

Product Data

A-1133 HS

AMODEL A-1133 HS resin is a 33% glass reinforced heat stabilized polyphthalamide (PPA) which exhibits 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, and it can be easily processed using conventional equipment and methods.

Table 1 Typical Properties of AMODEL A-1133 HS Resin - ASTM Test Methods (See Table 2 for Properties by ISO Methods)

Property	ASTM Test Method	Typical Values ⁽¹⁾					
		U.S. Customary Units			SI Units		
		DAM ⁽²⁾	50% RH ⁽³⁾	Units	DAM ⁽²⁾	50% RH ⁽³⁾	Units
Mechanical							
Tensile Strength	D 638	32.0	28.0	kpsi	221	193	MPa
Tensile Elongation	D 638	2.5	2.1	%	2.5	2.1	%
Tensile Modulus	D 638	1.90	1.90	Mpsi	13.1	13.1	GPa
Flexural Strength	D 790	46.0	36.9	kpsi	317	254	MPa
Flexural Modulus	D 790	1.65	1.65	Mpsi	11.4	11.4	GPa
Shear Strength	D 732	14.7	12.9	kpsi	101	89	MPa
Compressive Strength ⁽⁴⁾	D 695	26.9		kpsi	185		MPa
Poisson's Ratio		0.41			0.41		
Izod Impact, Notched	D 256	1.5	1.1	ft-lb/in	80	60	J/m
Izod Impact, Unnotched	D 4812	14		ft-lb/in	770		J/m
Rockwell Hardness	D 785	125		R	125		R
Thermal							
Heat Deflection Temperature ⁽⁵⁾	D 648						
at 264 psi (1.8 MPa)		545		°F	285		°C
at 66 psi (0.45 MPa)		567		°F	297		°C
Continuous Use Temperature	D 3045						
5,000 hr.		365		°F	185		°C
20,000 hr.		327		°F	165		°C
Melting Point	D 570	595		°F	313		°C
Flammability ⁽⁶⁾ , 1/8" (3.2 mm) bar	UL 94	HB			HB		
Coefficient of Thermal Expansion	E 831						
32° to 212°F (0° to 100°C), FD,TD ⁽⁷⁾		13, 33		µin/in°F	24, 60		µm/m°C
320° to 480°F (160° to 250°C),FD,TD ⁽⁷⁾		8, 72		µin/in°F	15, 130		µm/m°C
Electrical							
Dielectric Strength, 1/8" (3.2 mm)	D 149	520	520	V/mil	21	21	kV/mm
Volume Resistivity	D 257	1 x 10 ¹⁶	2 x 10 ¹⁵	ohm-cm	1 x 10 ¹⁶	2 x 10 ¹⁵	ohm-cm
High Voltage Arc Resistance	D 495	140	120	sec	140	120	sec
Comparative Tracking Index	D 3638	550	550	volts	550	550	volts
Dielectric Constant at 60 Hz	D 150	4.4	4.7		4.4	4.7	
Dielectric Constant at 10 ⁶ Hz		4.2	4.3		4.2	4.3	
Dissipation Factor at 60 Hz	D 150	0.005	0.009		0.005	0.009	
Dissipation Factor at 10 ⁶ Hz		0.017	0.022		0.017	0.022	
General							
Specific Gravity	D 792	1.48			1.48		
Moisture Absorption, 24 hours	D 570	0.21		%	0.21		%
Mold Shrinkage	D 955						
Flow Direction		0.4		%	0.4		%
Transverse Direction		0.8		%	0.8		%

⁽¹⁾ Actual properties of individual batches will vary within specification limits. Properties are typical of uncolored resin. Colorants or other additives will alter values.

⁽²⁾ Dry as molded.

⁽³⁾ Conditioned to 50% RH in accordance with ISO-1110, Accelerated Method.

⁽⁴⁾ Test specimen 0.5 x 0.5 x 1" (12.7 x 12.7 x 25.4 mm).

⁽⁵⁾ 0.125 inch (3.2 mm) thick specimens annealed in air for three hours at 320°F (160°C).

⁽⁶⁾ These flammability ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

⁽⁷⁾ FD = Flow direction; TD = Transverse direction.

Table 2 Typical Properties of AMODEL A-1133 HS Resin - ISO Test Methods

Property	Temp., °C	ISO Test Method	Typical Values ⁽¹⁾			
			U.S. Customary Units		SI Units	
			Value	Units	Value	Units
Mechanical						
Tensile Strength	23	527	33.8	kpsi	233	MPa
	100	527	21.5	kpsi	148	MPa
	150	527	11.5	kpsi	80	MPa
	175	527	10.4	kpsi	72	MPa
Tensile Elongation	23	527	2.5	%	2.5	%
	100	527	2.9	%	2.9	%
	150	527	8.7	%	8.7	%
	175	527	8.5	%	8.5	%
Tensile Modulus	23	527	1.94	Mpsi	13.4	GPa
	100	527	1.57	Mpsi	10.8	GPa
	150	527	0.97	Mpsi	6.7	GPa
	175	527	0.62	Mpsi	4.3	GPa
Flexural Strength	23	178	46.3	kpsi	319	MPa
	100	178	33.0	kpsi	227	MPa
	150	178	13.5	kpsi	93	MPa
	175	178	11.5	kpsi	80	MPa
Flexural Modulus	23	178	1.68	Mpsi	11.6	GPa
	100	178	1.42	Mpsi	9.8	GPa
	150	178	0.58	Mpsi	4.0	GPa
	175	178	0.52	Mpsi	3.6	GPa
Izod Impact, Notched	23	180/1A	4.2	ft-lb/in ²	8.8	kJ/m ²
Izod Impact, Unnotched	23	180/1U	23	ft-lb/in ²	49	kJ/m ²
Charpy Impact, Notched	23	179/1eA	4.5	ft-lb/in ²	9.5	kJ/m ²
Charpy Impact, Unnotched	23	179/1eU	35	ft-lb/in ²	73	kJ/m ²
Thermal						
Melting Point		11357-3	595	°F	313	°C
Heat Deflection Temperature at 1.8 MPa		75Af	536	°F	280	°C
General						
Specific Gravity		1183A	1.48		1.48	

(1) Actual properties of individual batches will vary within specification limits. Properties are typical of uncolored resin. Colorants or other additives will alter values.

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Drying

Resin should be dried before molding because excessive moisture will result in nozzle drool, reduced mechanical properties, poor surface appearance, and sprue sticking. Extremely wet resin will result in a foamy extrudate. The target moisture level is 0.03 to 0.06% (300 to 600 ppm) and the maximum recommended drying temperature is 135°C (275°F).

Although AMODEL resins are shipped with less than 0.15% moisture and packaged in moisture-proof foil-lined bags or boxes, the resin should be dried for optimum molding results. The preferred drying condition is 4 hours at 120°C (248°F). Alternatively, the resins can be dried for 8 hours at 90°C (194°F). In either case, a desiccant bed dryer with a dew point below -30°C (-22°F) should be used.

Drying Tips:

- Do not open containers until ready to process.
- Drying at temperatures higher than 125°C (257°F) may result in the darkening of natural colored pellets.
- If a thermogravimetric moisture analyzer is used, it should be set to 170°C (338°F)
- AMODEL resin in an open container needs to be dried as shown in the following table. The recommended drying time depends on how long the container has been open and the estimated relative humidity.

Drying Time at 120°C (248°F), hours

Relative Humidity, %	Elapsed Time From Container Opening, hours				
	0.25	0.5	1	2	3
30	4.5	5.0	5.5	6.0	6.5
50	5.0	5.5	6.0	7.0	7.5
75	5.0	5.5	6.5	7.5	8.0
100	5.5	6.5	7.5	8.5	9.0

Injection Molding

AMODEL A-1133 HS resin can be readily injection molded in most screw injection molding machines. A general purpose screw is recommended, with minimum back pressure.

Barrel temperatures generally should range from 580° to 605°F (304° to 318°C) in the rear zone and gradually increase to 600° to 625°F (315° to 329°C) in the front zone. These conditions should give melt temperatures of 610° to 650°F (321° to 343°C).

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A mold temperature of 275°F (135°C) is recommended to ensure full crystallinity in the typical molded part. High crystallinity results in optimum mechanical properties, excellent dimensional stability and good surface appearance. The use of lower mold temperatures may produce parts with lower crystallinity and, consequently, optimal performance may not be achieved.

Standard Packaging and Labeling

AMODEL A-1133 HS resin is packaged in foil lined, multiwall paper bags containing 25 kg (55.115 pounds) of material. Special packaging can be supplied upon request. Individual packages will be plainly marked with the product number, the color, the lot number, and the net weight.

Precautionary Labeling

On the basis of the toxicological, physical, and chemical properties of AMODEL A-1133 HS resin, labeling used on containers is as follows:

Caution! Handling and/or processing this material may generate a dust which can cause mechanical irritation of the eyes, skin, nose, and throat.

Product Safety and Emergency Service

For product safety information or a Material Safety Data Sheet on a product of Solvay Advanced Polymers

1 (800) 621-4557

1 (770) 772-8880 outside of U.S.

For information or help in an emergency such as a spill, leak, fire or explosion, call day or night:

Emergency Health Information

1 (800) 621-4590

1 (770) 772-5177 outside of U.S.

Emergency Spill Information

CHEMTREC 1 (800) 424-9300

1 (703) 527-3887 outside of U.S.

collect calls accepted

For Additional Information

Technical Service

1 (800) 621-4557

Customer Service

1 (800) 848-9744