SI-LINK™ DFDA-5445 BK

Flame Retarding Masterbatch for Moisture Curable Power Cable Insulation

The Dow Chemical Company

Message:

DFDA-5445 BK is a flame retardant, carbon black filled masterbatch, and SI-LINK®PE is used together for large cables that need to meet the requirements of UL-44 horizontal combustion tests. This product can pass the requirement of horizontal combustion XHHW-2 on thicker cables. specifications

DFDA-5445 BK is used with 60% SI-LINK crosslinkable polyethylene DFDA-5451 NT and 5% DFDB-5480 NT catalyst masterbatch in 35% proportion for 2 AWG or thicker conduits. At this ratio, the XHHW-2, RHW-2 and RHH cable specifications specified in the UL-44 and UL-1571 and the underground access cable (USE-2) specifications specified in the UL-854 and UL-1581 can be met, including flame retardant performance. DFDA-5445 BK concentration increases, even cables as thin as 6 AWG can meet the requirements of horizontal combustion test.

DFDA-5445 BK is a highly filled, black flame retardant masterbatch used to add standard SI-LINK PE extrusion resin (DFDA-5451) and catalyst (DFDB-5480) moisture curing system. DFDA-5445 the flexibility of BK, the formula products added with this component can meet the requirements of horizontal combustion test in various cable specifications. Under normal circumstances, the addition of 55% DFDA-5445 BK can make cables as thin as 6 AWG pass the horizontal combustion test; the addition of 35% can make cables as thin as 2 AWG pass the horizontal combustion test. The formula can be optimized according to the cable specifications made and the selected UL sample specifications to reduce costs. Factors such as processing conditions, curing degree and conduit type may affect product performance, so it is up to the cable manufacturer to determine the best formula for its product.

General Information			
Uses	Low voltage insulation		
	Wire and cable applications		
Agency Ratings	UL 1581		
	UL 44		
	UL 854		
Forms	Particle		
Physical	Nominal Value	Unit	Test Method
Density	1.28	g/cm³	ASTM D1505
Melt Mass-Flow Rate (MFR) (190°C/2.16			
kg)	0.21	g/10 min	ASTM D1238
Mechanical	Nominal Value	Unit	Test Method
Tensile Strength ¹	19.8	MPa	ASTM D638
Tensile Elongation ² (Break)	350	%	ASTM D638
Aging	Nominal Value	Unit	Test Method
Tensile strength retention rate ³			ASTM D638
Carbon Arc Weathering, 300 hours	97	%	ASTM D638
Heat Aging, 7 days : 121°C	97	%	ASTM D638
Elongation retention rate ⁴			ASTM D638
Carbon Arc Weathering, 300 hours	92	%	ASTM D638
Heat Aging, 7 days : 121°C	94	%	ASTM D638
Thermal creep elongation ⁵	43	%	ICEA T-28-562
Additional Information			

Typical Formulation Effect on Horizontal Burn
Aluminum Wire Size: 2 AWG
Wall Thickness: 45 mil
60% DFDA-5451 NT
5% DFDB-5480 NT
35% DFDA-5445 BK
Horizontal Burn: PASS
System Density: 1.022 g/cc
Aluminum Wire Size: 4 AWG
Wall Thickness: 45 mil
50% DFDA-5451 NT
5% DFDB-5480 NT
45% DFDA-5445 BK
Horizontal Burn: PASS
System Density: 1.055 g/cc
Aluminum Wire Size: 2 AWG
Wall Thickness: 45 mil
40% DFDA-5451 NT
5% DFDB-5480 NT
55% DFDA-5445 BK
Horizontal Burn: PASS
System Density: 1.090 g/cc
For conductor sizes smaller than 6 AWG, Dow Wire & Cable Compound's DFDA-5400 flame retardant masterbatch should be used.

Extrusion	Nominal Value	Unit
Drying Temperature	60.0 - 70.0	°C
Drying Time	4.0 - 6.0	hr
Melt Temperature	170 - 180	°C

Extrusion instructions

Highly filled systems with carbon black are inherently hygroscopic and will, over a period of time, absorb moisture. Though the packaging used for DFDA-5445 Black is specifically designed to reduce moisture penetration, drying for 4 to 6 hours at 140°-160°F (60°-70°C) in a hopper drier with dehumidified air is recommended for optimum results. If desired, it may be dry mixed with Dow Wire & Cable Compound's DFDB-5480 Natural catalyst master-batch prior to being dried.SI-LINK® PE can be extruded as a thermoplastic, with ordinary polyethylene extrusion equipment. To prevent scorch, the die and cross-head should be as streamlined as possible, and its volume be as small as possible. Exact extrusion characteristics will be dependent on the equipment in use and can be determined only during cable trials. An approximate melt temperature of 170-180°C is recommended.SI-LINK PE systems require curing in a warm, humid environment. A water bath at 70-90°C or a sauna at 70-90°C and 50-90% relative humidity is ideal. Cure time is typically around 8 hours, but reel size, cable construction and exact sauna or water bath conditions all affect cure time. Each manufacturer must determine the required cure time for each cable construction.

NOTE

	Insulation (35% DFDA-5445 BK,
	60% SI-LINK [®] PE Cross-linkable
	Polyethylene DFDA-5451 NT and
	5% DFDB-5480 NT Catalyst
	Masterbatch). 14 AWG copper
	cable with 30 mil insulation
	thickness. Cured 16 hours at 90°C
1.	in water.
	Insulation (35% DFDA-5445 BK,
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	Insulation (35% DFDA-5445 BK, 60% SI-LINK® PE Cross-linkable Polyethylene DFDA-5451 NT and 5% DFDB-5480 NT Catalyst Masterbatch). 14 AWG copper cable with 30 mil insulation
	Insulation (35% DFDA-5445 BK, 60% SI-LINK® PE Cross-linkable Polyethylene DFDA-5451 NT and 5% DFDB-5480 NT Catalyst Masterbatch). 14 AWG copper cable with 30 mil insulation thickness. Cured 16 hours at 90°C
2.	Insulation (35% DFDA-5445 BK, 60% SI-LINK® PE Cross-linkable Polyethylene DFDA-5451 NT and 5% DFDB-5480 NT Catalyst Masterbatch). 14 AWG copper cable with 30 mil insulation thickness. Cured 16 hours at 90°C in water.

	Insulation (35% DFDA-5445 BK, 60% SI-LINK® PE Cross-linkable Polyethylene DFDA-5451 NT and
	5% DFDB-5480 NT Catalyst
	Masterbatch). 14 AWG copper
	cable with 30 mil insulation
	thickness. Cured 16 hours at 90°C
3.	in water.
	Insulation (35% DFDA-5445 BK,
	60% SI-LINK® PE Cross-linkable
	Polyethylene DFDA-5451 NT and
	5% DFDB-5480 NT Catalyst
	Masterbatch). 14 AWG copper
	cable with 30 mil insulation
	thickness. Cured 16 hours at 90°C
4.	in water.
	Insulation (35% DFDA-5445 BK,
	60% SI-LINK® PE Cross-linkable
	Polyethylene DFDA-5451 NT and
	5% DFDB-5480 NT Catalyst
	Masterbatch). 14 AWG copper
	cable with 30 mil insulation
	thickness. Cured 4 hours at 90°C in
5.	water.

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