HydroOttawa	TITLE: **Technical Specification**	
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UNDERGROUND MEDIUM VOLTAGE TRXLPE AND EPR CONCENTRIC NEUTRAL CABLE

REVISION SHEET

REV.	DESCRIPTION	DATE	INITIAL
0	Original Document	2002-06-14	jjp/csm
1	Section 10.6 – Reel sizes	2002-06-24	jjp/csm
2	Revised to meet with C68.5	2016-12-19	mw/ks/csm
3	Update conductor shield for EPR	2017-02-01	mw/csm

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1. Introduction

This specification covers the construction and testing requirements for TRXLPE and EPR medium voltage, single and triplex type power cables for use in HOL's service territory.

2. References, definitions and abbreviations

2.1 References

CSA C68.5: Primary Shielded and Concentric Neutral Cable for Distribution Utilities.

Electrical Safety Authority of Ontario: Technical Guideline for Section 6. Approval of Electrical Equipment

ISO 9001: Quality Management Standard.

NEMA WC-26: Binational Wire and Cable Packaging Standard.

2.2 Definitions

Certified Test Report is defined in Technical Guideline for Section 6. Approval of Electrical Equipment by the Ontario Electrical Safety Authority.

Professional Engineer is defined in Technical Guideline for Section 6. Approval of Electrical Equipment by the Ontario Electrical Safety Authority.

2.3 Abbreviations

HOL means Hydro Ottawa Limited

TRXLPE means Tree-Retardant Cross-Linked Polyethylene

EPR means Ethylene Propylene Rubber

3. Scope

This specification covers the construction and testing requirements for TRXLPE and EPR concentric neutral medium voltage cable less than or equal to 46 kV. Cable shall be suitable for direct buried installation and installation in duct. This specification does not cover paper insulated lead cable (PILC).

The numbering of Section 4 through 13 of this specification is identical to that used in CSA Standard C68.5 Shielded & Concentric Neutral Power Cable for Distribution Utilities. Where no reference is made, the CSA Specification shall apply. Additional or modifying statements, as given in this specification, shall govern.

4. Conductors

4.2 Physical and electrical properties

4.2.2 Copper conductors

Shall be Class B compact, round, stranded, annealed and uncoated; except triplex cables 500 kcmil or greater shall be round Class C compressed.

4.2.3 Aluminum conductors

Shall be Class B compact, round, stranded and with ¾ hard temper.

4.3 Optional water-blocking components for stranded conductors

A water-blocking component (strand blocking) is required. The outer surface of the conductor shall be free from the water-blocking component.

5. Conductor shield (Stress control layer)

5.1 Material

The conductor shield for TRXLPE cables shall be black, super smooth, super clean material.

The conductor shield for EPR cables shall be black, super clean material

6. Insulation

6.2 Insulation thickness

6.2.1 General

Insulation level shall be 100%.

7. Extruded insulation shield

7.1 Material

The insulation shield shall be black.

7.4 Removability

The insulation shield shall be readily removable in the field at temperatures from -25°C to +40°C.

8. Concentric neutral and other metallic shielding

8.4 Optional water-blocking components for metallic shield / concentric neutral

A water-blocking component is required.

9. Jacket

9.1 Material

9.1.1 General

The jacket shall be linear low-density polyethylene (LLDPE) as per C68.5. It shall encapsulate the concentric neutral wires and be free stripping.

9.2.3 Jacket thickness

For # 2 AWG TRXLPE, 15 kV, copper cable, the thickness of the jacket shall be 1.3 mm [51 mils] minimum average with a minimum spot thickness of 1 mm [40 mils]. All dimensions shall be measured from the outer surface of the concentric neutral conductor.

10. Cable assembly and identification

10.2 Cable identification

10.2.3 Sequential length marking

Sequential metre marking shall be surface print, with the higher metre marking value at the outer layer of the cable on the reel.

10.3 Marking on reel

c) Additional markings required:
   ii) the appropriate HOL SKU;
   iii) HOL purchase order number;
   iv) the first and last sequential length numbers.

11. Production tests

11.14 Other tests

11.14.2 Longitudinal water penetration test — Optional water-blocking component for stranded conductors.

Longitudinal water penetration shall be tested in accordance with CSA C68.5 except that the minimum requirements are 0.103 MPa [15 psi] gauge for 15 minutes during production testing.

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12. Qualification tests

12.4 Other qualification tests

12.4.9 Longitudinal water penetration test – Optional water-blocking components for stranded conductors.

Longitudinal water penetration shall be tested in accordance with CSA C68.5 except that the minimum requirements are 0.103 MPa [15 psi] gauge for 1 hour during qualification testing.

12.4.10 Longitudinal water penetration test – Optional water-blocking components for stranded conductors.

Longitudinal water penetration shall be tested in accordance with CSA C68.5 except that the minimum requirements are 0.103 MPa [15 psi] gauge for 1 hour during qualification testing.

13. Information to be supplied by purchaser

13.4 Packaging

The following packaging information shall be adhered to:

a) Cable shall be supplied on heavy duty returnable wooden reels in accordance with NEMA WC-26, except where cable weight requires a steel reels;
b) Reel flange diameter shall be between 1200 mm and 2700 mm [48” and 108”];
c) Reel axle arbor hole to be no less than 73 mm [2-7/8”] diameter;

d) The overall width (including bolts and cable ends) shall be between 1000 mm and 1700 mm [38" and 68"];
e) Preferred maximum gross weight is 6350 kg [14,000 lbs]. Ultimate maximum gross weight shall be 9100 kg [20,000 lbs];
f) The length of cable on a reel shall be in accordance with Schedule 1 with a ± 10 m deviation;
g) No lagging is required. However, a masonite protective covering or plastic corrugated covering or equivalent for the cable shall be supplied, as per NEMA WC26 (Level 2: Weather Protector);
h) The cable shall be supplied in a continuous length on each reel, and;
i) The cable ends shall be tightly sealed with a heat shrink end cap, coated internally with mastic to prevent water ingress during shipping handling and storing.

14. Approval of drawings

Prior to the commencement of the first cable production run, the manufacturer shall submit to HOL a cross-sectional cable drawing detailing the dimensional components. HOL's acceptance will be returned to the manufacturer authorizing commencement of manufacture.

Upon cable design change the manufacturer shall submit to HOL a cross-sectional cable drawing detailing the dimensional components. HOL's acceptance will be returned to the manufacturer authorizing commencement of manufacture.

15. Quality assurance

Cable manufacturer shall be certified to ISO 9001 level.

16. Certified test reports

The supplier is required to submit a Certified Test Report in digital format (PDF or Word) for each reel of cable.

17. Acceptance of Cable

If the completed cable does not comply with all the requirements of this specification, HOL 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 HOL Stores or in final installed position.

HOL may reject cable or a reel if:

- The Certified Test Report for the cable does not comply with this standard;
- The manufacturing reel nameplate has been removed or modified;

- The cable is found damaged during shipping or installation; or
- The insulation measurement test failed prior to the cable installation by the use of a high-potential equipment or a megohmmeter.

Schedule 1 Cable Characteristics – Copper/Aluminum

Cable Class (kV)	System Voltage (kV)	Central Conductor (AWG/kcmil)	Central Conductor Metal	Insulation Type	BIL (kV)	HOL Store Code	Concentric Neutral (Cu)	Length of Cable	Reel Dimensions - Flange x Inside Traverse x Drum
15	13.2/7.6 Gnd	# 2	Cu	TRXLPE	95	184800	16 - #14 AWG	1000 m	50”x32”x23”
15	13.2/7.6 Gnd	# 1/0	Cu	TRXLPE	95	183404	26 - #14 AWG	960 m	66”x36”x36”
15	13.2/7.6 Gnd	500	Cu	TRXLPE	95	183402	26 - #12 AWG*	480 m	60”x32”x32”
15	13.2/7.6 Gnd	3 x 500	Cu	EPR	95	666253	15 - #16 AWG†	330 m	84”x42”x48”
28	27.6/16.0 Gnd	# 1/0	Al	TRXLPE	150	666281	16 - #14 AWG	800 m	66” x36”x36”
28	27.6/16.0 Gnd	750	Al	TRXLPE	150	666275	24 - #12 AWG*	850 m	84”x42”x48”
28	27.6/16.0 Gnd	1000	Al	TRXLPE	150	666100	20 - #10 AWG*	850 m	96”x46”x56”
46	44/25.4 Gnd	750	Cu	TRXLPE	95	666475	25 - #10 AWG*	700 m	96”x46”x56”

* NOTE: concentric neutral provides 33% of conductor cross sectional area
† NOTE: concentric neutral provides 8.26% of conductor cross-sectional area