Product Data

AMODEL®
polyphthalamide

AT-5001

AMODEL AT-5001 polyphthalamide resin is a neat ductile material that offers superior retention of properties after humid thermal aging, high impact at low temperature, and better mechanical properties than many unreinforced thermoplastic polyester and nylon resins especially after exposure to humid environments.

These materials were specifically designed for automotive electrical and electronic applications such as connectors, sockets, and sensors. Additional applications include fuel systems where both the high elongation/ductility and superior low permeation performance to automotive fuels are needed.

They can be processed readily using conventional injection molding equipment and methods.

Table 1 Typical Properties of AMODEL AT-5001 Resin - ASTM Test Methods (See Table 2 for Properties by ISO Methods)

Property	ASTM Test Method	Typical Values[1] U. S. Customary Units DAM[2]	50% RH[3]	Units	SI Units DAM[2]	50% RH[3]	Units
Mechanical							
Tensile Strength	D 638	9.4	7.4	kpsi	61	51	MPa
Tensile Elongation	D 638	30	50	%	30	50	%
Tensile Modulus	D 638	330	360	kpsi	2.3	2.5	GPa
Flexural Strength	D 790	13.3	10.3	kpsi	92	71	MPa
Flexural Modulus	D 790	310	280	kpsi	2.1	1.9	GPa
Shear Strength	D 732	7.7	6.8	kpsi	53	47	MPa
Izod Impact, Notched	D 256	3.0	15	ft-lb/in	160	800	J/m
Izod Impact, Unnotched		no break	no break	ft-lb/in	no break	no break	J/m
Penetration Impact Maximum Load	D 3763	1,000	900	lb.	4,400	4,000	N
Penetration Impact Total Energy		40	37	ft-lbs	54	50	J
Thermal							
Melting Point	D 3418	572		°F	300		°C
Deflection Temperature	D 648			°F			°C
at 66 psi (0.45 MPa)		365			185		
at 264 psi (1.8 MPa)		190			88		
Coefficient of Thermal Expansion at 32-158°F (0 - 70°C)	E 831	52		µin./in.°F	94		µm/m°C
Flammability[4]	UL 94	HB			HB		
Electrical							
Dielectric Strength	D 149	432	432	V/mil	17	17	kV/mm
Dielectric Constant 60 Hz	D 150	3.2	3.6		3.2	3.6	
Dielectric Constant 1 MHz		3.2	3.6		3.2	3.6	
Dissipation Factor 60 Hz	D 150	0.004	0.012		0.004	0.012	
Dissipation Factor 1 Mhz		0.016	0.027		0.016	0.027	
Volume Resistivity	D 257	3.9×10^{15}	2.5×10^{15}	Ohm-cm	3.9×10^{15}	2.5×10^{15}	Ohm-cm
Surface Resistivity		3.8×10^{15}	2.5×10^{15}	Ohm	3.8×10^{15}	2.5×10^{15}	Ohm
Comparative Tracking Index	D 3638	>600	>600	Volts	>600	>600	Volts
High Voltage Arc Track Rate	UL 746A	4.2	8.8	mm/min.	4.2	8.8	mm/min.
General							
Specific Gravity	D 792	1.10			1.10		
Moisture Absorption, 24 hours	D 570	0.5		%	0.5		%
Mold Shrinkage, FD,TD		1.9, 1.9		%	1.9, 1.9		%

[1] Actual properties of individual batches will vary within specification limits. Values are typical of uncolored resin, addition of colorants or other additives may alter properties.
[2] "dry, as molded"
[3] Conditioned to 50% RH in accordance with ISO-1110, Accelerated Method
[4] This rating is based on testing performed by Solvay Advanced Polymers in accordance with UL 94 test method. It is not intended to reflect hazards presented by this or any other material under actual fire conditions.

Solvay
Advanced Polymers

SOLVAY

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Table 2 Typical Properties of AMODEL AT-5001 Resin - ISO Test Methods

Property	Temp., °C	ISO Test Method	Typical Values (1) U.S. Customary Units Value	Units	SI Units Value	Units
Mechanical						
Tensile Stress at Yield	23	527	8.3	kpsi	57	MPa
Tensile Stress at Break	23	527	7.7	kpsi	53	MPa
Tensile Strain at Yield	23	527	5.0	%	5.0	%
Tensile Strain at Break	23	527	15.0	%	15.0	%
Tensile Modulus	23	527	320	kpsi	2.3	GPa
	100	527	73	kpsi	0.5	GPa
Flexural Strength	23	178	9.4	kpsi	65	MPa
	100	178	1.3	kpsi	9	MPa
Flexural Modulus	23	178	260	kpsi	1.8	GPa
	100	178	60	kpsi	0.4	GPa
Izod Impact, Notched	23	180/1A	6.7	ft-lb/in^2	14	kJ/m^2
Izod Impact, Unnotched	23	180/1U	no break	ft-lb/in^2	no break	kJ/m^2
Charpy Impact, Notched	23	179/1eA	no break	ft-lb/in^2	no break	kJ/m^2
Charpy Impact, Unnotched	23	179/1eU	no break	ft-lb/in^2	no break	kJ/m^2
Thermal						
Melting Point		11357-3	572	°F	300	°C
Heat Deflection Temperature at 1.8 MPa		75Af	184	°F	84	°C
General						
Specific Gravity		1183A	1.10		1.10	

(1) Actual properties of individual batches will vary within specification limits.

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 for most AMODEL resins 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 for this grade is 4 hours at 110°C (230°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 this grade at temperatures higher than 110°C (230°F) may result in pellet clumping.
- If a thermogravimetric moisture analyzer is used, it should be set to 170°C (338°F)

Equipment

Standard injection molding equipment can be used. A general-purpose screw with a compression ratio of 2.5 to 1 is recommended. A reverse taper nozzle is also recommended.

Startup Conditions

A melt temperature of 590-610°F (310-320°C) is recommended. This can be accomplished by setting the barrel temperature to 580°F (305°C) in the rear zone and increasing it linearly to 610°F (320°C) in the front zone. The nozzle temperature should be set close to the front zone temperature and adjusted to prevent freeze off or drool. A tool steel temperature of 200°F (93°C) is recommended.

A tool steel temperature of 158-194°F (70-90°C) is recommended to minimize dimensional variation both as molded and after thermal exposure.

Injection Molding

An injection speed of 1-3 in/sec (2.5-7.5 cm/sec) is recommended. Injection profiles that reduce speed toward the end of the injection stroke help prevent burn marks. Transfer to hold pressure should occur when the part is about 95% filled. Holding pressure should be adjusted to about 50% of the injection pressure. Holding pressure and time should be adjusted to maximize part weight without causing flash or over packing.

The screw speed should be relatively fast (100-200 rpm). Back pressure should be kept to a minimum, just enough to insure a uniform shot. Screw decompression or “suckback” should be used only if necessary, and then only a minimum amount. The cycle time should be only long enough to allow the part to be ejected without deformation or ejector pin “witness” marks.

Startup and Shutdown Purge Procedure

Avoid contamination of this material with polyvinylchloride (PVC), acetal (POM) or polysulfone (PSF). Equipment that has previously run any of these materials must be completely purged with polyethylene (PE), acrylic (PMMA), or a commercial purging compound designed for >600°F (>315°C) prior to use and again prior to shutdown.

Standard Packaging and Labeling

AMODEL AT-5001 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 toxicological, physical, and chemical properties of AMODEL AT-5001 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