DOW™ Electrical & Telecommunications DFDA-1648 NT EXP1
Non-Halogen, Flame Retardant, Thermoplastic Jacket Compound

Overview

DFDA-1648 NT EXP1 is a thermoplastic, non-halogen, flame retardant jacketing compound. It is designed for general purpose cable jacket applications.

Features

DFDA-1648 NT EXP1 provides the following features:

- Processing and cabling attributes
  - Ease of extrusion, without the need for special screws
  - Good anti-scratch whitening
  - Good surface appearance (shining and smoothness)
  - Good crack resistant on majority of armored cables
- Excellent combustion properties (lower smoke, lower acidity)
- Excellent electricals
  - High volume resistivity (could be used as 0.6/1 kV insulation in dry conditions)
  - Low dielectric constant and dissipation factor
- Competitive mechanical properties (tensile elongation, tear strength, abrasion resistance, flexibility)
- Good thermal properties (low temperature performance, good hot deformation)
- Environmentally friendly (lead-free, halogen free, sulfur/antimony-free)
- Colorable with EVA based color concentrates

Specifications

For many cable designs, DFDA-1648 NT EXP1 will meet UL-1685, IEEE-383, CSA FT-4, IEC-60332-3C vertical tray cable burn tests, and IEC-61034 smoke generation tests

Physical	**Nominal Value**	**(English)**	**Nominal Value**	**(SI)**	**Test Method**
Density	1.45	g/cm³	1.45	g/cm³	ASTM D792
Mechanical	**Nominal Value**	**(English)**	**Nominal Value**	**(SI)**	**Test Method**
Tensile Strength	1700	psi	11.7	MPa	ASTM D638
Tensile Elongation (Break)	250	%	250	%	ASTM D638
Elastomers	**Nominal Value**	**(English)**	**Nominal Value**	**(SI)**	**Test Method**
Tear Strength	45.7	lbf/in	8.00	kN/m	ASTM D470
Hardness	**Nominal Value**	**(English)**	**Nominal Value**	**(SI)**	**Test Method**
Durometer Hardness					ASTM D2240
Shore A	93		93		
Shore D	46		46		
Thermal	**Nominal Value**	**(English)**	**Nominal Value**	**(SI)**	**Test Method**
Brittleness Temperature	-40.0	°F	-40.0	°C	ASTM D746
Hot Deformation					UL 1581
194°F (90°C)	1.3	%	1.3	%	
212°F (100°C)	2.7	%	2.7	%	
250°F (121°C)	87	%	87	%	
Oxidation Induction Time - Al pans, no screen, 60 ml oxygen/min (428°F (220°C))	32	min	32	min	ASTM D3895
Aging	**Nominal Value**	**(English)**	**Nominal Value**	**(SI)**	**Test Method**
Retention of Tensile Elongation - 7 days					ASTM D638
250°F (121°C)	80	%	80	%	
Retention of Tensile Strength - 7 days					ASTM D638
250°F (121°C)	100	%	100	%	

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Electrical	Nominal Value	(English)	Nominal Value	(SI)	Test Method
Volume Resistivity (73°F (23°C))	2.1E+14	ohms·cm	2.1E+14	ohms·cm	ASTM D257
Dielectric Constant					ASTM D150
60 Hz	3.80		3.80		
100 kHz	3.43		3.43		
1 MHz	3.50		3.50		
Dissipation Factor					ASTM D150
60 Hz	0.034		0.034		
100 kHz	7.0E-3		7.0E-3		
1 MHz	9.0E-3		9.0E-3		
Flammability	**Nominal Value**	**(English)**	**Nominal Value**	**(SI)**	**Test Method**
Oxygen Index	39	%	39	%	ASTM D2863
Acid Gas Emission Conductivity	0.630	µS/mm	0.630	µS/mm	IEC 754-2
Acid Gas Emission pH	5.30		5.30		IEC 754-2
Smoke (0.10 in (2.54 mm))	23.0		23.0		NES 711
Smoke Density					ASTM E662
Flaming Mode - D1.5 : 20.0 mil (508.0 µm)	1.4		1.4		
Flaming Mode - D1.5 : 0.10 in (2.54 mm)	1.5		1.5		
Flaming Mode - D4.0 : 20.0 mil (508.0 µm)	9.1		9.1		
Flaming Mode - D4.0 : 0.10 in (2.54 mm)	2.5		2.5		
Flaming Mode - Dm, (corr.) : 20.0 mil (508.0 µm)	22		22		
Flaming Mode - Dm, (corr.) : 0.10 in (2.54 mm)	110		110		
Non-flaming Mode - D1.5 : 20.0 mil (508.0 µm)	6.9		6.9		
Non-flaming Mode - D1.5 : 0.10 in (2.54 mm)	0.040		0.040		
Non-flaming Mode - D4.0 : 20.0 mil (508.0 µm)	55		55		
Non-flaming Mode - D4.0 : 0.10 in (2.54 mm)	28		28		
Non-flaming Mode - Dm, (corr.) : 20.0 mil (508.0 µm)	130		130		
Non-flaming Mode - Dm, (corr.) : 0.10 in (2.54 mm)	330		330		
Temperature Index (Burning) - Critical	> 572	°F	> 300	°C	NES 715
Toxicity	1.90		1.90		NES 713

Additional Information

Fluid Resistance:

- Oil , IRM #902, 7 days, 23°C
  - Tensile Strength Retention: 87.6%
  - Elongation Retention: 89.8%
- Oil , IRM #902, 4 hrs, 70°C
  - Tensile Strength Retention: 75.9%
  - Elongation Retention: 86.1%
- Turbine Fuel, JP-5, MIL-T-5624, 24 hrs, 23°C
  - Tensile Strength Retention: 63.8%
  - Elongation Retention: 74.1%

Extrusion Notes

DFDA-1648 NT EXP1 can be processed on commercial thermoplastic extrusion equipment. Processing practices necessary to achieve optimum characteristics will be dependent on the particular equipment used and can be determined only by extrusion trials.

Typical Extrusion Conditions

- Typical commercial extrusion conditions are shown below as a guide. Each extrusion system is unique and will require optimization of these conditions for the specific unit.

EXTRUDER

- Screw L/D: 20:1 to 24:1
- Screw Type: Single Flight
- Compression Ratio: 2:1 to 3:1
- Screenpack: 12 or 20 mesh
- Draw-Down Ratio (DDR for semi pressure or tube on): Up to 3.5

TEMPERATURE PROFILE

- BARREL:
  - Feed Zone: 266°F (130°C)
  - Center Zones: 284°F (140°C)
  - Metering Zone: 293°F (145°C)
- CROSSHEAD:
  - Head: 320°F (160°C)
  - Die: 320°F (160°C)
  - Melt Temperature: < 338°F (170°C)
- SCREW:
  - Circulating Water: Neutral

Compound Drying

- Drying before extrusion in a dehumidifying hot air dryer for a minimum of 6 hours at 140°F (60°C) is recommended to avoid jacket porosity and to improve the extrusion quality. Do not heat over 195°F (90°C).

Notes

These are typical properties only and are not to be construed as specifications. Users should confirm results by their own tests.

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