



UNIGARD™ RE DFDE-1638 NT

Non-Halogen, Flame Retardant, Thermoplastic Jacket Compound

Overview

UNIGARD™ RE DFDE-1638 Natural is a non-halogen, highly flame retardant, thermoplastic, low smoke, low corrosivity, and low toxicity compound. It is designed for general purpose cable jacket applications. Used as jacket, it passes the IEEE-383/UL-1581/UL-1685 [Limited Smoke Test] vertical tray cable burn tests. Cable construction, of course, plays an important role in flame performance. It can be used as a jacket on cables operating at up to 90°C.

This compound can replace PVC, low smoke PVC, and halogenated rubbers as a jacket with excellent fire safety (low smoke, low corrosivity, and low toxicity) and good property balance. This compound meets or exceeds many of industry jacket specifications such as UL-1277 Tray Cable.

As a non-halogen flame retardant jacket, UNIGARD™ RE DFDE-1638 Natural is also designed to replace conventional non-halogen jacket products. It can withstand an extrusion temperature up to 180°C, and can be extruded with typical single-flight metering PE screws.

Main Characteristics:

- Highly flame retardant
- Environmentally friendly (lead free, halogen-free, sulfur/ antimony-free)
- Low smoke, low corrosivity and low toxicity
- Ease of extrusion and no special screw required
- Good balance of toughness and flexibility

Physical	Nominal Value (English)	Nominal Value (SI)	Test Method
Density	1.48 g/cm ³	1.48 g/cm ³	ASTM D1505
Environmental Stress-Cracking Resistance (ESCR) ¹			ASTM D1693
10% Igepal, F0	720 hr	720 hr	
Mechanical	Nominal Value (English)	Nominal Value (SI)	Test Method
Tensile Strength	2130 psi	14.7 MPa	ASTM D638
Tensile Elongation (Break)	150 %	150 %	ASTM D638
Flexural Modulus - 1% Secant	20000 psi	138 MPa	ASTM D790
Elastomers	Nominal Value (English)	Nominal Value (SI)	Test Method
Tear Strength	35.0 lbf/in	6.13 kN/m	ASTM D470
Hardness	Nominal Value (English)	Nominal Value (SI)	Test Method
Durometer Hardness (Shore A)	96	96	ASTM D2240
Thermal	Nominal Value (English)	Nominal Value (SI)	Test Method
Brittleness Temperature	-11.2 °F	-24.0 °C	ASTM D746
Hot Deformation			UL 1581
194°F (90°C)	4.0 %	4.0 %	
212°F (100°C)	4.0 %	4.0 %	
250°F (121°C)	20 %	20 %	
Aging	Nominal Value (English)	Nominal Value (SI)	Test Method
Retention of Tensile Elongation			ASTM D638
10 days : 230°F (110°C)	78 %	78 %	
7 days : 250°F (121°C)	80 %	80 %	
Retention of Tensile Strength			ASTM D638
10 days : 230°F (110°C)	110 %	110 %	
7 days : 250°F (121°C)	110 %	110 %	
Electrical	Nominal Value (English)	Nominal Value (SI)	Test Method
Volume Resistivity (73°F (23°C))	1.9E+15 ohms-cm	1.9E+15 ohms-cm	ASTM D257
Dielectric Constant (60 Hz)	3.90	3.90	ASTM D1531
Dissipation Factor (60 Hz)	0.013	0.013	ASTM D1531

Flammability	Nominal Value (English)	Nominal Value (SI)	Test Method
Oxygen Index	35 %	35 %	ASTM D2863
Acid Gas Emission Conductivity	29.0 μ S/cm	29.0 μ S/cm	IEC 60754-2
Acid Gas Emission pH	4.40	4.40	IEC 60754-2
Acid Gas Test - Acid by Weight	< 0.060 %	< 0.060 %	MIL C-24643
Smoke	13.7	13.7	NES 711
Smoke Density			ASTM E662
Flaming Mode - D1.5 : 0.10 in (2.54 mm)	0.40	0.40	
Flaming Mode - D4.0 : 0.10 in (2.54 mm)	51	51	
Flaming Mode - Dm, (corr.) : 0.10 in (2.54 mm)	320	320	
Non-flaming Mode - D1.5 : 0.10 in (2.54 mm)	0.10	0.10	
Non-flaming Mode - D4.0 : 0.10 in (2.54 mm)	12	12	
Non-flaming Mode - Dm, (corr.) : 0.10 in (2.54 mm)	190	190	
Temperature Index (Burning) - Critical	> 572 °F	> 300 °C	NES 715
Toxicity	0.900	0.900	NES 713
Additional Information	Nominal Value (English)	Nominal Value (SI)	Test Method
Sunlight Resistance - 720 hr	Pass	Pass	UL 1581

UNIGARD™ RE DFDE-1638 Natural fitness for use in applications requiring fluid resistance need to be validated by the manufacturer and could be different from past experiences with DFDA-1638 Natural or DFDC-1638 Black. Upon request, Dow can provide consultation on the acceptability of UNIGARD™ RE DFDE-1638 Natural for specific fluid resistance requirements. However, manufacturers need to insure the performance on their manufactured cables per regulatory/standard requirements.

Extrusion Notes

Typical extrusion conditions are listed below. Exact conditions will depend upon the equipment used and the application.

Extruder

- Screw L/D: 24:1; 4 ½ in. diameter
- Screw Suggested: Straight PE screw
- Compression Ratio: Range of 2.0:1 to 3.0:1
- Screen Pack: 20-mesh screen

Pre-Drying

- Dow recommends drying UNIGARD™ RE DFDE-1638 Natural in a desiccant dryer for a minimum of 4 hours at 140°F (60°C). Do not go above 150°F (65°C).

Extrusion Temperatures

- The following temperature profile was used successfully in a 4 1/2 in. diameter, 24:1 L/D extruder. We recommend that you use it as a starting point. It may be necessary to optimize it for your given extruder and cable construction.
 - Barrel Feed Zone: 360° F
 - Barrel Transition Zone: 350° F
 - Barrel Metering Zone: 340° F
 - Crosshead Zone: 330° F
 - Actual Melt Temperature: <380°F
- The following flat temperature profile could also be used: 350°F to 380°F.
 - Actual Melt Temperature: <380°F
- For Customers familiar with processing DFDA-1638 Natural, the power draw and extruder pressure will be higher for UNIGARD™ RE DFDE-1638 Natural due to higher viscosity. Attempting to run at melt temperatures above 380°F can lead to foaming.

Tooling

- Tube-on and semi-pressure tooling will work. A short land die is preferred.

Air Gap/Cooling water

- A short air gap (~ 6 in.) and ambient water are recommended.

Coloring

- UNIGARD™ RE DFDE-1638 Natural is a colorable compound. Color masterbatch materials based on EVA copolymers and added at a 1-2 percent by weight level gives adequate color and disperses well in the extrusion process.

Notes

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

¹ No cracks

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