

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

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Material Status	Commercial: Active	
Availability	 Africa & Middle East Asia Pacific Europe	Latin AmericaNorth America
Filler / Reinforcement	 Glass Fiber, 33% Filler by Weight 	Ī
Additive	 Heat Stabilizer 	
Features	 Antifreeze Resistant Chemical Resistant Creep Resistant Good Dimensional Stability Good Glycol Resistance 	Good StiffnessHeat StabilizedHigh Heat ResistanceHigh Strength
Uses	 Automotive Applications Automotive Under the Hood Housings Industrial Applications Industrial Parts 	 Machine/Mechanical Parts Metal Replacement Power/Other Tools Thick-walled Parts Valves/Valve Parts
RoHS Compliance	• RoHS Compliant	
Automotive Specifications	 ASTM D4000 PA121 G35 Color: BR ASTM D6779 PA121G35 BMW GS 93016 Color: BK 324 BIO BOSCH N28 BN05-OX1 BN0510-O CHRYSLER MS-DB-478 CPN4116 O FORD WSS-M4D861-A3 Color: BR GM GMP.PPA.019 Color: Black GM GMW16360P-PPA-GF35 Color ISO 1874 PA6T/6I/66, MH, 12-120, PSA Peugeot-Citroën SPA X62 4 VALEO PDT NVB 10 057 Color: BK 	ock GF45-3Gsw01SO Color: BK324 Black Color: Black K324 Black Or: BK-324 Black GF33 Color: BK324 Black 203
Appearance	• Black	
Forms	• Pellets	
Processing Method	 Injection Molding 	

Amodel® AS-1933 HS polyphthalamide

Density 1.45 g/cm³ ISO 183/A Molding Shrinkage ASTM D955 Flow 0.20 % Across Flow 0.60 % Water Absorption (24 hr) 0.21 % ASTM D570 Mechanical Typical Value Unit Test method Tensile Modulus 11700 MPa ASTM D638	Physical	Typical Value U	nit	Test method
Flow Across Flow Woter Absorption (24 hr) 0.20 % 0.6	Density	1.45 g	/cm³	ISO 1183/A
Across Flow 0.60 % Water Absorption (24 hr) 0.21 % ASTM D570 Mechanical Typical Value Unit Test method Tensile Modulus 11700 MPa ASTM D638 1 7580 MPa ASTM D638 1 12600 MPa ISO 527-1 Tensile Strength 221 MPa ASTM D638 Break 221 MPa ASTM D638 Break 212 MPa ISO 527-2 Tensile Elongation (Break) 2.5 % ASTM D638 Break 212 MPa ISO 527-2 Flexural Modulus - 10800 MPa ASTM D790 10800 MPa ASTM D790 10800 MPa ISO 178 Flexural Stress 309 MPa ISO 178 309 MPa ASTM D790 Impact Typical Value Unit Test method Charpy Notched Impact Strength 10 kJ/m² ISO 179/1eA Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eA Notched Izod Impact 91 J/m	Molding Shrinkage			ASTM D955
Water Absorption (24 hr) 0.21 % ASTM D570 Mechanical Typical Value Unit Test method Tensile Modulus 11700 MPa ASTM D638 1 7580 MPa ASTM D638 1 12600 MPa ISO 527-1 Tensile Strength 12600 MPa ASTM D638 Break 221 MPa ASTM D638 Break' 75.8 MPa ASTM D638 Break 212 MPa ISO 527-2 Tensile Elongation (Break) 2.5 % ASTM D638 Tensile Elongation (Break) 2.5 % ASTM D790 10800 MPa ASTM D790 10800 MPa ISO 178 Flexural Stress 10800 MPa ISO 178 Flexural Stress 309 MPa ISO 178 309 MPa ISO 178 Yield 313 MPa ASTM D790 Impact Typical Value Unit Test method Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eA Notched Izod Impact	Flow	0.20 %	•	
Mechanical Typical Value Unit Test method Tensile Modulus — 11700 MPa ASTM D638 —1 7580 MPa ASTM D638 —2 12600 MPa ISO 527-1 Tensile Strength Strength Break 221 MPa ASTM D638 Break Preak 212 MPa ASTM D638 Break Preak ASTM D638 Break Preak	Across Flow	0.60 %	•	
Tensile Modulus	Water Absorption (24 hr)	0.21 %)	ASTM D570
1 1700 MPa ASTM D638 1 7580 MPa ASTM D638 1 12600 MPa ISO 527-1 Tensile Strength Break 221 MPa ASTM D638 Break¹ 75.8 MPa ASTM D638 Break¹ 75.8 MPa ASTM D638 Break 212 MPa ISO 527-2 Tensile Elongation (Break) 2.5 % 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/m² ISO 179/1eA Charpy Unnotched Impact Strength 76 kJ/m² ISO 180 ISO 180 IA Thermal 75 kJ/m² ISO 180 IA	Mechanical	Typical Value U	nit	Test method
12600 MPa	Tensile Modulus			
Tensile Strength Serak 221 MPa ASTM D638 Break 221 MPa ASTM D638 Break 212 MPa ISO 527-2 Tensile Elongation (Break) 2.5 % ASTM D638 ISO 527-2 Tensile Elongation (Break) 2.5 % ASTM D638 ISO 527-2 Tensile Elongation (Break) 2.5 % ASTM D638 ISO 527-2 Tensile Elongation (Break) 2.5 % ASTM D638 ISO 527-2 Flexural Modulus		11700 M	1Pa	ASTM D638
Tensile Strength 221 MPa ASTM D638 Break 221 MPa ASTM D638 Break 212 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 ISO 178 — 10600 MPa ISO 178 Flexural Stress — 309 MPa ISO 178 ISO 178 ISO 178 ISO 178 ISO 178 ISO 179 ISO 180 ISO 179 ISO 180 ISO	1	7580 M	1Pa	ASTM D638
Break 221 MPa ASTM D638 Break¹ 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/m² ISO 179/leA Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/leA Notched Izod Impact 91 J/m ASTM D256 1 93 J/m ASTM D256 2 9.5 kJ/m² ISO 180/la 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		12600 M	1Pa	ISO 527-1
Break¹ 75.8 MPa ASTM D638 Break Break 212 MPa ISO 527-2 Tensile Elongation (Break) 2.5 % ASTM D638 ISO 527-2 Flexural Modulus 10800 MPa ASTM D790 ISO 178 — 10600 MPa ISO 178 Flexural Stress 309 MPa ISO 178 — 309 MPa ASTM D790 ISO 178 Yield 313 MPa ASTM D790 Impact Charpy Notched Impact Strength 10 kJ/m² ISO 179/1eA Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eA Notched Izod Impact 91 J/m ASTM D256 —1 91 J/m ASTM D256 —1 91 J/m ASTM D256 —2 9.5 kJ/m² 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	Tensile Strength			
Break 212 MPa ISO 527-2 Tensile Elongation (Break) 2.5 % ASTM D638 ISO 527-2 Flexural Modulus 10800 MPa ASTM D790 ISO 178 10600 MPa ISO 178 Flexural Stress 309 MPa ISO 178 ISO 178 Yield 313 MPa ASTM D790 Impact Typical Value Unit Test method Charpy Notched Impact Strength 10 kJ/m² ISO 179/1eA Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eA Notched Izod Impact 91 J/m ASTM D256 1 53 J/m ASTM D256 2 9.5 kJ/m² 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	Break	221 M	1Pa	ASTM D638
Tensile Elongation (Break) 2.5 % ASTM D638 ISO 527-2 Flexural Modulus 10800 MPa ASTM D790 ASTM D79	Break ¹	75.8 M	1Pa	ASTM D638
Flexural Modulus	Break	212 M	1Pa	ISO 527-2
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/m² ISO 179/1eA Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eU Notched Izod Impact 91 J/m ASTM D256 1 93 J/m ASTM D256 1 53 J/m ASTM D256 9.5 kJ/m² 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	Tensile Elongation (Break)	2.5 %	•	
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/m² ISO 179/1eA Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eU Notched Izod Impact 91 J/m ASTM D256 ¹ 9.5 kJ/m² 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	Flexural Modulus			
Flexural Stress		10800 M	1Pa	ASTM D790
309 MPa ISO 178 Yield 313 MPa ASTM D790 Impact Typical Value Unit Test method Charpy Notched Impact Strength 10 kJ/m² ISO 179/1eA Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eU Notched Izod Impact 91 J/m ASTM D256 1 53 J/m ASTM D256 2 9.5 kJ/m² 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		10600 M	1Pa	ISO 178
Yield 313 MPa ASTM D790 Impact Typical Value Unit Test method Charpy Notched Impact Strength 10 kJ/m² ISO 179/1eA Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eU Notched Izod Impact 91 J/m ASTM D256 1 53 J/m ASTM D256 2 9.5 kJ/m² 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	Flexural Stress			
Impact Typical Value Unit Test method Charpy Notched Impact Strength 10 kJ/m² ISO 179/1eA Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eU Notched Izod Impact 91 J/m ASTM D256 1 53 J/m ASTM D256 2 9.5 kJ/m² ISO 180/1A Thermal Typical Value Unit Test method Deflection Temperature Under Load 277 °C ASTM D648 1.8 MPa, Unannealed 278 °C ISO 75-2/Af		309 M	1Pa	ISO 178
Charpy Notched Impact Strength 10 kJ/m² ISO 179/1eA Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eU Notched Izod Impact 91 J/m ASTM D256 1 53 J/m ASTM D256 9.5 kJ/m² ISO 180/1A Thermal Typical Value Unit Test method Deflection Temperature Under Load 277 °C ASTM D648 1.8 MPa, Unannealed 278 °C ISO 75-2/Af	Yield	313 M	1Pa	ASTM D790
Charpy Unnotched Impact Strength 76 kJ/m² ISO 179/1eU Notched Izod Impact 91 J/m ASTM D256 1 53 J/m ASTM D256 9.5 kJ/m² ISO 180/1A Thermal Typical Value Unit Test method Deflection Temperature Under Load 277 °C ASTM D648 1.8 MPa, Unannealed 278 °C ISO 75-2/Af	Impact	Typical Value U	nit	Test method
Notched Izod Impact 91 J/m ASTM D256 1 53 J/m ASTM D256 9.5 kJ/m² ISO 180/1A Thermal Typical Value Unit Test method Deflection Temperature Under Load 277 °C ASTM D648 1.8 MPa, Unannealed 278 °C ISO 75-2/Af	Charpy Notched Impact Strength	10 k	J/m²	ISO 179/1eA
91 J/m ASTM D256 1 53 J/m ASTM D256 9.5 kJ/m² ISO 180/1A Thermal Typical Value Unit Test method Deflection Temperature Under Load 277 °C ASTM D648 1.8 MPa, Unannealed 278 °C ISO 75-2/Af	Charpy Unnotched Impact Strength	76 k	J/m²	ISO 179/1eU
1 53 J/m ASTM D256 9.5 kJ/m² 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	Notched Izod Impact			
9.5 kJ/m² 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		91 J,	/m	ASTM D256
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	1	53 J _/	/m	ASTM D256
Deflection Temperature Under Load 1.8 MPa, Unannealed 277 °C ASTM D648 1.8 MPa, Unannealed 278 °C ISO 75-2/Af		9.5 k	J/m²	ISO 180/1A
1.8 MPa, Unannealed 277 °C ASTM D648 1.8 MPa, Unannealed 278 °C ISO 75-2/Af	Thermal	Typical Value U	nit	Test method
1.8 MPa, Unannealed 278 °C ISO 75-2/Af	Deflection Temperature Under Load			
	1.8 MPa, Unannealed	277 °C	0	ASTM D648
Melting Temperature 312 °C ISO 11357-3	1.8 MPa, Unannealed	278 °C	2	ISO 75-2/Af
	Melting Temperature	312 °C	0	ISO 11357-3

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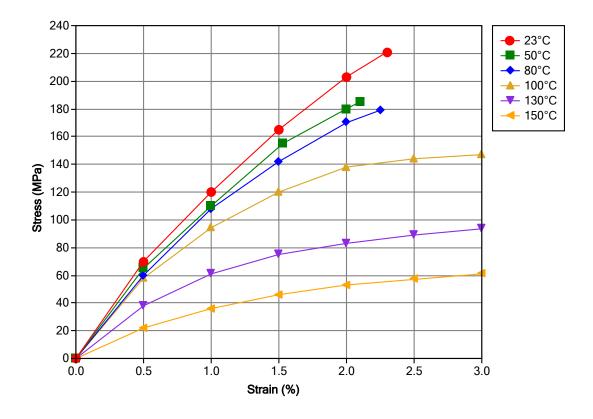
polyphthalamide

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	

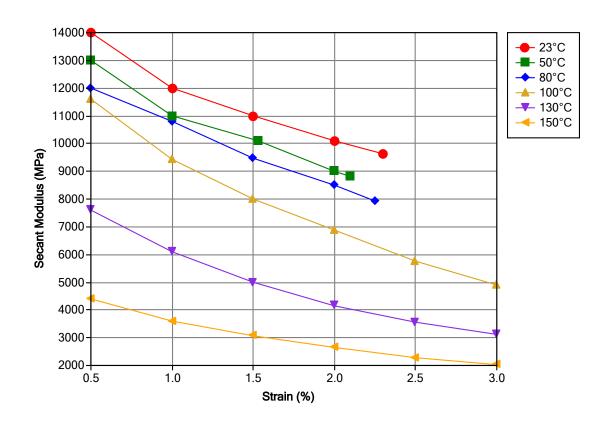
Injection Notes

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)



Secant Modulus vs. Strain (ISO 11403)



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Notes

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

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

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Safety Data Sheets (SDS) are available by emailing us or contacting your sales representative. Always consult the appropriate SDS before using any of our products.

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