TECHNICAL NEWS
from
THE OKONITE COMPANY

Engineering Information for the Professional Engineer

October, 2005 Edition: 0019

LOW SMOKE JACKETS

A low smoke jacket describes a compound that evolves little or no smoke when exposed to a fire. The jacket is flame retardant and passes the IEEE 383, IEEE 1202 and the UL equivalent 70,000 Btu/hr vertical tray flame tests dependent on cable construction.

The jacket is also characterized as a non-halogenated compound. This trait is becoming more attractive as regulatory authorities review the use of materials containing chlorine.

These low smoke compounds can be processed as either a thermoplastic or thermoset material. The selection is dependent on customer specification requirements and cable construction.

The application is usually found in the Mass Transit industry in enclosed areas where the general public is present. The outer jacket on 1/C traction power cables, multi-conductor signal and communication cables, are typical uses. The jacket is also used on 1/C medium voltage power cable and low voltage tray cable. There is no restriction for use in conduit, direct buried or in cable trays.

The low smoke characteristics are determined and measured by preparing a 4" x 4" x 100 mil slab of the material. The slab is exposed to a fire source inside a chamber. The ability to view a light source at the back of the chamber determines the low smoke values. ASTM E662 is the primary reference for conducting the test.

ICEA Publication T-33-655 titled “Guide For Low Smoke, Halogen-Free (LSHF) Polymeric Cable Jackets” describes the overall application as;

“There are cable applications where consideration of the cable combustion performance should include not only the potential for fire propagation, but also the potential for damage due to the generation of smoke and acid gases.”

Okonite is prepared to offer our low smoke thermoplastic or thermoset compounds for those applications requiring low smoke characteristics.

Following is a table summarizing the physical characteristics of Okonite’s low smoke, non-halogenated jackets.

J. V. Fitzgerald

THE OKONITE COMPANY

Specifying Standard

PHYSICAL CHARACTERISTICS of THE OKOCLEAR-TP JACKET

When tested in accordance with ICEA and UL requirements the low smoke, non-halogenated, flame resistant thermoplastic polyolefin (TPPO) jacket shall meet the guaranteed values presented below:

Properties tested for control of product.	**Guaranteed Values**
A. Physical Requirements–Unaged	
Tensile Strength, Minimum	1400 psi (9.6 N/mm^2)
Elongation at Rupture, %, Minimum	175
B. Aging Requirements	
Air Oven Test at 100°C for 168 hours	
Tensile Strength, % of Unaged Value, Minimum	80
Elongation, % of Unaged Value, Minimum	60

Properties, demonstrated by qualification testing, that are inherent to the formulation.

C. Aging Requirements	**Minimum % of Unaged, Retained**	
	Tensile	Elongation
Oil Immersion at 70°C for 4 hours (IRM 902)	90	90
Hydraulic Fluid 5606 for 24 hours at 50°C	60	60
Hydraulic Fluid 17672 for 24 hours at 50°C	60	60
Diesel Fuel for 24 hours at 50°C	60	60
Lube Oil 23699 for 24 hours at 50°C	60	60
Methanol for 24 hours at 20°C	60	60
Gasoline for 24 hours at 20°C	60	60
Salt Water for 24 hours at 20°C	90	90

D. Fire Resistance/Smoke/Toxicity	
Oxygen Index, ASTM D-2863, Minimum	37
NBS Smoke, ASTM E-666 (100 mil slab)	
Flame Mode 4 minutes, Maximum	20
20 Minutes, Maximum	125
Non-Flaming Mode 4 minutes, Maximum	50
20 Minutes, Maximum	350
Smoke Index, NES-711, (63 mil slab), Maximum	20
Toxicity Index, NES-713, Maximum	5
Acid Gas Equivalent, MIL-C-24643, %, Maximum	0.5
E. Ozone Resistance, 3 hours 2 300 ppm Ozone	No Cracks
F. Mechanical Water Absorption	
7 days at 70°C, Maximum	8 $mg./in.^2$ (1.23 mg/cm^2)
G. Electrical Properties	
Specific Surface Resistance, meg ohms, Minimum	200,000

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Specifying Standard

PHYSICAL CHARACTERISTICS
of
THE OKOCLEAR-TS JACKET

When tested in accordance with ICEA and UL requirements the low smoke, non-halogenated, crosslinked polyolefin (XLPO) jacket shall meet the guaranteed values presented below:

Properties tested for control of product.	**Guaranteed Values**
A. Physical Requirements–Unaged	
Tensile Strength, Minimum	1700 psi (11.8 N/mm^2)
Elongation at Rupture, %, Minimum	150
B. Aging Requirements	
Air Oven Test at 121°C for 168 hours	
Tensile Strength, % of Unaged Value, Minimum	85
Elongation, % of Unaged Value, Minimum	75
Oil Immersion, at 121°C for 18 hours (IRM 902)	
Tensile Strength, % of unaged vlaue, Minimum	60
Elongation, % of unaged value, Minimum	50

Properties, demonstrated by qualification testing, that are inherent to the formulation.

C. Aging Requirements	**Minimum % of Unaged, Retained**	
	Tensile	Elongation
Air Oven Test at 100°C for 168 hours	100	75
Air Oven Test at 150°C for 168 hours	60	60
Gasoline for 24 hours at 25°C	50	50
Oil Immersion, at 70°C for 4 hours (IRM 902)	80	80
Oil Immersion, at 125°C for 22 hours	60	50
Methanol for 24 hours at 25°C	50	50
MIL-A-17672 for 24 hours at 50°C	50	50
MIL-I-23699 for 24 hours at 100°C	50	50

D. Oxygen Index, ASTM D-2863, Minimum	35
E. Ozone Resistance, 24 hours @ 150ppm Ozone	No Cracks
F. Tear Strength, Minimum	35 lbs/in (6.25 kgs/cm)
G. Cold bend, 1 hour at -40°C, Minimum	No Cracks
H. Durometer, Shore A, Minimum	90
I. Gravimetric Water Absorption, 7 days @ 70°C Max.	20 mg/in^2 (3.08 mg/cm^2)
J. Acid Gas Equivalent MIL-C-24643, %, Maximum	0.2
K. Toxicity Index NES 713, Maximum	1.5
L. Smoke Index NES 711, Maximum	25

M. Smoke Generation, ASTM E662

D_s 4 Min. Uncorr. (max.)		D_m Corr. (max.)	
Flaming	Non-Flaming	Flaming	Non-Flaming
25	50	150	275