Dow ENDURANCE™ HFDC-4202 EC

Overview

Dow ENDURANCE™ HFDC-4202 EC is a long-life, water-tree-retardant, unfilled, crosslinkable, low density polyethylene insulation compound designed for distribution and transmission power cable applications. It has a very low level of contamination and bears the designation Extra Clean (EC). HFDC-4202 EC has been designed to have a low level of additive bloom for a long storage life, low dusting and an enhanced degree of scorch retardance for long production run lengths during cable manufacture. The permanent tree-retardant additive provides improved performance in power cables in service involving exposure to moisture while retaining the excellent physical, electrical, and processing attributes of conventional, crosslinkable polyethylene.

DOW ENDURANCE™ HFDC-4202 EC compound provides electric utilities with:

• Advanced, next generation “water” tree-retardant technology, consistently outperforming conventional XLPE and conventional TR-XLPE in accelerated cable wet aging tests at ambient and elevated temperatures

• Proven in the field water tree retardance technology for over 25 years, at a broad cross section of geographical conditions, demonstrating excellent reliability and help achieving lowest life cycle costs

• Excellent electrical performance demonstrated by very high aged electrical strength and very low aged dissipation factor and power loss.

DOW ENDURANCE™ HFDC-4202 EC compound represents an advancement over conventional water tree-retardant, power cable insulation compounds. DOW ENDURANCE™ HFDC-4202 EC is recommended for the insulation of power distribution cables rated up to 46 kV and can be used for transmission cables rated up to 69 kV.

Specifications

DOW ENDURANCE™ HFDC-4202 EC tree-retardant compound is designed for use in power distribution and sub-transmission cables. DOW ENDURANCE™ HFDC-4202 EC provides improved wet electrical performance and is recommended, with or without moisture barriers, for use as cable insulation up to and including 69 kV applications. Cables insulated with HFDC-4202 EC, using sound commercial fabrication manufacturing practice, would be expected to meet the latest editions of the following specifications and regulations:

• ANSI/ICEA: S-94-649, S-97-682, S-93-639 / NEMA WC74 (TR-XLPE requirements)
• AEIC: CS8
• RUS 50-70 (U-1)
• CEA: WCWG-01, WCWG-02
• UL 1072
• IEC: 60502, 60840
• CENELEC: HD 620 S2
• DIN VDE 0276-620
• BSI BS 6622
• GB/T 12706
• DL/T 1070

Physical	Nominal Value	(English)	Nominal Value	(SI)	Test Method
Density [1] (73°F (23°C))	0.920	g/cm³	0.920	g/cm³	ASTM D792
Mechanical	**Nominal Value**	**(English)**	**Nominal Value**	**(SI)**	**Test Method**
Tensile Strength [2]	3200	psi	22.1	MPa	ASTM D638
Tensile Elongation [2]	530	%	530	%	ASTM D638
Thermal	**Nominal Value**	**(English)**	**Nominal Value**	**(SI)**	**Test Method**
Hot Set - Under Load/Without Load @ 392°F (392°F (200°C))	<100%/<5%	%	<100%/<5%	%	IEC 811-2-1
Aging	**Nominal Value**	**(English)**	**Nominal Value**	**(SI)**	**Test Method**
Retention of Tensile Elongation - 7 days [2]					ASTM D638
302°F (150°C)	> 75	%	> 75	%	
Retention of Tensile Strength - 7 days [2]					ASTM D638
302°F (150°C)	> 75	%	> 75	%	

Form No. 400-00285121en
Rev: 2020-03-06

Electrical	Nominal Value	(English)	Nominal Value	(SI)	Test Method
Volume Resistivity [3] (73°F (23°C))	> 1.0E+15	ohms·cm	> 1.0E+15	ohms·cm	ASTM D257
Dielectric Strength [4]					ASTM D149
0.125 in (3.18 mm), Method A (Short-Time)	660	V/mil	26	kV/mm	
0.125 in (3.18 mm), Method B (Step-by-Step)	580	V/mil	23	kV/mm	
Dielectric Constant [5] (73°F (23°C), 60 Hz)	2.30		2.30		ASTM D150
Dissipation Factor [5] (73°F (23°C), 60 Hz)	3.0E-4		3.0E-4		ASTM D150
Water-Tree Growth Rate [6]	10	%	10	%	ASTM D6097
Water-Tree Relative Size [7]	25	%	25	%	ASTM D6097

Additional Information

Nominal property values representing tests on molded, stress-relieved slabs. Cure times were 15 minutes at 175°C.

Cleanliness Requirements

DOW ENDURANCE™ HFDC-4202 EC meets high standards for cleanliness (extra clean) established for an unfilled, crosslinkable cable insulation compound. Throughout the production process, the product is tested to ensure a high level of cleanliness. Extruded tapes are scanned by an automatic inspection system in a clean room. The purity data is managed using an acceptance sampling procedure, which ensures that the product meets or exceeds Dow extra-clean standards.

In addition, a continuous stream of pellets is analyzed using a high resolution pellet inspector system designed for Dow's quality standard that exceeds industry requirements as well as complies with ICEA specifications. A review of the detected contamination is incorporated into our EC quality program

Storage

The environment or conditions of storage greatly influences the recommended storage time. Storage under extreme conditions may affect the quality, processing, or performance of the product. Storage should be in accordance with good manufacturing practices. The recommended storage conditions, in the original unopened packages, are dry conditions with temperatures between 50ºF and 104ºF (10°C and 40°C). When stored between 50°F and 86°F (10°C and 30°C), the product may be used by the customer for up to one year from the date of sale or two years from the date of manufacture, whichever comes first. The recommended maximum storage time is 1 year at 104°F (40°C). It is recommended that the practice of using the product on a first-in / first-out basis be established.

Packaging

DOW ENDURANCE™ HFDC-4202 EC can be delivered in different packaging types dependent on the specific materials handling needs. These packaging types could be in 1300lb/590 kg UNICLEAN™ octabins, 1300lb/590 kg top unloading octabins, 1000kg bottom unloading octabins or in 20MT van boxes. Please consult with your local Dow sales representative to discuss your packaging needs.

Extrusion Notes

DOW ENDURANCE™ HFDC-4202 EC provides excellent performance and outstanding output rates over a range of extrusion conditions. For optimum results, melt extrusion temperatures in the range of 115°C to 140°C (240°F to 285°F) are recommended, although higher melt temperatures may be possible on certain extrusion lines with due care. In general the use of a minimum 60 mesh screen pack system is recommended. However, specific processing recommendations can only be made when information about the application and actual extrusion and processing equipment types are known. It is recommended melt pressures and optionally melt temperatures should be monitored during cable production.

Notes

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

[1] ASTM D792/ISO 1183

[2] ASTM D638/IEC 60811-1-1

[3] ASTM D257/IEC 60093

[4] ASTM D149/IEC 60243-1

[5] ASTM D150/IEC 60250

[6] Rate is relative to rate for standard XLPE. FREQ = 1 kHz.

[7] Size is relative to size for standard XLPE.

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Published: 2016-07-21

Form No. 400-00285121en
Rev: 2020-03-06