



Offshore and
Marine Shipboard
Cables

IEEE 1580 Type P Polyrad® XT-125 Single Conductor



Specification BR-781

Polyrad® XT-125 Flexible Marine Type P

Irradiated Cross-linked Polyolefin Single Conductor

Rated for 600/1000 Volts or 2000/1000 Volts (AC or DC)

For Use on Oil Rig-Shipboard-Apparatus

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I. Scope

This specification covers single conductor wire and cable rated at 600/1000 volts or 2000/1000 volts, AC or DC, insulated with General Cable's Polyrad XT-125 Type P Marine insulation, a thermosetting irradiation cross-linked polyolefin which is flame retardant, moisture- and oil-resistant, and mechanically tough. Armor of aluminum or bronze and an arctic-grade overall sheath in accordance with IEEE Standard 45/ IEEE Standard 1580-2010 is available at the option of the purchaser.

IEEE 1580 Type P cables should be designed, engineered and produced by cable manufacturers that have manufactured these specific cables for a minimum of 15 years. These manufacturers should be actively involved in the standards organizations that support the continued development, safety and quality of IEEE 1580 Type P cables.

II. Applicable Documents

The wire and cable manufactured under this specification shall be tested and inspected in accordance with the latest issues of the following standards, as applicable or as modified herein:

ASTM B33	Tinned Soft or Annealed Copper Wire
ASTM D149	Test for Dielectric Breakdown Voltage and Dielectric Strength of Electrical Insulation Materials at Commercial Power Frequencies
CSA C22.2 No. 245/ UL 1309	Marine Shipboard Cable
IEEE Std 45	IEEE Recommended Practice for Electrical Installation on Shipboard
IEEE Std 1580	IEEE Recommended Practice for use on Shipboard and Marine Fixed or Floating Platforms
IEEE Std 383	Type Test of Class 1E Electrical Cable, Field Splices & Connectors for Nuclear Power Generating Stations
IEEE Std 1202	Standard for Flame Testing of Cables for use in Cable Tray in Industrial and Commercial Occupancies
IEC-92-3	Electrical Installations in Ships, Part 3; Cables (Construction, Testing and Installation)
IEC 60332-2A	Tests on Electric Cables Under Fire Conditions
ICEA S-95-658	ICEA/NEMA Standard for Non-shielded Power Cables Rated 2000 Volt or Less for Distribution of Electrical Energy (NEMA WC 70)
UL 44	Standard for Rubber Insulated Wire & Cable
UL (UBVZ)	Shipboard Cable, Marine



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III. Conductor

Conductors shall be of soft annealed tinned copper per ASTM B33 and shall conform to requirements as listed in the Dimensional Data section of the Type P data sheets.

IV. Separator

A suitable separator may be used if deemed necessary by the manufacturer.

V. Insulation

The insulation shall be Polyrad XT-125 Type P Marine, an irradiated cross-linked polyolefin, with a minimum average thickness as listed in the Dimensional Data section of the Type P data sheets. The insulated conductor shall meet the following requirements:

A. Physical Properties

Unaged Requirement

Tensile Strength, Min. PSI	2000 Min.
Elongation at rupture, Min. %	250 Min.

Aged Requirements

After air oven 7 days @ 158°C ± 2°C

Tensile Strength (% of original)	90 Min.
Elongation (% of original)	55 Min.

After air oven 7 days @ 121°C ± 2°C

Tensile Strength (% of original)	90 Min.
Elongation (% of original)	90 Min.

Oxygen Bomb 7 days @ 80°C @ 300 PSI

Tensile Strength (% of original)	90 Min.
Elongation (% of original)	90 Min.

Air Bomb 42 hours @ 127°C 80 PSI

Tensile Strength (% of original)	90 Min.
Elongation (% of original)	90 Min.

Heat Distortion, 1 hour @ 200°C

Clause 4.3.6.1 CSA Std. C22.2 No. 0.3	20% Max.
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Cold Bend, 120 hours @ -55°C

6 kV - 5 Min.



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5. Oil Resistance

Hot Oil Swell Tests - Insulated wires are premeasured and immersed in a hot oil bath. After the required exposure time, they are removed and measured for the amount of swell.

Requirement:

- A. IRM 902 Oil 100 hours @ 150°C Max. Max. % Swell 40
- B. Diesel Oil 100 hours @ 60°C Max. Max. % Swell 60

Note: When tested in accordance with AAR 589 (IRM 902 oil at 121°C for 18 hours), the retention of tensile and elongation shall be:

Tensile - 70% Minimum Elongation - 90% Minimum

6. Smoke Emission

The test shall be performed in an N.B.S. Smoke Chamber using #12 AWG wire insulated with 45 mils of Polyrad XT Type P Marine. The procedures are per NFPA Standard 258 in the flaming (F) and non-flaming (N) modes.

	<u>Dm</u>	<u>T16</u>	<u>T.9Dm</u>
(F) Flaming plus Radiant Furnace	485	1.20	7.15
(N) Non-flaming Radiant Furnace	203	10.3	25.7

Dm = Max. Specified Optical Density
T16 = Time to reach critical Ds (Specified Optical Density)
T.9 Dm = Time to reach 90% of Dm

7. Abrasion Resistance

Rotating Scrap abrader (Ref. MIL-C-915) - A 24 inch specimen is draped over an 8 inch rotating drum with two (2) 90° vee edge abrading tools 180° apart. Failure is detected by electrical contact between abrading tool and conductor. The cable is weighted with a 450 gram weight.

Requirement: 2500 cycles minimum

8. Crush Resistance

A wire sample is placed between two (2) parallel flat plates and compressed until electrical contact is detected across conductor to the plate.

Requirement: 7500 lbs. minimum

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VI. Arctic-Grade Jacket (Optional)

The optional arctic-grade jacket, when required, shall meet NEK 606 ester-based mud oil resistant requirements and be black irradiated cross-linked Chlorosulfonated Polyethylene meeting the following requirements when tested in accordance with IEEE Standard 1580-2010.

Jacket & Overall Sheath Physical Properties	Requirements Per IEEE 1580-2010 Table 16	General Cable Type CP Jacket
Material (Arctic-Grade Chlorosulfonated Polyethylene)	Thermosetting Chlorosulfonated Polyethylene	Thermosetting Chlorosulfonated Polyethylene
Physical Requirements Unaged:		
Tensile Strength, min. psi	1800	2200
Elongation at rupture, min. percent	300	350
Set, max. percent	30	12
Aging Requirements		
After air oven at °C	121 ± 1	121 ± 1
Hours	168	168
Tensile Strength percent of unaged, min.	85	100
Elongation at rupture, percent of unaged, min.	65	90
After oil immersion at °C	121 ± 1	121 ± 1
Hours	18	18
Tensile Strength percent of unaged, min.	60	90
Elongation at rupture, percent of unaged, min.	60	90
Cold Bend, no cracks, °C (Note 1)	-40	-55
Cold Impact, °C (Note 1)	-40	-40
Mechanical water absorption, mg/in ²	100	87

NOTE: (1) For test procedures refer to CSA Standard C22.2, No. 38, Clause 6.4.7. The insulation system used for this test shall be representative of the final product. Cable intended for arctic or severe cold application should be capable of passing both cold bend at -40°C and cold impact at -40°C.



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IEEE 1580 Type P MOR™ Polyrad® XT-125, Unarmored



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VII. Cable Identification

The surface of the cable shall be printed with the following minimum information at intervals not greater than two feet.

“POLYRAD® XT-125 (UL) E85994 BR781 110C 1/C XXAWG 2000V or (CSA) 245/1309 FT4 –40C IEC 1KV 60332.3A IEEE 1580 TYPE P OR (ETL) 109229 YEAR OF MFG SEQUENTIAL FOOTAGE MARK”

VIII. Reel Markings

Each reel to be shipped shall be marked to include the following minimum information in addition to any other information specified by the purchaser:

General Cable
Polyrad XT-125 Type P Marine
Voltage Rating
Conductor Size & No. of Conductors
Footage on Reel
Month/Year of Manufacture