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# Technical Newsletter

## 300V ITS Listed Marine Shipboard Cables

### IEEE 1580 -2001 & IEEE 45-2002

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#### ABSTRACT:

*Rockbestos-Surprenant Cable Corporation is the first to obtain a listing from a nationally recognized testing lab (ITS) for its 300V Type P, EXANE<sup>®</sup> insulated, instrumentation cables.*

Until the publication of IEEE 1580-2001 there was no specific mention of 300V rated cables or the recommended minimum safety design requirements for these cables in IEEE 45. The industry primarily used 600V cables for their instrumentation cable needs.

IEEE 45-1998, Section 8 - "Cable Construction" - details recommended cable design requirements, voltage ratings, and associated insulation thicknesses. However, the phase-to-phase, voltage ratings are "0-600", "601-2000", and "2001-5000" only. There is no specific mention of 300V rated cables or recommended insulation thicknesses. The tabulated insulation thickness for 22 AWG to 10 AWG, Type P cables, rated 600V is 30 Mils.

However, due to the changing demands of the fixed and floating oil drilling platforms, there has been a greater need of instrumentations for measurement and communications. Off-the-shelf 300V instrumentation cables are not rugged enough for this environment. In addition, they do not have the necessary listings and type approval certificates. The 600V Type P cables, on the other hand, are too large to fit the connectors utilized on the instruments, and are too cumbersome to use.

In 2001, the cable construction section was removed from IEEE 45, and made into a new recommended practice called IEEE 1580-2001. This new recommended practice now has a section for cables rated, phase-to-phase, "0-300" volts, in sizes from 22 AWG to 16 AWG.

IEC publication 92-3 has two categories of low voltage cables: 750V & 250V. The insulating compounds that are allowed include EPR and XLPE. There are major differences between the IEC 250V and the IEEE 1580-2001, 300V cables as detailed in the following report.

## IEEE 1580-2001:

This new IEEE recommended practice is invoked by IEEE 45-2002 for cable constructions for use on Shipboard and Fixed or Floating Platforms. In Table 15 of this standard, the insulation thickness for Type P cables, rated 0-300 V, phase-to-phase is given as follows:

Conductor	Type P Insulation Thickness
22 AWG – 19 AWG:	15 Mils (0.38 mm)
18 AWG – 16 AWG:	20 Mils (0.50 mm)

## Listing By INTERTEK ETL SEMKO:

Rockbestos-Surprenant's 300V Type P cables have passed the following tests at Intertek Testing Services NA:

- 1) Physical properties of the Type P insulation, both aged and unaged.
- 2) Accelerated Water Absorption – Electrical Method (EM-60).
- 3) Insulation Resistance Constant,  $K > 20,000$  meg-ohms 1000 ft
- 4) IEEE 1202 Vertical Cable Tray Flame Test at 70,000 Btu/hr with a maximum burn (char) height of 1.5 meters (4ft 11in).

On the basis of the above passing results, ITS has given Rockbestos-Surprenant a listing for the 300V cables to IEEE 1580-2001. *Rockbestos-Surprenant is the first company to receive this listing from a NRTL lab.*

## Listing By Underwriters Laboratories (UL):

Rockbestos-Surprenant has also obtained a listing from UL for 300 V multiple conductor signal and instrumentation cables as follows:

- 1) Type X110 (Type P) rated at 110°C, 300V.
- 2) Shields: optional, includes Aluminum/Polyester foil or braided Copper shields.
- 3) Inner/Outer Jackets: Black Neoprene
- 4) Armor: Tinned Copper or Bronze braids
- 5) Optional Marking: "-40°C" and/or FT4

## Mud Resistance:

ITS has given Rockbestos-Surprenant a listing for the 300V cables with an overall Exane<sup>®</sup> jacket. This is a special listing allowed for in IEEE 45. This listing will allow Rockbestos-Surprenant to provide cables resistant to Ester based drilling muds. *These represent the first NRTL listed 300 volt, drilling mud resistant cables available in the industry.*

A summary of the two listings from ITS are as follows:

- 1) 300V Type P, Exane insulation, Overall **Neoprene** Jacket, including Type BS.
- 2) 300V Type P, Exane insulation, Overall **EXANE**<sup>®</sup> Jacket, including Type BS.

## **IEC 92-3 Low Voltage Cables:**

In Amendment No. 1 to Publication 92-3, IEC allowed for the following low voltage cables:

- 1) 440/750V cables (phase-ground/phase-phase)
- 2) 150/250V cables (phase-ground/phase-phase)

The approved insulating compounds being, Butyl Rubber, Silicone Rubber, EPR, PVC, and XLPE. Because of these materials, the required Minimum Average Thickness of the insulation is 0.7 mm (28 Mils) for XLPE, and 0.8 mm (31.5 Mils) for the other insulating compounds.

It is to be noted that IEC does not have corresponding cable tests as those detailed for the 300V cables above. Instead, IEC has test requirements for the insulation and jackets. Some of the differences are:

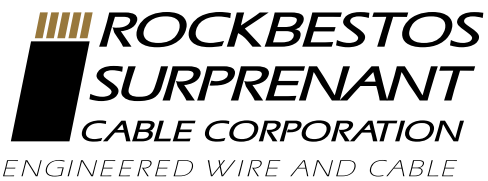
- 1) Insulation Resistance Constant,  $K > 12000 \text{ meg-ohms} \cdot 1000 \text{ ft.}$  (IEEE 1580 is  $> 20000 \text{ meg-ohm} \cdot 1000 \text{ ft.}$ )
- 2) There is no requirement for a flame test on the single conductor. Exane<sup>®</sup> passes the VW-1 flame test on 1/C, and the IEEE 1202 (FT-4) test on 1/C 18 AWG with 30 Mils insulation.
- 3) There is no requirement in the IEC for the initial SIC value (IEEE 1580 says this must be  $< 6$  after 24 hrs of immersion in water).
- 4) The change in capacitance, 1st day – 14th day: IEC  $< 15\%$ ; IEEE 1580  $< 3\%$  for Type P.
- 5) The IEC cables are only rated for 250V, Max and not 300V per IEEE 1580.

*Taking all factors into consideration, the Type P 300V cables are superior in performance to the above mentioned equivalent IEC cables.*

## **Type Approval Certificates:**

The following type approval certificates are currently under investigation:

- 1) Det Norske Veritas (DNV)
- 2) American Bureau of Shipping (ABS)



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