

Amodel® AT-1002 HS

polyphthalamide

Amodel® AT-1002 HS is a neat, toughened, heat stabilized polyphthalamide (PPA) resin 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.

This material was specifically designed for automotive electrical/electronic applications such as connectors, sockets and sensors.

- Natural: AT-1002 HS NT

General

| | | | |
|---------------------------|--|---|---|
| Material Status | • Commercial: Active | | |
| Availability | • Africa & Middle East • Asia Pacific | • Europe • Latin America | • North America |
| Additive | • Heat Stabilizer • Impact Modifier | • Lubricant • Mold Release | |
| Features | • Chemical Resistant • Ductile • Heat Stabilized | • Hot Water Moldability • Impact Modified • Low Temperature Impact Resistance | • Low Warpage • Lubricated |
| Uses | • Automotive Applications • Automotive Electronics | • Automotive Under the Hood • Machine/Mechanical Parts | • Metal Replacement • Valves/Valve Parts |
| RoHS Compliance | • RoHS Compliant | | |
| Automotive Specifications | • DELPHI MS008756 Color: NT Natural • FORD WSS-M4D1008-A1 | • GM GMP.PPA.015 Color: Natural • GM GMW16799P-PPA Color: Natural | • IMDS ID 11974222 Color: Natural |
| Appearance | • Natural Color | | |
| Forms | • Pellets | | |
| Processing Method | • Water-Heated Mold Injection Molding | | |

| Physical | Dry | Conditioned | Unit | Test method |
|--------------------------|------|-------------|-------------------|-------------|
| Density | 1.13 | -- | g/cm ³ | ISO 1183/A |
| Molding Shrinkage | | | | ASTM D955 |
| Flow | 2.0 | -- | % | |
| Across Flow | 2.1 | -- | % | |
| Water Absorption (24 hr) | 0.50 | -- | % | ASTM D570 |

| Mechanical | Dry | Conditioned | Unit | Test method |
|-----------------|------|-------------|------|-------------|
| Tensile Modulus | | | | |
| -- | 2760 | 2760 | MPa | ASTM D638 |
| 23°C | 2760 | -- | MPa | ISO 527-2 |
| 100°C | 2100 | -- | MPa | ISO 527-2 |
| Tensile Stress | | | | |
| Yield, 23°C | 75.2 | -- | MPa | ISO 527-2 |
| Yield, 100°C | 38.6 | -- | MPa | ISO 527-2 |
| Break, 23°C | 68.3 | -- | MPa | ISO 527-2 |
| -- | 83.4 | 76.5 | MPa | ASTM D638 |

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| Mechanical | Dry | Conditioned | Unit | Test method |
|--|------------|--------------------|-------------------|---------------------------|
| Tensile Strain | | | | |
| Yield, 23°C | 5.0 | -- | % | ISO 527-2 |
| Yield, 100°C | 3.7 | -- | % | ISO 527-2 |
| Break ¹ | 80 | 100 | % | ASTM D638 |
| Break, 23°C | 15 | -- | % | ISO 527-2 |
| Flexural Modulus | | | | |
| -- | 2210 | 2280 | MPa | ASTM D790 |
| 23°C | 2280 | -- | MPa | ISO 178 |
| 100°C | 1720 | -- | MPa | ISO 178 |
| Flexural Strength | | | | |
| -- | 103 | 73.1 | MPa | ASTM D790 |
| 23°C | 79.3 | -- | MPa | ISO 178 |
| 100°C | 49.6 | -- | MPa | ISO 178 |
| Shear Strength | 64.1 | 57.2 | MPa | ASTM D732 |
| Impact | | | | |
| Charpy Notched Impact Strength (23°C) | 13 | -- | kJ/m ² | ISO 179/1eA |
| Charpy Unnotched Impact Strength (23°C) | No Break | -- | | ISO 179/1eU |
| Notched Izod Impact | | | | |
| -- | 140 | 150 | J/m | ASTM D256 |
| 23°C | 13 | -- | kJ/m ² | ISO 180/1A |
| Unnotched Izod Impact Strength (23°C) | No Break | -- | | ISO 180/1U |
| Instrumented Dart Impact (Total Energy) | 54.2 | 47.5 | J | ASTM D3763 |
| Penetration Impact ² | 4448 | 4003 | N | ASTM D3763 |
| Thermal | | | | |
| Deflection Temperature Under Load | | | | |
| 0.45 MPa, Annealed | 163 | -- | °C | ASTM D648 |
| 1.8 MPa, Unannealed | 118 | -- | °C | ISO 75-2/ Af |
| 1.8 MPa, Annealed | 121 | -- | °C | ASTM D648 |
| Melting Temperature | 315 | -- | °C | ISO 11357-3 ASTM D3418 |
| CLTE | | | | |
| Flow : 0 to 100°C | 7.8E-5 | -- | cm/cm/°C | |
| Flow : 100 to 200°C | 1.3E-4 | -- | cm/cm/°C | |
| Transverse : 0 to 100°C | 9.3E-5 | -- | cm/cm/°C | |
| Transverse : 100 to 200°C | 1.4E-4 | -- | cm/cm/°C | |
| Electrical | | | | |
| Surface Resistivity | 8.0E+13 | 2.5E+13 | ohms | ASTM D257 |
| Volume Resistivity | 1.2E+16 | 7.0E+14 | ohms·cm | ASTM D257 |
| Dielectric Strength | 17 | 17 | kV/mm | ASTM D149 |
| Dielectric Constant | | | | |
| 60 Hz | 3.30 | 3.80 | | |
| 1 MHz | 3.30 | 3.80 | | |
| Dissipation Factor | | | | |
| 60 Hz | 4.0E-3 | 0.018 | | ASTM D150 |
| 1 MHz | 0.016 | 0.035 | | |

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| Electrical | Dry | Conditioned Unit | Test method |
|---------------------------------------|------------|-------------------------|--------------------|
| Comparative Tracking Index | > 600 | > 600 V | ASTM D3638 |
| High Voltage Arc Tracking Rate (HVTR) | 12.0 | 12.0 mm/min | UL 746 |

| Flammability | Dry | Conditioned Unit | Test method |
|---------------------------|------------|-------------------------|--------------------|
| Flame Rating ³ | HB | -- | UL 94 |

| Injection | Dry Unit |
|-------------------------|-----------------|
| Drying Temperature | 110 °C |
| Drying Time | 4.0 hr |
| Suggested Max Moisture | 0.060 % |
| Rear Temperature | 304 °C |
| Front Temperature | 324 °C |
| Processing (Melt) Temp | 321 to 329 °C |
| Mold Temperature | < 90.0 °C |
| Screw Speed | 100 to 200 rpm |
| Screw Compression Ratio | 2.5:1.0 |

Injection Notes

Injection Rate: 1 to 3 in/sec

Holding Pressure: 50% of injection pressure

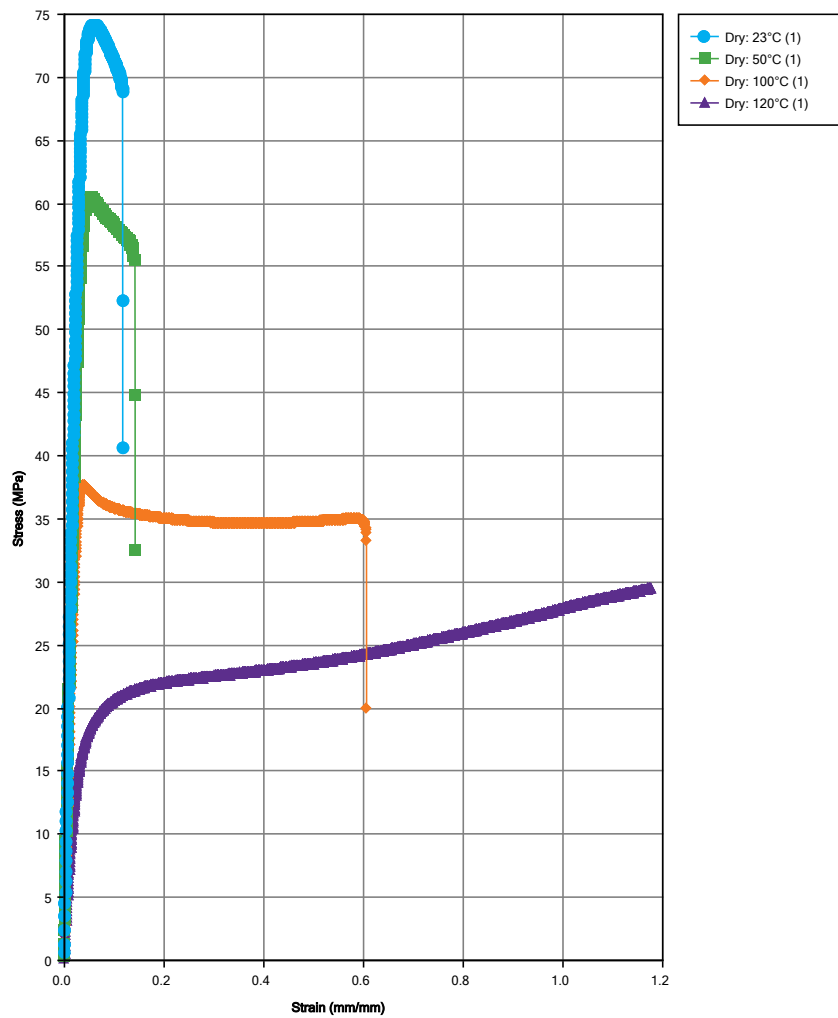
Storage:

- 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.

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Isothermal Stress vs. Strain (ISO 11403-1)



Data Notes
(1) - 2 in/min (50 mm/min)

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Notes

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

¹ Type IV

² Maximum Load

³ This rating is not intended to reflect hazards presented by this or any other material under actual fire conditions.

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