

# Amodel® A-1133 HS

## polyphthalamide

Amodel® A-1133 HS is a 33% glass reinforced, heat stabilized polyphthalamide (PPA) with a high heat deflection temperature, high flexural modulus and high tensile strength. Excellent creep resistance and low moisture absorption are also characteristic of this resin. Testing conducted on samples dry as molded and samples

conditioned to 50% relative humidity in accordance with ISO-1110, Accelerated Method.

- Black: A-1133 HS BK 324
- Natural: A-1133 HS NT

### General

Material Status	• Commercial: Active		
Availability	• Africa & Middle East • Asia Pacific	• Europe • Latin America	• North America
Filler / Reinforcement	• Glass Fiber, 33% Filler by Weight		
Additive	• Heat Stabilizer		
Features	• Good Chemical Resistance • Good Creep Resistance • Good Dimensional Stability	• Good Stiffness • High Heat Resistance • High Stiffness	• High Strength • High Temperature Strength • Low Moisture Absorption
Uses	• Automotive Applications • Automotive Electronics • Automotive Interior Parts • Automotive Under the Hood • Cell Phones	• Connectors • Fuel Lines • Housings • Industrial Applications • Industrial Parts	• Machine/Mechanical Parts • Metal Replacement • Power/Other Tools
RoHS Compliance	• RoHS Compliant		

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## General

Automotive Specifications	<ul style="list-style-type: none"> <li>• 3M 11-0003-5762-1 X62 4200</li> <li>• ASTM D4000 PA121 G35 Color: BK324 Black</li> <li>• ASTM D4000 PA121 G35 Color: NT Natural</li> <li>• ASTM D6779 PA121G35</li> <li>• BOSCH N28 BN05-OX1 BN0510-GF35-0Anf01SO Color: NT Natural</li> <li>• BOSCH N28 BN05-OX1 BN0510-GF35-0Asw01SO Color: BK-324 Black</li> <li>• CHRYSLER MS-DB-478 CPN4242 Color: NT Natural</li> <li>• CHRYSLER MS-DB-478 Type A CPN3598 Color: BK324 Black</li> <li>• DELPHI M-53290 Color: BK324 Black</li> <li>• DELPHI M-53290 Color: NT Natural</li> <li>• DELPHI M-6071 Color: NT Natural</li> <li>• DELPHI MS-5216 Color: BK324 Black</li> <li>• DELPHI MS-5216 Color: NT Natural</li> <li>• FORD WSP-M4D843-A Color: BK324 Black</li> <li>• FORD WSP-M4D843-A Color: NT Natural</li> <li>• GM GMP.PPA.004 Color: BK324 Black</li> <li>• GM GMP.PPA.004 Color: NT Natural</li> <li>• GM GMW15702-110020 &gt;PPA+GF33&lt; (A4, A22, A64, BA633, DC1473, G20, KM1158, KS2300, LS20, RS9, SS260, Z1) Color: NT Natural<sup>1</sup></li> <li>• GM GMW16356P-PPA-GF35 Color: BK-324 Black</li> <li>• GM GMW16356P-PPA-GF35 Color: NT Natural</li> <li>• IMDS ID 21195756 Color: Black</li> <li>• IMDS ID 21195756 Color: Natural</li> <li>• TRW S-13318701 Color: BK543 Black</li> <li>• VALEO VMS-4470 Color: BK324 Black</li> <li>• VALEO VMS-4470 Color: NT Natural</li> <li>• YAZAKI YPES-25-02-135 Color: Colors</li> <li>• YAZAKI YPES-25-02-135 Color: NT Natural</li> </ul>
UL File NumberGlobal	• E95746
Appearance	• Black • Natural Color
Forms	• Pellets
Processing Method	• Injection Molding
Part Marking Code (ISO 11469)	• >PA6T/6I/66-GF33<

Physical	Dry	Conditioned Unit	Test method
Density	1.48	-- g/cm <sup>3</sup>	ISO 1183/A
Molding Shrinkage			ASTM D955
Flow	0.40	-- %	
Across Flow	0.80	-- %	
Water Absorption (24 hr)	0.23	-- %	ASTM D570

Mechanical	Dry	Conditioned Unit	Test method
Tensile Modulus			
--	13100	13100 MPa	ASTM D638
23°C	13400	-- MPa	ISO 527-2
100°C	10800	-- MPa	ISO 527-2
150°C	6700	-- MPa	ISO 527-2
175°C	4300	-- MPa	ISO 527-2

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<b>Mechanical</b>	<b>Dry</b>	<b>Conditioned</b>	<b>Unit</b>	<b>Test method</b>
<b>Tensile Stress</b>				
Break, 23°C	233	--	MPa	ISO 527-2
Break, 100°C	148	--	MPa	ISO 527-2
Break, 150°C	80.0	--	MPa	ISO 527-2
Break, 175°C	72.0	--	MPa	ISO 527-2
--	221	193	MPa	ASTM D638
<b>Tensile Elongation</b>				
Break	2.5	2.1	%	ASTM D638
Break, 23°C	2.5	--	%	ISO 527-2
Break, 100°C	2.9	--	%	ISO 527-2
Break, 150°C	8.7	--	%	ISO 527-2
Break, 175°C	8.5	--	%	ISO 527-2
<b>Flexural Modulus</b>				
--	11400	11400	MPa	ASTM D790
23°C	11600	--	MPa	ISO 178
100°C	9800	--	MPa	ISO 178
150°C	4000	--	MPa	ISO 178
175°C	3600	--	MPa	ISO 178
<b>Flexural Strength</b>				
--	317	254	MPa	ASTM D790
23°C	319	--	MPa	ISO 178
100°C	227	--	MPa	ISO 178
150°C	93.0	--	MPa	ISO 178
175°C	80.0	--	MPa	ISO 178
<b>Compressive Strength</b>				
	185	--	MPa	ASTM D695
<b>Shear Strength</b>				
	101	88.9	MPa	ASTM D732
<b>Poisson's Ratio</b>				
	0.41	--		ASTM E132
<b>Impact</b>				
<b>Charpy Notched Impact Strength (23°C)</b>				
	9.5	--	kJ/m <sup>2</sup>	ISO 179/1eA
<b>Charpy Unnotched Impact Strength (23°C)</b>				
	73	--	kJ/m <sup>2</sup>	ISO 179/1eU
<b>Notched Izod Impact</b>				
--	80	59	J/m	ASTM D256
23°C	8.8	--	kJ/m <sup>2</sup>	ISO 180/1A
<b>Unnotched Izod Impact</b>				
--	770	--	J/m	ASTM D256
23°C	49	--	kJ/m <sup>2</sup>	ISO 180/1U
<b>Hardness</b>				
<b>Rockwell Hardness (R-Scale)</b>				
	125	--		ASTM D785
<b>Thermal</b>				
<b>Deflection Temperature Under Load</b>				
0.45 MPa, Annealed, 3.20 mm	297	--	°C	ASTM D648
1.8 MPa, Unannealed	280	--	°C	ISO 75-2/A
1.8 MPa, Annealed, 3.20 mm	285	--	°C	ASTM D648

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<b>Thermal</b>	<b>Dry</b>	<b>Conditioned Unit</b>	<b>Test method</b>
Continuous Use Temperature			ASTM D3045
-- <sup>2</sup>	164	-- °C	
-- <sup>3</sup>	185	-- °C	
Melting Temperature	313	-- °C	ASTM D570 ISO 11357-3
CLTE			ASTM E831
Flow : 0 to 100°C	2.4E-5	-- cm/cm/°C	
Flow : 100 to 200°C	2.7E-5	-- cm/cm/°C	
Transverse : 0 to 100°C	5.5E-5	-- cm/cm/°C	
Transverse : 100 to 200°C	1.1E-4	-- cm/cm/°C	

<b>Electrical</b>	<b>Dry</b>	<b>Conditioned Unit</b>	<b>Test method</b>
Volume Resistivity	1.0E+16	2.0E+15 ohms·cm	ASTM D257
Dielectric Strength (3.20 mm)	21	21 kV/mm	ASTM D149
Dielectric Constant			ASTM D150
60 Hz	4.40	4.70	
1 MHz	4.20	4.30	
Dissipation Factor			ASTM D150
60 Hz	5.0E-3	9.0E-3	
1 MHz	0.017	0.022	
Arc Resistance	140	120 sec	ASTM D495
Comparative Tracking Index (CTI)	550	550 V	UL 746

<b>Flammability</b>	<b>Dry</b>	<b>Conditioned Unit</b>	<b>Test method</b>
Flame Rating <sup>4</sup> (3.20 mm)	HB	--	UL 94

<b>Optical</b>	<b>Dry</b>	<b>Conditioned Unit</b>	<b>Test method</b>
Transmittance <sup>5</sup>			ASTM D1003
1070 nm : 1.60 mm	> 30	-- %	
940 nm : 1.60 mm	> 30	-- %	

## Additional Information

Conditioned                      Conditioned to 50% RH in accordance with ISO-1110, Accelerated Method

<b>Injection</b>	<b>Dry Unit</b>
Drying Temperature	120 °C
Drying Time	4.0 hr
Suggested Max Moisture	0.045 %
Rear Temperature	304 to 318 °C
Front Temperature	316 to 329 °C
Processing (Melt) Temp	321 to 343 °C
Mold Temperature	135 °C

# Amodel® A-1133 HS

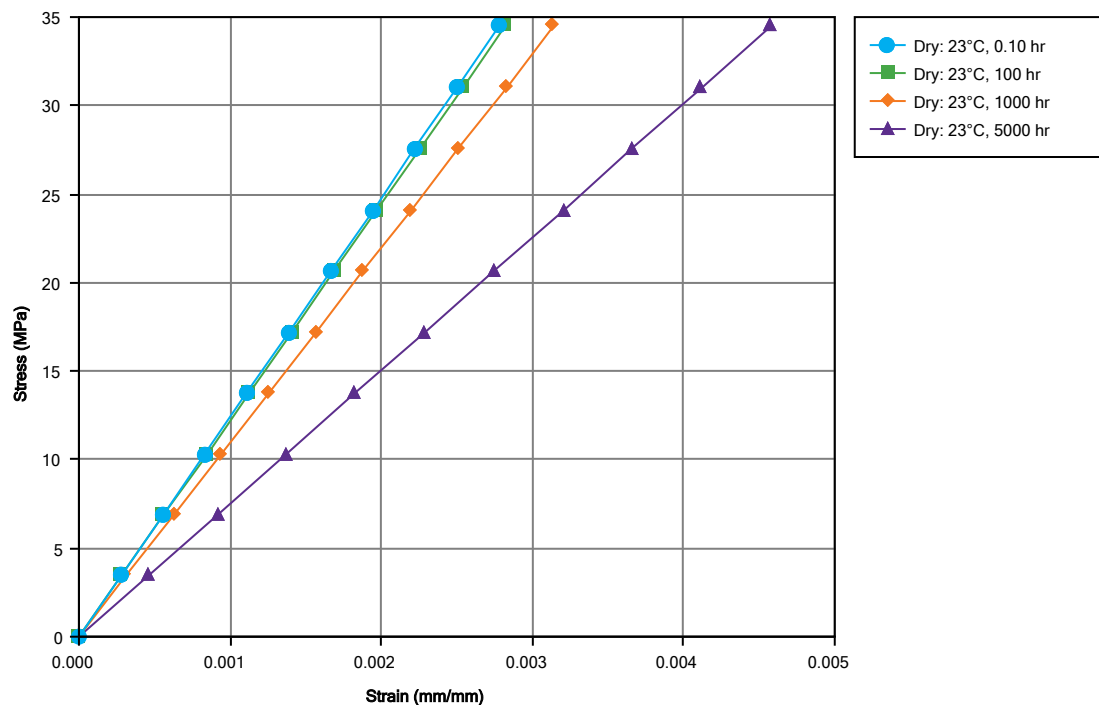
polyphthalamide

## Injection Notes

### 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.

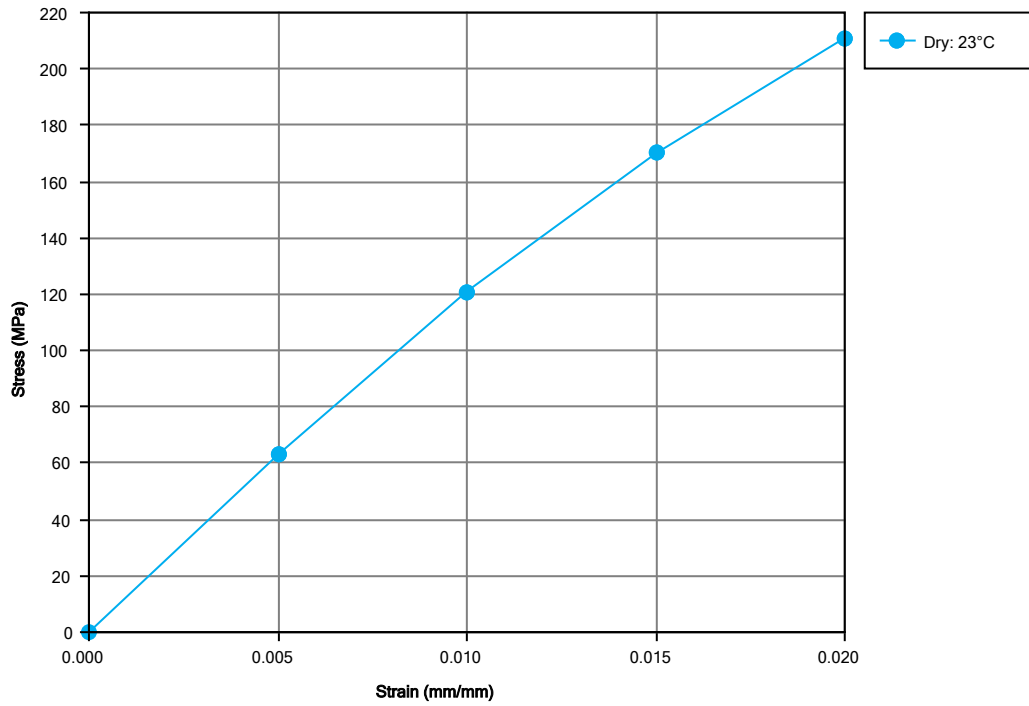
## Isochronous Stress vs. Strain (ISO 11403-1)



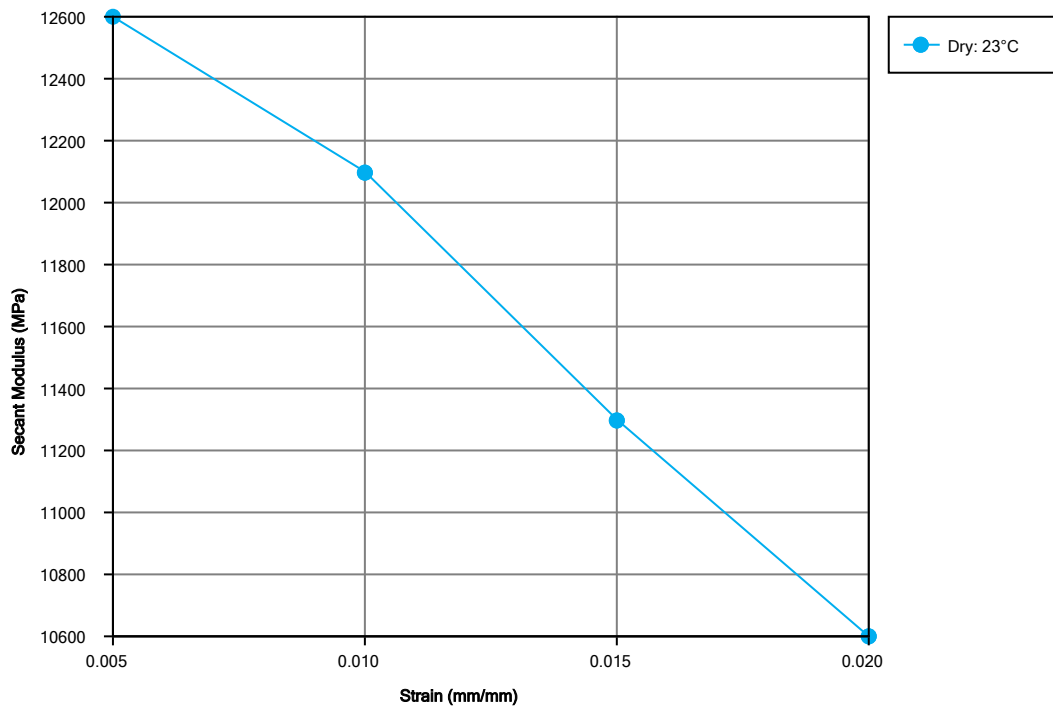
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## Isothermal Stress vs. Strain (ISO 11403-1)



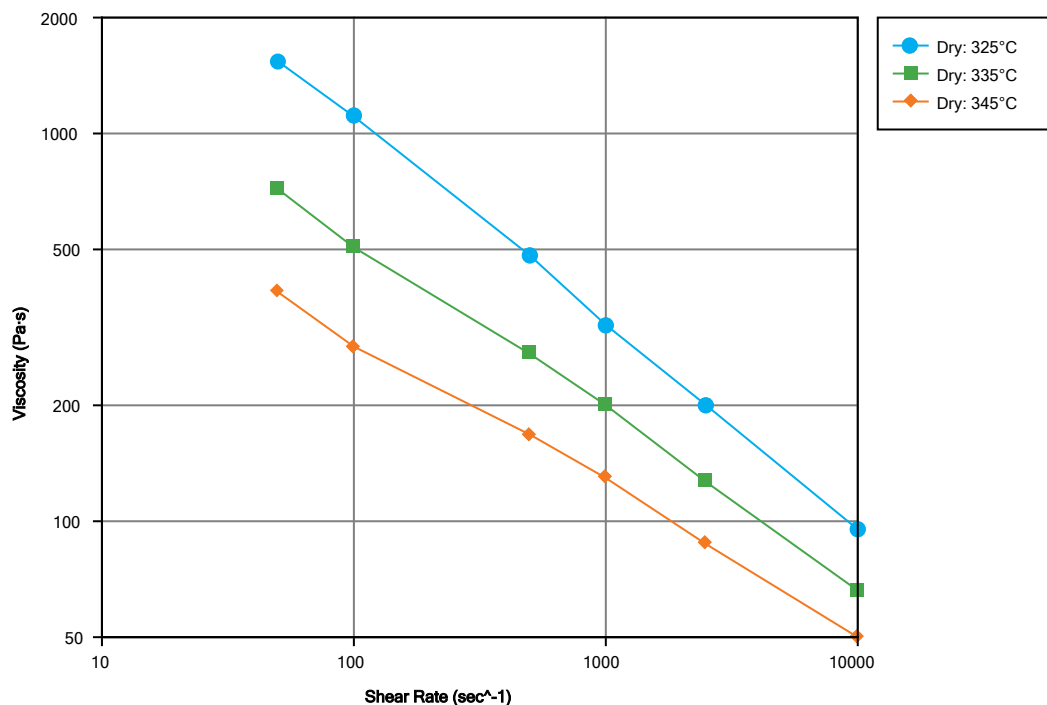
## Secant Modulus vs. Strain (ISO 11403-1)



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## Viscosity vs. Shear Rate (ISO 11403-2)



### Notes

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

<sup>1</sup> Limited to use by GMNA Powertrain in water baffles, use in any other application requires approval from GM.

<sup>2</sup> 20000 hr

<sup>3</sup> 5000 hr

<sup>4</sup> These flammability ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

<sup>5</sup> Transmittance for natural only.

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