

# Amodel® AS-1933 HS

## polyphthalamide

Amodel® AS-1933 HS is a 33% glass reinforced grade of polyphthalamide (PPA) resin developed specifically for improved performance in a 50/50 ethylene glycol and water environment. This material exceeds the performance required by the automotive industry for polymeric materials exposed to antifreeze at 226°F (108°C), even when tested at 275°F (135°C).

Potential applications include a variety of automotive components such as thermostat housings, heater core endcaps, heater hose connectors, and water inlets, outlets and valves.

- Black: AS-1933 HS BK 324

### General

Material Status	<ul style="list-style-type: none"> <li>• Commercial: Active</li> </ul>
Availability	<ul style="list-style-type: none"> <li>• Africa &amp; Middle East</li> <li>• Asia Pacific</li> <li>• Europe</li> <li>• Latin America</li> <li>• North America</li> </ul>
Filler / Reinforcement	<ul style="list-style-type: none"> <li>• Glass Fiber, 33% Filler by Weight</li> </ul>
Additive	<ul style="list-style-type: none"> <li>• Heat Stabilizer</li> </ul>
Features	<ul style="list-style-type: none"> <li>• Antifreeze Resistant</li> <li>• Chemical Resistant</li> <li>• Creep Resistant</li> <li>• Good Dimensional Stability</li> <li>• Good Glycol Resistance</li> <li>• Good Stiffness</li> <li>• Heat Stabilized</li> <li>• High Heat Resistance</li> <li>• High Strength</li> </ul>
Uses	<ul style="list-style-type: none"> <li>• Automotive Applications</li> <li>• Automotive Under the Hood</li> <li>• Housings</li> <li>• Industrial Applications</li> <li>• Industrial Parts</li> <li>• Machine/Mechanical Parts</li> <li>• Metal Replacement</li> <li>• Power/Other Tools</li> <li>• Thick-walled Parts</li> <li>• Valves/Valve Parts</li> </ul>
RoHS Compliance	<ul style="list-style-type: none"> <li>• RoHS Compliant</li> </ul>
Automotive Specifications	<ul style="list-style-type: none"> <li>• ASTM D4000 PA121 G35 Color: BK324 Black</li> <li>• ASTM D6779 PA121G35</li> <li>• BMW GS 93016 Color: BK 324 Black</li> <li>• BOSCH N28 BN05-OX1 BN0510-GF45-3Gsw01SO Color: BK324 Black</li> <li>• CHRYSLER MS-DB-478 CPN4116 Color: Black</li> <li>• FORD WSS-M4D861-A3 Color: BK324 Black</li> <li>• GM GMP.PPA.019 Color: Black</li> <li>• GM GMW16360P-PPA-GF35 Color: BK-324 Black</li> <li>• ISO 1874 PA6T/6I/66, MH, 12-120, GF33 Color: BK324 Black</li> <li>• PSA Peugeot-Citroën SPA X62 4203</li> <li>• VALEO PDT NVB 10 057 Color: BK324 Black</li> </ul>
Appearance	<ul style="list-style-type: none"> <li>• Black</li> </ul>
Forms	<ul style="list-style-type: none"> <li>• Pellets</li> </ul>
Processing Method	<ul style="list-style-type: none"> <li>• Injection Molding</li> </ul>

Physical	Typical Value	Unit	Test method
Density	1.45	g/cm <sup>3</sup>	ISO 1183/A
Molding Shrinkage			ASTM D955
Flow	0.20	%	
Across Flow	0.60	%	

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Physical	Typical Value	Unit	Test method
Water Absorption (24 hr)	0.21	%	ASTM D570
Mechanical	Typical Value	Unit	Test method
Tensile Modulus			
--	11700	MPa	ASTM D638
-- <sup>1</sup>	7580	MPa	ASTM D638
--	12600	MPa	ISO 527-2
Tensile Strength			
Break	221	MPa	ASTM D638
Break <sup>1</sup>	75.8	MPa	ASTM D638
Break	212	MPa	ISO 527-2
Tensile Elongation (Break)	2.5	%	ASTM D638 ISO 527-2
Flexural Modulus			
--	10800	MPa	ASTM D790
--	10600	MPa	ISO 178
Flexural Stress			
--	309	MPa	ISO 178
Yield	313	MPa	ASTM D790
Impact	Typical Value	Unit	Test method
Charpy Notched Impact Strength	10	kJ/m <sup>2</sup>	ISO 179/1eA
Charpy Unnotched Impact Strength	76	kJ/m <sup>2</sup>	ISO 179/1eU
Notched Izod Impact			
--	91	J/m	ASTM D256
-- <sup>1</sup>	53	J/m	ASTM D256
--	9.5	kJ/m <sup>2</sup>	ISO 180/1A
Thermal	Typical Value	Unit	Test method
Deflection Temperature Under Load			
1.8 MPa, Unannealed	277	°C	ASTM D648
1.8 MPa, Unannealed	278	°C	ISO 75-2/Af
Melting Temperature	312	°C	ISO 11357-3
Injection	Typical Value	Unit	
Drying Temperature	121	°C	
Drying Time	4.0	hr	
Suggested Max Moisture	0.030 to 0.060	%	
Hopper Temperature	79	°C	
Rear Temperature	304 to 318	°C	
Front Temperature	316 to 329	°C	
Processing (Melt) Temp	321 to 343	°C	
Mold Temperature	135	°C	

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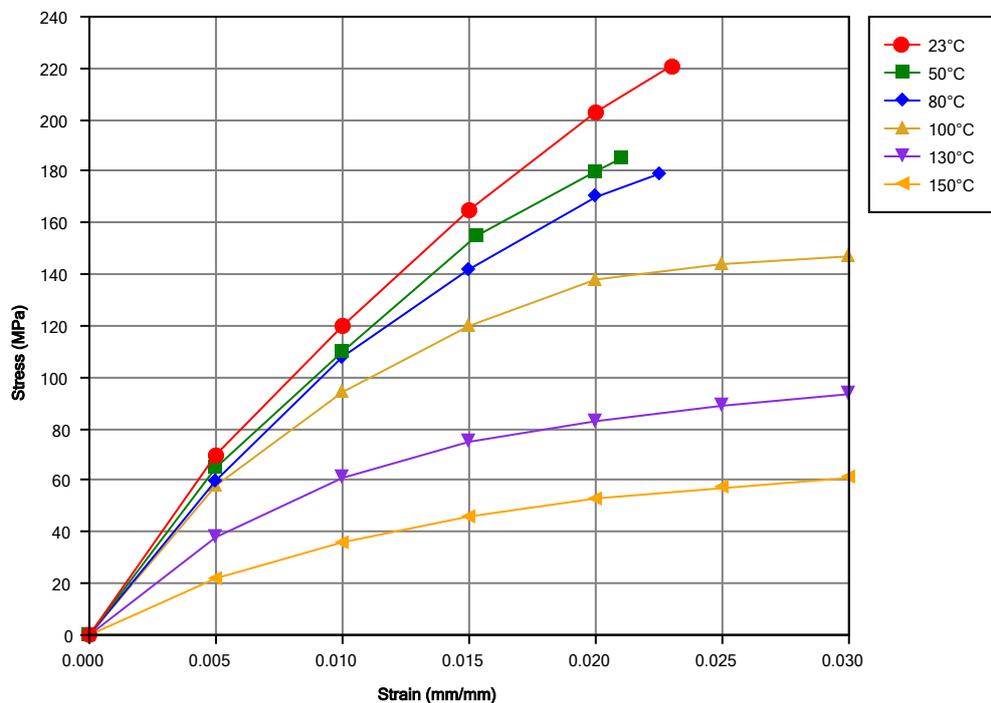
polyphthalamide

## 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.

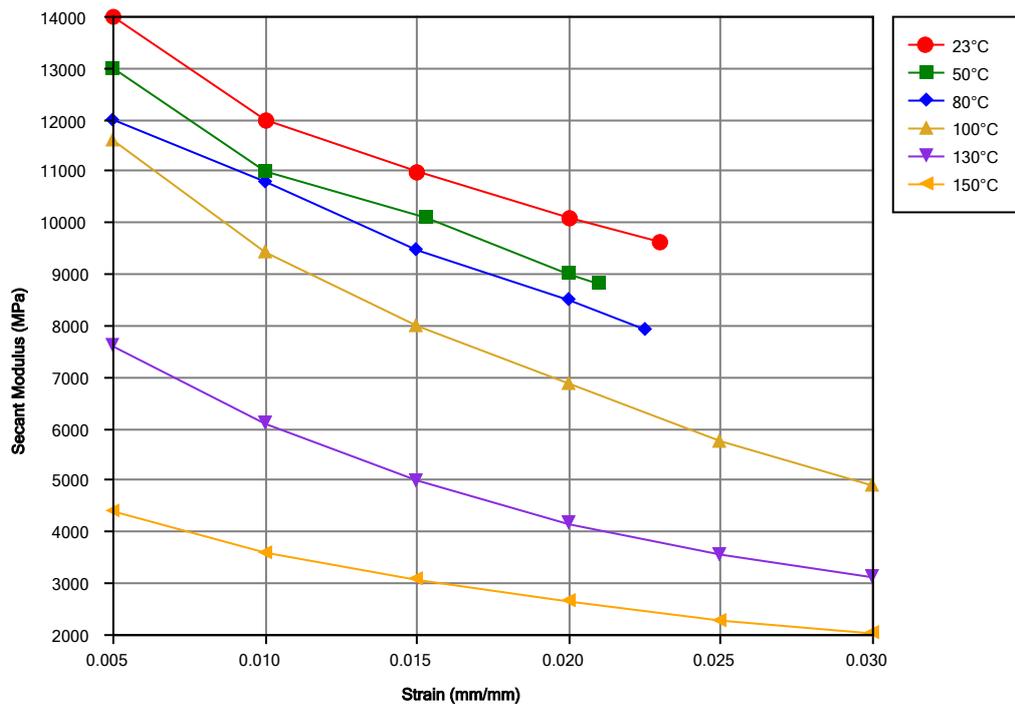
## Isothermal Stress vs. Strain (ISO 11403-1)



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



### Notes

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

<sup>1</sup> After Immersion in 50/50 Glycol/Water Mixture for 1,000 hours at 275°F (135°C)

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