# UNIGARD™ HP HFDA-1544 NT

# Halogenated Flame Retardant Insulation Compound

## The Dow Chemical Company

### Message:

#### Control cable insulation

UNIGARD<sup>™</sup>HP HFDA-1544 Natural is a flame-retardant, peroxide-cured polyethylene copolymer used as a wire insulation material. It is recommended to apply it to 600 volt power cables and control cables. It is suitable for wet and dry occasions such as UL XHHW-2 or Canadian Standards Association (CSA) RW-90 at an operating temperature of 90°C. When this product was developed, it was considered to widen its processing temperature window to reduce the scorch phenomenon in the extrusion system that can cause problems, and reduce odor and head drop due to the use of peroxide curing system. Specifications

HFDA-1544 Natural have been UL announced to meet the requirements of XHHW, XHHW-2, RHH, RHW, RHW-2, SIS, USE, USE-2 and VW-1 applications. The material is also applicable to applications specified by the Canadian Standards Association NMD-90 and RW-90.

Uses   Flame Retardant Insulation     Halogenated Insulation     Low voltage insulation     Wire and cable applications     Insulating material     Moisture-resistant insulating material     Processing Method     Protessing Method     Physical     Density     Mominal Value     Value     Mominal Value     Mosture-resistant insulation     Method     Protessing Method     Physical     Mominal Value     Value     Value     Mominal Value	General Information					
Iow volage insulation Wir and cable applications Insulating material Insulating material Noisure-resistant insulating materi	Uses	Flame Retardant Insulation				
Wire and able splications insulating material insulating material insulating material insulating material insulating material insulating material insulating material insulating material insulating material insulation processing MethodPartcleFormsPartcleIntText MethodProcessing MethodNormal ValueUnitText MethodDensity1.30gran <sup>1</sup> Stat MethodMechanicalNormal ValueUnitText MethodTensile Strength1.38MPaASTM D638Tensile Strength1.30%PaASTM D638Tensile Strength1.24MPaASTM D638Tensile Strength centor of Part MethodMandASTM D638Tensile Strength centor of Strength10%ASTM D638Tensile Strength centor of Astm DataMominal ValueMaterialTensile Strength centor of Astm Data%MoterialAgingNormal Value%MoterialTensile Strength Centor900Motin V100 ftU143Strength Centor of March MarkFast-Strength StrengthU144Centor of Mark MarkFast-Strength Strength Stre		Halogenated Insulation				
Instating material (biture-resistant insulating material)FormaParticeInformationRetMedded (biture-resistant insulation)MediandaNomina ValueNomina ValueAtt DisoFormation (Carlon)Nomina ValueNomina ValueAtt DisoFormation (Carlon)Nomina ValueNomina ValueAtt DisoFormation (Carlon)Nomina ValueNomina ValueNomina ValueFormation (Carlon)SonoNomina ValueNomina ValueFormation (Carlon)SonoNomina ValueNomina ValueFormation (Carlon)Nomina ValueNomina ValueNomina ValueFormation (Carlon)SonoNomina ValueNomina ValueFormation (Carlon)Nomina ValueNomina ValueNomina ValueFormation (Carlon)Nomina ValueNomin		Low voltage insulation				
Notiver-resistant insulating materialFormsParticeProcessing MethodExtrusionPhysicalNominal ValueInitDensity1.30g/cm <sup>2</sup> MechanicalNominal ValueInitMechanicalNominal ValueInitTensile Strength1.3NaTensile Strength1.3NaTensile Strength1.3NaFleural Modules 1% Scattor1.4StM D505Fleural Modules 1% Scattor1.4NaAgingNominal ValueNaAgingNominal ValueNaFleural Modules 1% Scattor1.0StM D638Elevard Modules 1% Scattor1.0StM D638Elevard Modules 1% Scattor1.0StM D638Instantersteristor 7 advs (21°)1.0NaInstantersteristor 7 advs (21°)1.0Na		Wire and cable applications				
FormsParticleProcessing MethodExtrusionPhysicalNominal ValueUnitDensity1.30g/cm³MechanicalNominal ValueUnitTensile Strength1.38MPaTensile Strength3.30%Result Modulus - 1% Secant1.24MPaAgingNominal ValueUnitAgingNominal ValueUnitAgingNominal ValueMPaAgingNominal ValueMPaAgingNominal ValueUnitElevaral Modulus - 1% Secant124MPaAgingNominal ValueUnitElongation retention 7 days (121°)100%Bordion retention 7 days (121°)100%Isulation resistance-in water (16°C)5000Mohms/1000 ftUnitSaltSomonoMohms/1000 ftIsulation resistance-in water (16°C)PassUnitAFlare test-Horizontal, No. 14 AWG (16.3 mm dia) 0.030 in. wallPassParsenderSononoCaAfter DefaceSononoCaFlaremater55.0°CAfter DefaceMorinal ValueDielectricalNominal ValueDielectrical (60+2)320SononoCaSononoSononoSononoCaSononoCaSononoSononoSononoCaSononoSononoSononoSononoSononoCaSononoSononoS		Insulating material				
Processing MethodExtursionPhysicalNominal ValueUnitTest MethodDensity1.30g/cm³ASTM D1505MechanicalNominal ValueUnitTest MethodTensile Strength13.8MPaASTM D638Tensile Elongation (Break)330%PaASTM D638Flexural Modulus - 1% Secant124MPaASTM D638AgingNominal ValueUnitTest MethodAgingNominal ValueUnitTest MethodTensile strength retention-7 days (121°C)100%ASTM D638Elongation retention rate-7 days (121°C)95%ASTM D638Deformation (121°C)100%UL 1581Insulation resistance-in water (16°C)5000Mohms/1000 ftUL 44VM-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia)PassLift And PassUnitThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D76Brittleness Temperature52.0°CASTM D76Brittleness Temperature32.0UnitTest MethodDielectric Constant (60 H2)32.0Nominal ValueInitDielectric Constant (60 H2)32.0Nominal ValueAstM D63		Moisture-resistant insulating mate	rial			
Processing MethodExtursionPhysicalNominal ValueUnitTest MethodDensity1.30g/cm³ASTM D1505MechanicalNominal ValueUnitTest MethodTensile Strength13.8MPaASTM D638Tensile Elongation (Break)330%PaASTM D638Flexural Modulus - 1% Secant124MPaASTM D638AgingNominal ValueUnitTest MethodAgingNominal ValueUnitTest MethodTensile strength retention-7 days (121°C)100%ASTM D638Elongation retention rate-7 days (121°C)95%ASTM D638Deformation (121°C)100%UL 1581Insulation resistance-in water (16°C)5000Mohms/1000 ftUL 44VM-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia)PassLift And PassUnitThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D76Brittleness Temperature52.0°CASTM D76Brittleness Temperature32.0UnitTest MethodDielectric Constant (60 H2)32.0Nominal ValueInitDielectric Constant (60 H2)32.0Nominal ValueAstM D63						
PhysicalNominal ValueUnitTest MethodDensity1.30g/cm³ASTM D1505MechanicalNominal ValueUnitTest MethodTensile Strength1.3.8MPaASTM D638Tensile Elongation (Break)330% AASTM D638Flexural Modulus - 1% Secant124MPaASTM D638AgingNominal ValueUnitTest MethodAgingNominal ValueUnitTest MethodTensile Strength retention-7 days (121°C)100%ASTM D638Elongation retention rate-7 days (121°C)95%ASTM D638Deformation (121°C)10%UL 1581Insulation resistance-in water (16°C)5000Mohms/1000 ftUL 44VW-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassUnitTest MethodFlame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassUnitTest MethodBrittleness Temperature-55.0°CASTM D746ElectricalBrittleness Temperature320UnitTest MethodDelectric Constant (60 Hz)3.20UnitTest Method	Forms	Particle				
Density1.30g/cm³ASTM D1505MechanicalNominal ValueUnitTest MethodTensile Strength13.8MPaASTM D638Tensile Elongation (Break)330%ASTM D638Flexural Modulus - 1% Secant124MPaASTM D790AgingNominal ValueUnitTest MethodTensile strength retention -7 days (121°C)100%ASTM D638Elongation retention rate-7 days (121°C)95%ASTM D638Deformation (121°C)100%UL 1581Insulation resistance-in water (16°C)50000Mohms/1000 ftUL 44VW-1 - Vertical Burn Test (No. 14 AWG) (1.63 m dia.)SesUL 44Flame test-Horizontal, No. 14 AWG (1.63 m dia.)SesUL 44ThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDelectric Constant (60 Hz)3.20UnitASTM D750	Processing Method	Extrusion				
MechanicalNominal ValueUnitTest MethodTensile Strength13.8MPaASTM D638Tensile Elongation (Break)330%ASTM D638Flexural Modulus - 1% Secant124MPaASTM D790AgingNominal ValueUnitTest MethodTensile strength retention-7 days (121°C)100%ASTM D638Elongation retention rate-7 days (121°C)10%ASTM D638Deformation (121°C)10%UL 1581Insulation resistance-in water (16°C)50000Mohms/1000 ftUL 44VW-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassLingLingFlame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueUnitTest MethodFlame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallSouth of SamLingLingFlemetest-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueUnitTest MethodFlemetest-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallSouth of SamLingLingFlemetest-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallSouth of SamLingTest MethodFlemetest-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueUnitTest MethodElectricalNominal ValueUnitTest MethodLingElectricalNominal ValueUnitTest MethodElectrical (Gi Hz)3.20LingASTM D53	Physical	Nominal Value	Unit	Test Method		
Tensile Strength13.8MPaASTM D638Tensile Elongation (Break)330%ASTM D638Flexural Modulus - 1% Secant124MPaASTM D790AgingNominal ValueUnitTest MethodTensile strength retention-7 days (121°C)100%ASTM D638Elongation retention rate-7 days (121°C)95%ASTM D638Deformation (121°C)10%U L1581Insulation resistance-in water (16°C)50000Mohms/1000 ftU L44VW-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassLUnitFlame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassLUnitTest MethodFleme test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueUnitTest MethodFlemetst-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueUnitTest MethodFlemetst-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueUnitTest MethodFlemetst-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueUnitTest MethodFlemetst-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueInitASTM D638Flemetst-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueInitASTM D638Flemetst-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueInitASTM D638Flemetst-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueInit	Density	1.30	g/cm³	ASTM D1505		
Tensile Elongation (Break)330% ASTM D638Flexural Modulus - 1% Secant124MPaASTM D790AgingNominal ValueUnitTest MethodTensile strength retention - 7 days (121°C)100% 0ASTM D638Elongation retention rate - 7 days (121°C)95% 0ASTM D638Deformation (121°C)10% 0Moms/1000 ftUL 1581Insulation resistance-in water (16°C)5000Mohms/1000 ftUL 44W-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassLine test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassUnitTest MethodFleme test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueUnitTest MethodFlemetest-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallSi.50°CASTM D746Brittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDielectric Constant (60 Hz)3.20Line test-Horizontal, No. 14 AUG	Mechanical	Nominal Value	Unit	Test Method		
Flexural Modulus - 1% Secant124MPaASTM D790AgingNominal ValueUnitTest MethodTensile strength retention-7 days (121°C)100%ASTM D638Elongation retention rate-7 days (121°C)95%ASTM D638Deformation (121°C)10%UL 1581Insulation resistance-in water (16°C)50000Mohms/1000 ftUL 44VW-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia.)PassUL 44Flame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in wallPassUL 144ThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDeformation (60 Hz)3.20S.0ASTM D150	Tensile Strength	13.8	MPa	ASTM D638		
AgingNominal ValueUnitTest MethodTensile strength retention-7 days (121°C)100%0ASTM D638Elongation retention rate-7 days (121°C)95%0MotodDeformation (121°C)10%0UL 1581Insulation resistance-in water (16°C)50000Mohms/1000 ftUL 44VW-1 - Vertical Burn Test (No. 14 AWG) (1.63 mm dia.) 0.030 in. wallPassUL 44Flame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassUnitTest MethodFlame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallNominal ValueUnitTest MethodFlame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wall>5.0°CASTM D746Brittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodBrittleness Temperature3.20UnitASTM D745	Tensile Elongation (Break)	330	%	ASTM D638		
Tensile strength retention-7 days (121°C)100%ASTM D638Elongation retention rate-7 days (121°C)95%ASTM D638Deformation (121°C)10%UL 1581Insulation resistance-in water (16°C)50000Mohms/1000 ftUL 44VW-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia.)PassUL 44Flame test-Horizontal, No. 14 AWG (1.63 mm dia.)PassUL 44ThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDielectric Constant (60 Hz)3.20	Flexural Modulus - 1% Secant	124	MPa	ASTM D790		
Elongation retention rate-7 days (121°C)95%ASTM D638Deformation (121°C)10%UL 1581Insulation resistance-in water (16°C)50000Mohms/1000 ftUL 44VW-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia.)PassUL 44Flame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassUL 44ThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDielectric Constant (60 Hz)3.20ASTM D150	Aging	Nominal Value	Unit	Test Method		
Deformation (121°C)10%UL 1581Insulation resistance-in water (16°C)50000Mohms/1000 ftUL 44VW-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassUL 44Flame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassUL 44ThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDielectric Constant (60 Hz)3.20	Tensile strength retention-7 days (121°C)	100	%	ASTM D638		
Insulation resistance-in water (16°C)50000Mohms/1000 ftUL 44VW-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia.)PassUL 44Flame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassUL 44ThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDielectric Constant (60 Hz)3.20S.20S.20	Elongation retention rate-7 days (121°C)	95	%	ASTM D638		
WW-1 - Vertical Burn Test (No. 14 AWG (1.63 mm dia.)PassUL 44Flame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassUl 44ThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDielectric Constant (60 Hz)3.20·LASTM D150	Deformation (121°C)	10	%	UL 1581		
(1.63 mm dia.)PassUL 44Flame test-Horizontal, No. 14 AWG (1.63 mm dia.) 0.030 in. wallPassUL 44ThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDielectric Constant (60 Hz)3.20-STM D150	Insulation resistance-in water (16°C)	50000	Mohms/1000 ft	UL 44		
(1.63mm dia.) 0.030 in. wallPassUL 44ThermalNominal ValueUnitTest MethodBrittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDielectric Constant (60 Hz)3.20-STM D150		Pass		UL 44		
Brittleness Temperature-55.0°CASTM D746ElectricalNominal ValueUnitTest MethodDielectric Constant (60 Hz)3.20STM D150		Pass		UL 44		
Electrical Nominal Value Unit Test Method   Dielectric Constant (60 Hz) 3.20 ASTM D150	Thermal	Nominal Value	Unit	Test Method		
Dielectric Constant (60 Hz) 3.20 ASTM D150	Brittleness Temperature	-55.0	°C	ASTM D746		
	Electrical	Nominal Value	Unit	Test Method		
Dissipation Factor (60 Hz) 3.0E-3 ASTM D150	Dielectric Constant (60 Hz)	3.20		ASTM D150		
	Dissipation Factor (60 Hz)	3.0E-3		ASTM D150		

Flammability	Nominal Value	Unit	Test Method
Oxygen Index	29	%	ASTM D2863

```
Additional Information
```

变形,UL-1581,121℃:10%拉伸强度保持,ASTM D638,在 121℃下 7 天后:100%拉伸伸长率保持,ASTM D638,在 121℃下 7 天后:95%

Figure 5: EM-60 Data HFDA-1544 Specific Inductance Capacitance in 90°C water

#### Extrusion instructions

The Extrusion Profile summarizes conditions for a commercial extrusion run on UNIGARD-HP HFDA-1544 Natural. Using these conditions with a standard polyethylene screw afforded high quality finished wire meeting the specifications set forth in Underwriters Laboratories, Subject 44 (XHHW, SIS, USE, A, B or C applications and VW-1). Exact extrusion characteristics will, of course, be dependent on the equipment in use and can only be determined during cable trials. Hopper drying at 150°F (65°C) before extrusion is recommended to remove moisture and diminish the possibility of die drool.Extrusion Profile Compound: HFDA-1544 on #14 7/STR (1.84 mm) Bare Copper, .030 in, 3 1/2 in Extruder Head: 235°F (113°C) Die: 180°F (82°C) Zones: RF 235, 235, 235, 240, 250°F (113, 113, 115, 121°C) Screw: 180°F (82°C) Stock: 250°F (121°C) Speed: Dependent on steam leg length. Allow for residence time of approximately 1 min. for 14 AWG (1.63 mm dia.) and 0.030 in, wall.

The information and data on this page are provided by manufacturers and document providers. SHANGHAI SUSHENG assumes no legal liability. It is strongly recommended to verify all technical data with material suppliers before final material selection. All rights belong to the original authors. If any infringement occurs, please contact us immediately.

#### Recommended distributors for this material

# Susheng Import & Export Trading Co.,Ltd.

Tel: +86 21 5895 8519

Phone: +86 13424755533

Email: sales@su-jiao.com

No. 215, Lianhe North Road, Fengxian District, Shanghai, China

