with Article 7 of this Agreement and Exhibit 14 – Performance Security
2.01	MF	9,384,061	0	0	0	Site Management	Equal Monthly payments starting upon completion of mobilization of Contractor as defined in line item 2.02 and ending upon Pole 1 Mechanical Completion as Approved by Company.	Payable per calendar month upon completion of Mobilization of Contractor's Staff and Equipment (see Item 2.02 below)
2.02	MF	526,638	0	0	0	Mobilization of Staff and Equipment	- 60% upon completion of mobilization of staff and equipment (as defined in the Mobilization Plan) of Contractor at site - 40% upon completion of mobilization of staff and equipment (as defined in a revised mobilization Plan) of the electromechanical installation subcontractor at site	Milestone criteria to be defined in the Mobilization Plan
2.03	MF	3,122,288	0	0	0	Temporary Site Facilities	- 35% upon completion of mobilization of Contractor's Temporary Site Facilities (as defined in the Mobilisation Plan) at site - 25% upon completion of mobilization of the electromechanical installation subcontractor temporary facilities (as defined in the Mobilisation Plan) at site - 40% will be paid in equal monthly payments starting upon completion of mobilization of Contractor's temporary facilities and ending at completion of static checks for Bi-pole as shown in Exhibit 9	Milestone criteria to be defined in the Mobilization Plan

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Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
2.04	MF	11,510,434	0	0	0	General Civil Works	Payable monthly on achieved progress of the civil works as Approved by Company	Payment upon achieved progress (percent complete) as Approved by Company
2.05	MF	3,649,665	0	0	0	Valve Halls	a) Engineering and Procurement payment 100% upon delivery of AHU and Chillers for Value Halls at Site b) Construction payable monthly on achieved progress of the building erection as Approved by Company	a) Milestone achieved upon receipt by Company of Material Receiving Report. Report to show all material received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone b) Payment upon achieved progress (percent complete) as Approved by Company
2.06	MF	3,400,103	0	0	0	Control Building	a) Engineering and Procurement payment 100% upon delivery of AHU and Chillers for Control Building at Site b) Construction payable monthly on achieved progress of the building erection as Approved by Company	a) Milestone achieved upon receipt by Company of Material Receiving Report. Report to show all material received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone b) Payment upon achieved progress (percent complete) as Approved by Company


  
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Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
2.07	MF	27,244,909	3,861,455	282,093	298,978	Supply, Shipping and Installation of Converter Transformers	a) Engineering, Procurement and Shipping payment per the following milestones: i. CAD 670,735 and 100% of GBP, EUR and USD upon Purchase Order (PO)/slot reservation booked. ii. 84.4% of "main equipment" CAD value upon confirmation ready for shipping (FAT complete) iii. Remaining of "main equipment" CAD value upon receipt at site b) Construction payable monthly on achieved progress of the equipment installation as Approved by Company  *List of "main equipment" for Line Items shown at the end of this table. Payment may be claimed as individual pieces of equipment reach each milestones noted above	

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Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
2.08 to 2.13	MF	74,496,607	0	0	0	Supply, Shipping and Installation of 1) HVac Filters; 2) 315kV HVac breakers; 3) HVdc Equipment; 4) Valve cooling equipment; 5) Fire detection and protection equipment; and 6) Miscellaneous electrical equipment	a) Engineering, Procurement and Shipping payment per the following milestones: i. 25% of "main equipment" value upon Purchase Order(PO)/slot reservation booked ii. 65% of "main equipment" value upon confirmation of ready for shipping (FAT complete) iii. 10% of "main equipment" value upon receipt at Site b) Construction payable monthly on achieved progress of the equipment installation as Approved by Company  *List of "main equipment" for Line Items shown at end of this table. Payment may be claimed as individual pieces of equipment reach each milestone noted above.	a) Milestone achieved: i. upon receipt by Company of unpriced PO where PO placement timing is consistent with Contractor's overall schedule ii. upon receipt by Company of FAT report and shipping release form iii. upon receipt by Company of Material Receiving Report. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone b) Payment upon achieved progress (percent complete) as Approved by Company
2.14	MF	1,141,905	0	0	0	Static Testing and Commissioning	- 60% payment upon completion of Pole 1 Commissioning Static Checks as Approved by Company - 40% payment upon completion of Bipole Commissioning Static Check as Approved by Company	Milestone achieved upon completion of Commissioning Static Checks as described in Section 10 of the Testing and Commissioning Specification and Approved by Company.
2.15	MF	225,702	0	0	0	Demobilization	100% payment upon removal of temporary facilities and cleaning of Contractor's laydown area at Site	Milestone achieved upon completion of demobilization activities as Approved by Company

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3-Apr-2017 (Rev 1)

Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
2.16 (Converter Transformer)	MF	3,600,923	620,571	47,016	0	Mandatory Spare Parts and Tools	Spare converter transformer: i. 100% of GBP and Euro value upon Purchase Order (PO)/slot reservation booked ii. 86.7% % of item CSD Value upon confirmation ready for shipping (FAT complete) iii. 13.3%% of Item CAD Value upon receipt at Site	Milestone achieved: i. upon receipt by Company of unpriced PO where PO placement timing is a consistent with Contractor's overall schedule ii. upon receipt by Company of FAT report and shipping release form iii. upon receipt by Company of Material Receiving Report. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone
2.16 (All Other Spares)	MF	4,552,364	0	0	0	Mandatory Spare Parts and Tools	a) 100% payment upon delivery to Site of all other spares	a) Milestone achieved upon receipt by Company of Material Receiving Reports for all other spares. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone
3.01	FP	2,239,365	0	0	0	Site Management	Equal Monthly payments starting upon completion of mobilization of Contractor as defined in line item 3.02 and ending upon Pole 1 Mechanical Completion at FP as Approved by Company.	Payable per calendar month upon completion of Mobilization of Contractor's Staff and Equipment (see Item 3.02 below)
3.02	FP	309,748	0	0	0	Mobilization of Staff and Equipment	- 60% upon completion of mobilization of staff and equipment (as defined in the Mobilization Plan) of Contractor at site - 40% upon completion of mobilization of staff and equipment (as defined in a revised Mobilization Plan) of the electromechanical installation subcontractor at site	Milestone criteria to be defined in the Mobilization Plan

  
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3-Apr-2017 (Rev 1)

Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
3.03	FP	398,318	0	0	0	Temporary Site Facilities	- 35% upon completion of mobilization of Contractor's Temporary Site Facilities (as defined in the Mobilisation Plan) at site - 25% upon of completion of mobilization of electromechanical installation subcontractor temporary facilities(as defined in the Mobilisation Plan) at site - 40% will be paid in equal Monthly payments starting upon completion of mobilization of Contractor's temporary facilities and ending at completion of static checks for Bi-pole as shown in Exhibit 9	Milestone criteria to be defined in the Mobilization Plan
3.04	FP	1,023,753	0	0	0	Building - Control Room	a) Engineering and Procurement - 100% payment upon delivery of building at Site b) Construction payable monthly on achieved progress of the building erection as Approved by Company	a) Milestone achieved upon receipt by Company of Material Receiving Report. Report to show all material received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone b) Payment upon achieved progress (% complete) as Approved by Company

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3-Apr-2017 (Rev 1)

Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
3.06/3.07	FP	6,185,766	0	0	0	Supply, Shipping and Installation of HVdc, Fire Detection and Protection equipment	a) Engineering, Procurement and Shipping paid per the following milestones: <ul style="list-style-type: none"> <li>i. 25% of "main equipment" value upon PO/slot reservation booked</li> <li>ii. 65% of "main equipment" value upon confirmation of ready for shipping (FAT complete)</li> <li>iii. 10% of "main equipment" value upon receipt at site</li> </ul> b) Construction payable monthly on achieved progress of the equipment installation as Approved by Company	a) Milestone achieved: <ul style="list-style-type: none"> <li>i. upon receipt by Company of unpriced PO where PO placement timing is consistent with on Contractor's overall schedule</li> <li>i. upon receipt by Company of FAT report and shipping release form</li> <li>ii. upon receipt by Company of Material Receiving Report. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone</li> </ul> b) Payment upon achieved progress (percent complete) as Approved by Company
3.08	FP	207,284	0	0	0	Static Testing and Commissioning	100% payment upon completion of Pole 1 Commissioning Static Checks as Approved by Company	Milestone achieved upon completion of Commissioning Static Checks as described in Section 10 of the Testing and Commissioning Specification and Approved by Company
3.09	FP	132,749	0	0	0	Demobilization	100% payment upon removal of temporary facilities and cleaning of Contractor's laydown area at Site	Milestone achieved upon completion of demobilization activities as Approved by Company
3.10	FP	185,456	0	0	0	Mandatory Spare Parts and Tools	100% payment upon delivery to Site of all spares	Milestone achieved upon receipt by Company of Material Receiving Reports for all spares. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone

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Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
4.01	SC	2,179,897	0	0	0	Site Management	Equal Monthly payments starting upon completion of mobilization of Contractor as defined in line item 4.02 and ending upon Pole 1 Mechanical Completion at SC as Approved by Company.	Payable per calendar month upon completion of Mobilization of Staff and Equipment (see Item 4.02 below)
4.02	SC	308,859	0	0	0	Mobilization of Staff and Equipment	- 60% upon completion of mobilization of staff and equipment (as defined in the Mobilization Plan) of Contractor at site - 40% upon completion of mobilization of staff and equipment (as defined in a revised mobilization Plan) of the electromechanical installation subcontractor at site	Milestone criteria to be defined in the Mobilization Plan
4.03	SC	396,808	0	0	0	Temporary Site Facilities	- 35% upon completion of mobilization of Contractor's Temporary Site Facilities (as defined in the Mobilisation Plan) at site - 25% upon completion of mobilization of the electromechanical installation subcontractor temporary facilities(as defined in a revised Mobilisation Plan) at site - 40% will be paid in equal monthly payments starting upon completion of mobilization of Contractor's temporary facilities and ending at completion of static checks for Bi-pole as shown in Exhibit 9	Milestone criteria to be defined in the Mobilization Plan
4.04	SC	1 021 137	0	0	0	Building - Control Room	a) Engineering and Procurement - 100% payment upon delivery of building at Site b) Construction payable monthly on achieved progress of the building erection as Approved by Company	a) Milestone achieved upon receipt by Company of Material Receiving Report. Report to show all material received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone b) Payment upon achieved progress (percent complete) as Approved by Company

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Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
4.06/4.07	SC	6,131,522	0	0	0	Supply, Shipping and Installation of HVdc, Fire Detection and Protection equipment	a) Engineering, Procurement and Shipping paid per the following milestones: <ul style="list-style-type: none"> <li>i. 25% of "main equipment" value upon PO/slot reservation booked</li> <li>ii. 65% of "main equipment" value upon confirmation of ready for shipping (FAT complete)</li> <li>iii. 10% of "main equipment" value upon receipt at site</li> </ul> b) Construction payable monthly on achieved progress of the equipment installation as Approved by Company	a) Milestone achieved: <ul style="list-style-type: none"> <li>i. upon receipt by Company of unpriced PO where PO placement timing is consistent with Contractor's overall schedule</li> <li>ii. upon receipt by Company of FAT report and shipping release form</li> <li>iii. upon receipt by Company of Material Receiving Report. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone</li> </ul> b) Payment upon achieved progress (percent complete) as Approved by Company
4.08	SC	207,284	0	0	0	Static Testing and Commissioning	100% payment upon completion of Pole 1 Commissioning Static Checks as Approved by Company	Milestone achieved upon completion of Commissioning Static Checks as described in Section 10 of the Testing and Commissioning Specification and Approved by Company
4.09	SC	132,749	0	0	0	Demobilization	100% payment upon removal of temporary facilities and cleaning of Contractor's laydown area at Site	Milestone achieved upon completion of demobilization activities as Approved by Company
4.10	SC	607,759	0	0	0	Mandatory Spare Parts and Tools	100% payment upon delivery to Site of all spares	Milestone achieved upon receipt by Company of Material Receiving Reports for all spares. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone

\*List of "main equipment" for Line Items shown at end of this table. Payment may be claimed as individual pieces of equipment reach each milestone noted above.

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Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
5.01	SOP	10,870,374	0	0	0	Site Management	Equal Monthly payments starting upon completion of mobilization of Contractor as defined in line item 5.02 and ending upon Pole 1 Mechanical Completion as Approved by Company.	Payable per calendar month upon completion of Contractor's Mobilization of Staff and Equipment (see item 5.02 below)
5.02	SOP	1,746,252	0	0	0	Mobilization of Staff and Equipment	- 60% upon completion of mobilization of staff and equipment (as defined in the Mobilization Plan) of Contractor at site. - 40% upon completion of mobilization of staff and equipment (as defined in a revised mobilization Plan) of the electromechanical installation subcontractor at site	Milestone criteria to be defined in the Mobilization Plan.
5.03	SOP	2,705,058	0	0	0	Temporary Site Facilities	- 35% upon completion of mobilization of Contractor's Temporary Site Facilities (as defined in the Mobilisation Plan) at site - 25% upon completion of mobilization of electromechanical installation subcontractor temporary facilities(as defined in a revised Mobilisation Plan) at site - 40% will be paid in equal Monthly payments starting upon completion of mobilization of Contractor's temporary facilities and ending at completion of static checks for Bi-pole as shown in Exhibit 9	Milestone criteria to be defined in the Mobilization Plan
5.04	SOP	8,430,910	0	0	0	General Civil Works	Payable monthly on achieved progress of the civil works as Approved by Company	Payment upon achieved progress (percent complete) as Approved by Company

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Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
5.05	SOP	3,891,566	0	0	0	Valve Halls	a) Engineering and Procurement payment 100% upon delivery of AHU and Chillers for Value Halls at Site b) Construction payable monthly on achieved progress of the building erection as Approved by Company	a) Milestone achieved upon receipt by Company of Material Receiving Report. Report to show all material received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone b) Payment upon achieved progress (percent complete) as Approved by Company
5.06	SOP	3,225,416	0	0	0	Control Building	a) Engineering and Procurement payment 100% upon delivery of AHU and Chillers for Control Building at Site b) Construction payment monthly on achieved progress of the building erection as Approved by Company	a) Milestone achieved upon receipt by Company of Material Receiving Report. Report to show all material received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone b) Payment upon achieved progress (percent complete) as Approved by Company


  
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Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
5.07	SOP	23,644,495	3,602,290	282,093	149,488	Supply, Shipping and Installation of Converter Transformers	<p>a) Engineering, Procurement and Shipping paid per the following milestones:</p> <p>i. CAD 260,841 and 100% of GBP, EUR and USD upon Purchase Order (PO)/slot reservation booked.</p> <p>ii. 85.6% of "main equipment" CAD value upon confirmation ready for shipping (FAT complete)</p> <p>iii. Remaining of "main equipment" CAD value upon receipt at site</p> <p>b) Construction payable monthly on achieved progress of the equipment installation as Approved by Company</p> <p>*List of "main equipment" for Line Items shown at the end of this table. Payment may be claimed as individual pieces of equipment reach each milestones noted above</p>	<p>a) Milestone achieved:</p> <p>i. upon receipt by Company of unpriced PO where PO placement timing is consistent with Contractor's overall schedule</p> <p>ii. upon receipt by Company of FAT report and shipping release form</p> <p>iii. upon receipt by Company of Material Receiving Report. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone</p> <p>b) Payment upon achieved progress (percent complete) as Approved by Company</p>

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Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
5.08 to 5.13	SOP	75,304,134	0	0	0	Supply, Shipping and Installation of 1) HVac Filters; 2) 315kV HVac breakers; 3) HVdc Equipment; 4) Valve cooling equipment; 5) Fire detection and protection equipment; and 6) Misc electrical equipment	<p>a) Engineering, Procurement and Shipping paid per the following milestones:</p> <ul style="list-style-type: none"> <li>i. 25% of "main equipment" value upon Purchase Order(PO)/slot reservation booked</li> <li>ii 65% of "main equipment" value upon confirmation of ready for shipping (FAT complete)</li> <li>iii. 10% of "main equipment" value upon receipt at Site</li> </ul> <p>b) Construction payable monthly on achieved progress of the equipment installation as Approved by Company</p> <p>*List of "main equipment" for Line Items shown at end of this table. Payment may be claimed as individual pieces of equipment reach each milestone noted above.</p>	<p>a)Milestone achieved:</p> <ul style="list-style-type: none"> <li>i. upon receipt by Company of unpriced PO where PO placement timing is consistent with Contractor's overall schedule</li> <li>ii. upon receipt by Company of FAT report and shipping release form</li> <li>iii upon receipt by Company of Material Receiving Report. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone</li> </ul> <p>b)Payment upon achieved progress (percent complete) as Approved by Company</p>
5.14	SOP	1,141,905	0	0	0	Static Testing and Commissioning	<p>- 60% payment upon completion of Pole 1 Commissioning Static Checks as Approved by Company</p> <p>- 40% payment upon completion of Bipole Commissioning Static Check as Approved by Company</p>	Milestone achieved upon completion of Commissioning Static Checks as described in Section 10 of the Testing and Commissioning Specification and Approved by Company
5.15	SOP	748,394	0	0	0	Demobilization	100% payment upon removal of temporary facilities and cleaning of Contractor's laydown area at Site	Milestone achieved upon completion of demobilization activities as Approved by Company

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Line Item	Site	Value (CAD)	Value (GBP)	Value (EUR)	Value (USD)	Description	Payment Schedule	Criteria
5.16 (Converter Transformer)	SOP	3,364,590	577,377	47,016	0	Mandatory Spare Parts and Tools	Spare converter transformer: i. 100% of Item GBP and EUR Value upon Purchase Order(PO)/slot reservation booked ii. 86.7% of Item CAD Value upon confirmation ready for shipping (FAT complete) iii. 13.3% of Item CAD Value upon receipt at Site	Milestone achieved: i. upon receipt by Company of unpriced PO where PO placement timing is consistent with Contractor's overall schedule ii. upon receipt by Company of FAT report and shipping release form iii. upon receipt by Company of Material Receiving Report. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone
5.16 (All Other Spares)	SOP	4,647,385	0	0	0	Mandatory Spare Parts and Tools	100% payment upon delivery to Site of all other spares	Milestone achieved upon receipt by Company of Material Receiving Reports for all other spares. Report to show equipment received and inspected; any damages or deficiencies must be cleared to the satisfaction of the Company to achieve this Milestone
6.00	Overall	826,944	0	0	0	Dynamic Testing and Commissioning at low power	- 60% payment upon completion of Monopole Dynamic Testing and Commissioning at low power as approved by Company - 40% payment upon completion of Bipole Dynamic Testing & Commissioning at low power as approved by Company	Milestone achieved upon completion of Commissioning Dynamic Checks as described in Section 10 of the Testing and Commissioning Specification and Approved by Company
6.01	Overall	269,543	0	0	0	Trial operation at low power	- 60% payment upon completion of Monopole Trial Operation at low power as approved by Company - 40% payment upon completion of Bipole Trial Operation at low power as approved by Company	Milestone achieved upon completion of Trial Operation at low power as described in Section 12 of the Testing and Commissioning Specification and Approved by Company
<b>TOTAL</b>		<b>354,115,630</b>	<b>8,829,537</b>	<b>658,218</b>	<b>448,466</b>			

Notes:

1. Holdback of 10% not shown in values above. Holdback to be paid as per Article 25 of this Agreement.

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2. Line Items do not need to be claimed sequentially
3. One invoice per month (per currency) to be invoiced with milestones above shown separately
4. Payment as per Article 12 of this Agreement.

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