HydroOttawa	TITLE: Engineering Specification		
RECOMMENDED: J.Patenaude	NO: GMS0005	1 OF 9	REV: 2
APPROVED: C.Malone			
DATE: 2002-07-04			

UNDERGROUND SECONDARY CABLE

TECHNICAL SPECIFICATIONS

Note: For Alternate Bid Work (Developer constructed), Sections 9 of this specification must be completed and returned to Hydro Ottawa.

See Hydro Ottawa's Web site for the
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REVISION SHEET

Revision	Description	Date	Initial
0	Original Document	2001-05-17	csm
1	Section 7.5 - lagging Appendix A – Cable Characteristics	2002-01-31	csm
2	Revised Section 2.0, 4.0, & Appendix A	2002-07-04	jjp/csm

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1.0 SCOPE

The construction and testing of the cable shall be in general accordance with:

1.1 CSA Standard C22.2 No 38 (Thermoset),
1.2 CSA Standard C22.2 No 75 (Thermoplastic), and
1.3 CSA Standard C22.2 No 52 (underground triplex secondary service entrance cable),

suitable for underground direct buried and ducted installations. Where any conflict exists between the above noted specifications or publication and this specification, this specification will take precedence.

2.0 APPROVAL OF SOURCE

Cable shall be supplied only by manufacturers that are certified with the Quality Management Institute, a Division of the Canadian Standards Association, in compliance with ISO 9002-1994, registering the Quality Assurance Programs at all Manufacturing Plant(s) and their Head Office or approved by Hydro Ottawa. A prerequisite is that every three years the manufacturer shall provide a Qualification Test Report to Hydro Ottawa in accordance with this specification.

A prerequisite for such approval shall be the successful completion of Qualification Testing in accordance with this specification.

3.0 CABLE DESCRIPTION

The cables shall consist of:

3.1 thermoset cable shall consist of copper conductor and black RWU, 1000 V, 90 °C insulation, and CSA certified
3.2 thermoplastic cable shall consist of copper conductor and coloured TWU, 600 V, -40 °C insulation, and CSA certified
3.3 underground triplex secondary service entrance cable shall consist of aluminium conductor, coloured PVC jacketed, full size insulated neutral, 600 V, -40 °C to 90 °C XLPE insulation, and CSA certified.

4.0 JACKET MARKINGS

The following information shall be printed legibly on the jacket at intervals of one metre:

"Manufacturer's name - conductor size - conductor material - insulation type temperature class – voltage class - year of manufacture - identification of power cable in accordance with the 1990 proposal for the NESC – CSA SPEC".

eg. Name, # 500 KCMIL - CU - RWU – 90 °C – 1000 V – MANUFACTURED - 1991 -  (NESC Lightning Bolt symbol) – CSA SPEC

The sequential length markings shall be at intervals of 1m. The method of indicating lengths shall be from XXX on the outside to 0m on the drum. Uniform accuracy of the sequential marking throughout the length of the cable shall be $\pm$1.0% or better and a specific statement about the expected accuracy shall be quoted.

The printing shall be continuous throughout the length of the cable. If non-indent printing is used, it shall be a contrasting colour and indelible under normal environmental conditions. Indent printing may be accepted at the discretion of Hydro Ottawa.

5.0 WITNESS OF TESTS - INSPECTION

5.1 Hydro Ottawa reserves the right to have a representative on hand to witness all Production Tests.

5.2 The Hydro Ottawa representative reserves the right to request the manufacturer to verify the calibration of the test instruments.

5.3 A minimum of 24 hours notice will be required to enable an Hydro Ottawa Inspector to witness these tests. However, where the location of cable testing is beyond 60 km from Hydro Ottawa, a minimum of 72 hours notice will be required.

6.0 CABLE SPECIFICATION COMPLIANCE

If the completed cable does not comply with all the requirements of this specification, Hydro Ottawa reserves the right to reject all or part of the cable under consideration. The right of rejection will apply whether the cable is in plant, in Hydro Ottawa Stores or in final installed position.

7.0 SHIPPING - LABELLING

7.1 The cable shall be supplied in a continuous length on each reel or in specific lengths specified on each order release.

7.2 There shall be no water in the strands prior to cable sealing.

7.3 The ends of the cable on each reel shall be tightly sealed to prevent moisture or water ingress during shipping, handling and storing. The seal shall consist of a preformed heat shrink end cap, coated internally with mastic and with sufficient wall thickness, strength and sealing properties to achieve a tight seal.

7.4 Reel Nameplate

Each reel shall have a nameplate clearly indicating the following information:

- Cable core conductor material and size
- Insulation type
- Insulation temperature
- Insulation voltage
- Length of cable (actual)
- Cable weight (kg/km)
- Gross shipping weight
- Reel weight (empty less lagging)
- First and last sequential length numbers
- Hydro Ottawa material code number

7.5 No lagging is required. However, a masonite protective or plastic corrugated covering or equivalent for the cable shall be supplied.

7.6 Size of Shipping Reels

7.6.1 RWU and underground triplex secondary service entrance cables shall be on reels having a total width (including inside cable termination) of not more than 38 inches and an overall diameter of not more than 59 inches. The estimated gross weight is to be quoted by the supplier. Reel axle hole to be no less than 2 7/8 inches diameter.

7.6.2 TWU shall be on reels having a total width (including inside cable termination) of not more than 15 inches and an overall diameter of not more than 21 inches. The estimated gross weight is to be quoted by the supplier. Reel axle hole to be no less than 1.5 inches diameter.

8.0 PRODUCTION QUALIFICATION - PERFORMANCE DATA

The manufacturer shall to complete and submit with the quotation all technical information contained in Appendix A, attached. This information will be used for the evaluation and consideration of the quotation.

9.0 TENDER INFORMATION TO BE PROVIDED BY SUPPLIER

The following information will be required for tender consideration:

9.1 Completion of Appendix A, Cable Characteristics for each type and size of cable.

9.2 Any deviations from the requirements of this specification.

9.3 Warranty Conditions.

9.4 Qualification Type Test results.

APPENDIX A : CABLE CHARACTERISTICS

1. Reference Specification No. **GMS-0005, UG Secondary Cable**.
2. Cable Type: _____
3. Cable Size _____ AWG/kcmil.
4. Cable central conductor material: **Cu**, **Al**.
5. Insulation Voltage _____ V; Jacketed.
6. Cable Manufacturer: _____
7. Date Manufactured: _____
8. Number of Strands per Conductor : _____
9. Lay of the central conductor: unidirectional / opposite.
10. Number of Conductors per Cable : _____
11. Resistance, 60 hertz, **70** C: central conductor _____ Ω/km
12. Reactance, 60 hertz: 3 conductors flat 1 cm spacing _____ Ω/km
    3 conductors triplexed _____ Ω/km
13. Capacitance, 60 hertz: _____ uf/km.
14. Impedance, 60 hertz, **70** C, 95% PF: 3 conductors flat 1 cm spacing _____ Ω/km
    3 conductors triplexed _____ Ω/km
15. Maximum Operating Temperature: _____ **C**
16. Minimum Installation Temperature: _____ **C**
17. Recommended minimum bending radius _____ x cable O.D.
18. Calculated weight of completed cable _____ kg/km.
19. Recommend maximum pulling tension: applied to core conductor _____ kN.
    applied over insulation _____ kN.
20. Method of insulation curing: dry / steam / other (specify) _____
21. Indicate all insulating and jacketing material: _____
    _____

22. Jacketing colour:_____

23. Reel information

Estimated gross weight _____ kg and maximum length of cable _____m on a full reel.

Cable reel diameter _____ inches

How many reels _____

24. Expected accuracy of sequential marking: _____**%**

completed by distributor &/or manufacturer:

Company Name _____

Contact Person _____

Telephone No. _____

e-mail: _____

Date: _____