Amodel® HFFR-4133
polyphthalamide

Amodel® HFFR-4133 is a 33% glass-reinforced, halogen-free, flame retardant polyphthalamide (PPA) resin which offers enhanced processing capabilities for electrical and electronic applications. This resin is rated V-0 by Underwriters Laboratories using the UL94 test and is hot-water moldable. It has high flow and a wide processing window and offers good surface appearance, especially for larger electrical components.

This grade can withstand the demanding infrared reflow soldering process typically used in the electronics industry. It is well suited for connectors and other electrical devices requiring surface mount technology (SMT).

- Black: HFFR-4133 BK 324
- Natural: HFFR-4133 NT

General		
Material Status	• Commercial: Active	
Availability	• Asia Pacific • Europe	• North America
Filler / Reinforcement	• Glass Fiber, 33% Filler by Weight	
Additive	• Flame Retardant	
Features	• Chemical Resistant • Creep Resistant • Fast Molding Cycle • Flame Retardant • Good Dimensional Stability	• Good Electrical Properties • Good Stiffness • Halogen Free • High Strength • Hot Water Moldability
Uses	• Connectors	• Electrical/Electronic Applications
RoHS Compliance	• RoHS Compliant	
Automotive Specifications	• APTIV M8101001 [1]	• APTIV M8101002 [2]
Appearance	• Black	• Natural Color
Forms	• Pellets	
Processing Method	• Water-Heated Mold Injection Molding	

Physical	Typical Value	Unit	Test method
Density	1.46	g/cm³	ISO 1183/A
Molding Shrinkage			ISO 294-4
Across Flow	1.3	%	
Flow	0.32	%	
Water Absorption (24 hr)	0.28	%	ASTM D570

Mechanical	Typical Value	Unit	Test method
Tensile Modulus	12000	MPa	ISO 527-1
Tensile Stress [3] (Yield)	145 to 160	MPa	ISO 527-2
Tensile Strain [3] (Break)	1.9 to 2.3	%	ISO 527-2
Flexural Modulus	10800	MPa	ISO 178
Flexural Stress [3]	220 to 230	MPa	ISO 178

Impact	Typical Value	Unit	Test method
Notched Izod Impact Strength [3]	7.0 to 8.0	kJ/m²	ISO 180/1A
Unnotched Izod Impact Strength [3]	40 to 48	kJ/m²	ISO 180/1U

Hardness	Typical Value	Unit	Test method
Rockwell Hardness (R-Scale)	121		ASTM D785

Thermal	Typical Value	Unit	Test method
Deflection Temperature Under Load			ISO 75-2/Af
1.8 MPa, Unannealed	300	°C	
CLTE			ASTM E831
Flow : 0 to 90°C	2.0E-5	cm/cm/°C	
Flow : 120 to 200°C	1.2E-5	cm/cm/°C	
Transverse : 0 to 90°C	8.0E-5	cm/cm/°C	
Transverse : 120 to 200°C	1.3E-4	cm/cm/°C	

Electrical	Typical Value	Unit	Test method
Volume Resistivity [4]	1.3E+16	ohms·cm	ASTM D257
Dielectric Strength			ASTM D149
0.800 mm	30	kV/mm	
1.60 mm	26	kV/mm	
Dielectric Constant			ASTM D150
100 Hz	3.78		
1 MHz	3.53		
Dissipation Factor			ASTM D150
100 Hz	5.0E-3		
1 MHz	0.012		
Comparative Tracking Index (CTI)	600	V	IEC 60112
Comparative Tracking Index (CTI)	PLC 0		UL 746A

Flammability	Typical Value	Unit	Test method
Flame Rating [5] (0.40 mm, Black, Natural)	V-0		UL 94

Injection	Typical Value	Unit
Drying Temperature	120	°C
Drying Time	4.0	hr
Suggested Max Moisture	0.030 to 0.060	%
Rear Temperature	300	°C
Front Temperature	325	°C
Processing (Melt) Temp	340 to 350	°C
Mold Temperature [6]	90 to 100	°C

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Injection Notes

Injection Rate: 3 to 4 in/sec
Holding Pressure: 50% of injection pressure

Storage:

- Amodel® compounds are shipped in moisture-resistant packages at moisture levels according to specifications. Sealed, undamaged bags should be preferably stored in a dry room at a maximum temperature of 50°C (122°F) and should be protected from possible damage. If only a portion of a package is used, the remaining material should be transferred into a sealable container. It is recommended that Amodel® resins be dried prior to molding following the recommendations found in this datasheet and/or in the Amodel® processing guide.

Notes

Typical properties: these are not to be construed as specifications.

[1] The automotive specification APTIV M8101001 is for Amodel® HFFR-4133 NT.

[2] The automotive specification APTIV M8101002 is for Amodel® HFFR-4133 BK 324.

[3] Higher values are for NT and BK324.

[4] Specimens conditioned for 96 hours at 95°F (35°C) and 90% RH

[5] This flammability rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.

[6] Note that higher mold temperatures may be necessary for very thin-walled parts, or to achieve better quality surface finish.

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