

Amodel® AS-4133 HS

polyphthalamide

Amodel® AS-4133 HS is a 33% glass reinforced, lubricated, heat stabilized grade of polyphthalamide (PPA) that offers fast cycle times and moldability in hot water molds. Testing conducted on samples dry as molded and samples conditioned to 50% relative humidity in accordance with ISO-1110, Accelerated Method. Typical applications

include electrical and electronic components especially for automotive systems.

- Black: AS-4133 HS BK 324
- Natural: AS-4133 HS NT

General

| | | | |
|------------------------|---|---|---|
| Material Status | • Commercial: Active | | |
| Availability | • Africa & Middle East • Asia Pacific | • Europe • Latin America | • North America |
| Filler / Reinforcement | • Glass Fiber, 33% Filler by Weight | | |
| Additive | • Heat Stabilizer | • Lubricant | • Mold Release |
| Features | • Fast Molding Cycle • Good Chemical Resistance • Good Creep Resistance • Good Dimensional Stability | • Good Stiffness • Heat Stabilized • High Heat Resistance • High Strength | • Hot Water Moldability • Laser Weldable • Low Moisture Absorption • Lubricated |
| Uses | • Automotive Applications • Automotive Electronics • Automotive Under the Hood • Cell Phones • Connectors | • Electrical/Electronic Applications • General Purpose • Industrial Applications • Industrial Parts • Lawn and Garden Equipment | • Machine/Mechanical Parts • Metal Replacement • Thick-walled Parts • Valves/Valve Parts |
| RoHS Compliance | • RoHS Compliant | | |

Amodel® AS-4133 HS

polyphthalamide

General

| | |
|---------------------------|---|
| | <ul style="list-style-type: none">• ASTM D4000 PA102 G35 Color: BK324 Black• ASTM D4000 PA102 G35 Color: NT Natural• ASTM D4000 PPA0121 G34 GB145 KD170 KN100 PN060 YI285 Color: BK324 Black• ASTM D4000 PPA0121 G34 GB145 KD170 KN100 PN060 YI285 Color: NT Natural• ASTM D6779 PA102G35• BOSCH N28 BN05-OX2 BN0515-GF35-3Anf01AM Color: NT Natural• BOSCH N28 BN05-OX2 BN0515-GF35-3Asw01AM Color: BK324 Black• CHRYSLER MS-DB-478 Type A CPN3598 Color: BK Black• CHRYSLER MS-DB-478 Type A CPN3972 Color: Natural• DELPHI M-2396 Color: BK324 Black• DELPHI M-2396 M2396001 Color: NT Natural• DELPHI M-2396 M2396002 Color: BK-324 Black• DELPHI M-2396 M239600x Color: BU474 Blue• DELPHI M-53291 Color: BU474 Blue• DELPHI M-53293 Color: BK324 Black• DELPHI M-53293 Color: NT Natural• DELPHI M-6081 Color: NT Natural• DELPHI M-6083 Color: BK324 Black• GM GMP.PPA.002 Color: BK324 Black• GM GMP.PPA.002 Color: NT Natural• GM GMW16357P-PPA-GF35 Color: Black• GM GMW16357P-PPA-GF35 Color: Natural• ISO 1874 PA6T/66, MH, 12-120, GF33 Color: BK324 Black• ISO 1874 PA6T/66, MH, 12-120, GF33 Color: NT Natural• TORRINGTON T-456 Color: BK324 Black• TRW S-13972700 Color: BK324 Black• TRW S-13972700 Color: NT Natural• TYCO 100-1392 Color: BK324 Black• TYCO 100-1392 Color: NT Natural• YAZAKI YPES-25-02-306 Color: BK324 Black• YAZAKI YPES-25-02-306 Color: NT Natural |
| Automotive Specifications | |
| Appearance | • Black • Natural Color |
| Forms | • Pellets |
| Processing Method | • Water-Heated Mold Injection Molding |

| Physical | Dry | Conditioned Unit | Test method |
|--------------------------|------|----------------------|-------------|
| Density | 1.45 | -- g/cm ³ | ISO 1183/A |
| Molding Shrinkage | | | ASTM D955 |
| Flow | 0.50 | -- % | |
| Across Flow | 1.0 | -- % | |
| Water Absorption (24 hr) | 0.29 | -- % | ASTM D570 |

| Mechanical | Dry | Conditioned Unit | Test method |
|-----------------|-------|------------------|-------------|
| Tensile Modulus | | | |
| -- | 11700 | 11700 MPa | ASTM D638 |
| 23°C | 12600 | -- MPa | ISO 527-2 |
| 100°C | 6830 | -- MPa | ISO 527-2 |
| 150°C | 5310 | -- MPa | ISO 527-2 |
| 175°C | 4830 | -- MPa | ISO 527-2 |

Amodel® AS-4133 HS

polyphthalamide

| Mechanical | Dry | Conditioned | Unit | Test method |
|--|------------|--------------------|-------------------|--------------------------|
| Tensile Stress | | | | |
| Break, 23°C | 211 | -- | MPa | ISO 527-2 |
| Break, 100°C | 125 | -- | MPa | ISO 527-2 |
| Break, 150°C | 87.6 | -- | MPa | ISO 527-2 |
| Break, 175°C | 79.3 | -- | MPa | ISO 527-2 |
| -- | 200 | 172 | MPa | ASTM D638 |
| Tensile Elongation | | | | |
| Break | 2.5 | 2.2 | % | ASTM D638 |
| Break, 23°C | 2.6 | -- | % | ISO 527-2 |
| Break, 100°C | 4.3 | -- | % | ISO 527-2 |
| Break, 150°C | 6.6 | -- | % | ISO 527-2 |
| Break, 175°C | 6.6 | -- | % | ISO 527-2 |
| Flexural Modulus | | | | |
| -- | 11000 | 11000 | MPa | ASTM D790 |
| 23°C | 10400 | -- | MPa | ISO 178 |
| 100°C | 7170 | -- | MPa | ISO 178 |
| 150°C | 4620 | -- | MPa | ISO 178 |
| 175°C | 4210 | -- | MPa | ISO 178 |
| Flexural Strength | | | | |
| -- | 290 | 241 | MPa | ASTM D790 |
| 23°C | 296 | -- | MPa | ISO 178 |
| 100°C | 177 | -- | MPa | ISO 178 |
| 150°C | 111 | -- | MPa | ISO 178 |
| 175°C | 99.3 | -- | MPa | ISO 178 |
| Compressive Strength | 179 | 172 | MPa | ASTM D695 |
| Shear Strength | 89.6 | 75.8 | MPa | ASTM D732 |
| Poisson's Ratio | 0.41 | -- | | ASTM E132 |
| Impact | | | | |
| Charpy Notched Impact Strength (23°C) | 11 | -- | kJ/m ² | ISO 179/1eA |
| Charpy Unnotched Impact Strength (23°C) | 67 | -- | kJ/m ² | ISO 179/1eU |
| Notched Izod Impact | | | | |
| -- | 80 | 69 | J/m | ASTM D256 |
| 23°C | 9.7 | -- | kJ/m ² | ISO 180/1A |
| Unnotched Izod Impact | | | | |
| -- | 960 | -- | J/m | ASTM D256 |
| 23°C | 59 | -- | kJ/m ² | ISO 180/1U |
| Thermal | | | | |
| Deflection Temperature Under Load | | | | |
| 0.45 MPa, Annealed, 3.20 mm | 320 | -- | °C | ASTM D648 |
| 1.8 MPa, Unannealed | 294 | -- | °C | ISO 75-2/A |
| 1.8 MPa, Annealed, 3.20 mm | 300 | -- | °C | ASTM D648 |
| Continuous Use Temperature ¹ | 210 | -- | °C | ASTM D3045 |
| Melting Temperature | 327 | -- | °C | ASTM D570 ISO 11357-3 |

Amodel® AS-4133 HS

polyphthalamide

| Thermal | Dry | Conditioned | Unit | Test method |
|---------------------------|--------|-------------|----------|-------------|
| CLTE | | | | ASTM E831 |
| Flow : 0 to 100°C | 2.0E-5 | -- | cm/cm/°C | |
| Flow : 100 to 200°C | 1.5E-5 | -- | cm/cm/°C | |
| Transverse : 0 to 100°C | 7.6E-5 | -- | cm/cm/°C | |
| Transverse : 100 to 200°C | 1.2E-4 | -- | cm/cm/°C | |

| Electrical | Dry | Conditioned | Unit | Test method |
|---------------------------------------|---------|-------------|---------|-------------|
| Volume Resistivity | 2.0E+16 | 5.0E+14 | ohms·cm | ASTM D257 |
| Dielectric Strength (1.60 mm) | 20 | 20 | kV/mm | ASTM D149 |
| Dielectric Constant | | | | ASTM D150 |
| 60 Hz | 3.80 | 4.30 | | |
| 1 MHz | 3.60 | 3.40 | | |
| Dissipation Factor | | | | ASTM D150 |
| 60 Hz | 4.0E-3 | 0.020 | | |
| 1 MHz | 0.012 | 0.019 | | |
| Comparative Tracking Index (CTI) | 600 | 600 | V | UL 746 |
| High Voltage Arc Tracking Rate (HVTR) | 14.0 | 18.0 | mm/min | UL 746 |

| Flammability | Dry | Conditioned | Unit | Test method |
|-------------------------------------|-----|-------------|------|-------------|
| Flame Rating ² (3.20 mm) | HB | -- | | UL 94 |

| Optical | Dry | Conditioned | Unit | Test method |
|----------------------------|------|-------------|------|-------------|
| Transmittance ³ | | | | ASTM D1003 |
| 1070 nm : 1.60 mm | > 20 | -- | % | |
| 940 nm : 1.60 mm | > 20 | -- | % | |

| Injection | Dry | Unit |
|------------------------|--------------|------|
| Drying Temperature | 120 | °C |
| Drying Time | 4.0 | hr |
| Suggested Max Moisture | 0.045 | % |
| Rear Temperature | 318 to 324 | °C |
| Front Temperature | 327 to 332 | °C |
| Processing (Melt) Temp | 329 to 343 | °C |
| Mold Temperature | 65.6 to 93.3 | °C |

Injection Notes

Injection Rate: 3 to 4 in/sec

Holding Pressure: 50% of injection pressure

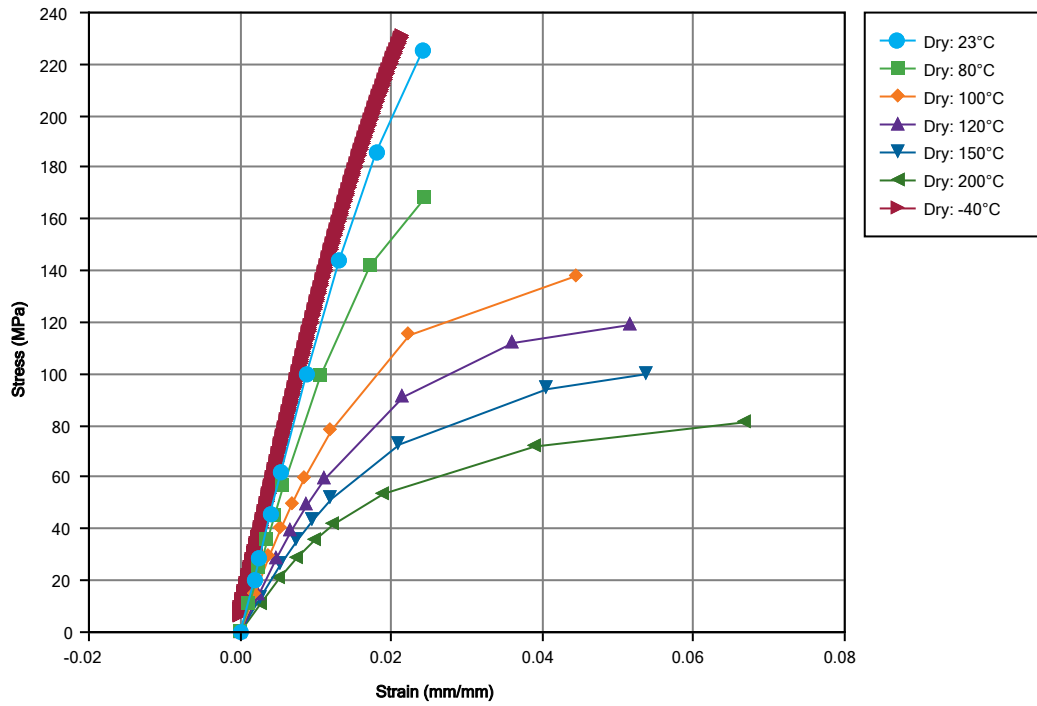
Storage:

- 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.

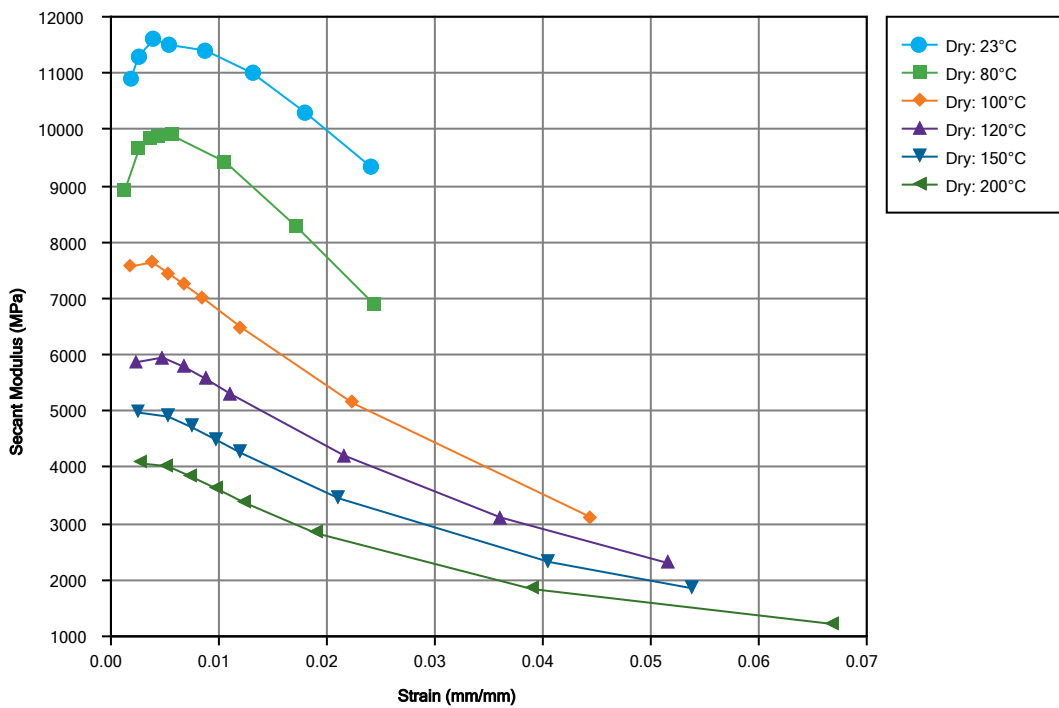
Amodel® AS-4133 HS

polyphthalamide

Isothermal Stress vs. Strain (ISO 11403-1)



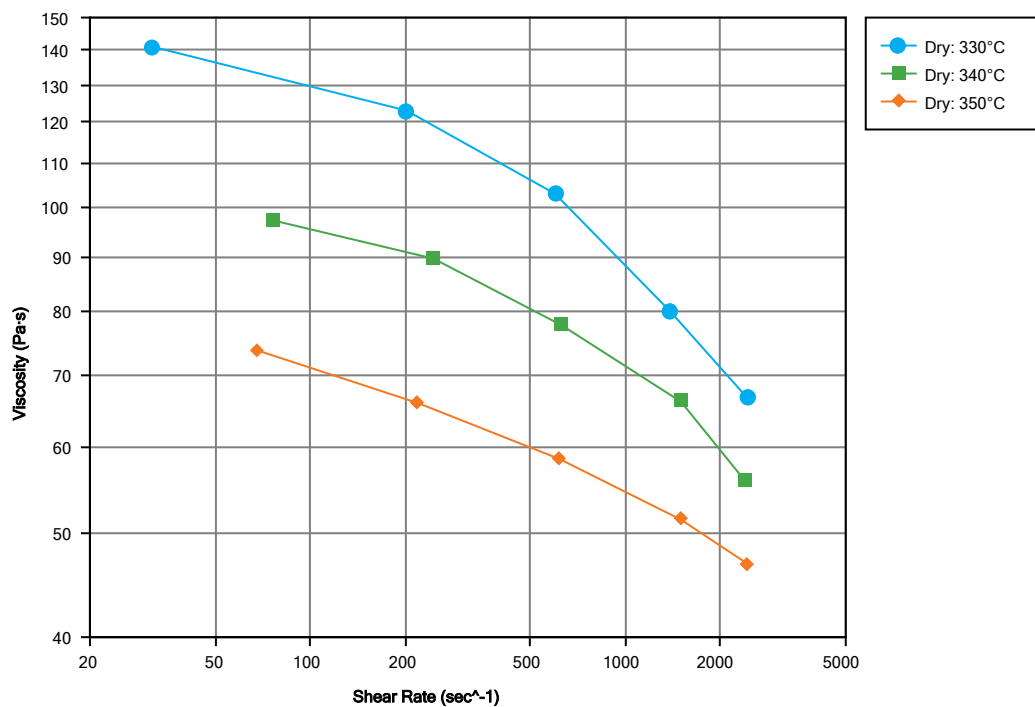
Secant Modulus vs. Strain (ISO 11403-1)



Amodel® AS-4133 HS

polyphthalamide

Viscosity vs. Shear Rate (ISO 11403-2)



Notes

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

¹ 1500 hr

² These flammability ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.

³ Transmittance for natural grade

www.solvay.com

SpecialtyPolymers.EMEA@solvay.com | Europe, Middle East and Africa

SpecialtyPolymers.Americas@solvay.com | Americas

SpecialtyPolymers.Asia@solvay.com | Asia and Australia

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.

Neither Solvay Specialty Polymers nor any of its affiliates makes any warranty, express or implied, including merchantability or fitness for use, or accepts any liability in connection with this product, related information or its use. Some applications of which Solvay's products may be proposed to be used are regulated or restricted by applicable laws and regulations or by national or international standards and in some cases by Solvay's recommendation, including applications of food/feed, water treatment, medical, pharmaceuticals, and personal care. Only products designated as part of the Solviva® family of biomaterials may be considered as candidates for use in implantable medical devices. The user alone must finally determine suitability of any information or products for any contemplated use in compliance with applicable law, the manner of use and whether any patents are infringed. The information and the products are for use by technically skilled persons at their own discretion and risk and does not relate to the use of this product in combination with any other substance or any other process. This is not a license under any patent or other proprietary right.

All trademarks and registered trademarks are property of the companies that comprise the Solvay Group or their respective owners.

© 2016 Solvay Specialty Polymers. All rights reserved.