

# Amodel® HFZ A-4133L polyphthalamide

Amodel® HFZ A-4133 L polyphthalamide (PPA) is a 33% glass-reinforced, hot water moldable resin. Key properties include heat resistance, reduced outgassing and high strength and stiffness over a broad temperature range. It also displays low moisture absorption, excellent chemical resistance and excellent electrical properties.

Amodel® HFZ A-4133 L resin is ideal for automotive electrical and electronic applications, including

connectors, sockets, switches and sensors. It is also a good choice for under-hood enclosures that protect critical control systems such as anti-lock brakes, traction control, steering, electronic engine control, transmission and chassis control units.

- Black: HFZ A-4133 L BK 324
- Natural: HFZ A-4133 L NT

## General

|                        |                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                          |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Material Status        | • Commercial: Active                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                          |
| Availability           | <ul style="list-style-type: none"> <li>• Africa &amp; Middle East</li> <li>• Asia Pacific</li> <li>• Europe</li> </ul>                                                                                                                                   | <ul style="list-style-type: none"> <li>• Latin America</li> <li>• North America</li> </ul>                                                                                                                                                                                               |
| Filler / Reinforcement | • Glass Fiber, 33% Filler by Weight                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                          |
| Additive               | • Lubricant                                                                                                                                                                                                                                              | • Mold Release                                                                                                                                                                                                                                                                           |
| Features               | <ul style="list-style-type: none"> <li>• Chemical Resistant</li> <li>• Creep Resistant</li> <li>• Fast Molding Cycle</li> <li>• Good Dimensional Stability</li> <li>• Good Stiffness</li> <li>• High Flow</li> </ul>                                     | <ul style="list-style-type: none"> <li>• High Stiffness</li> <li>• High Strength</li> <li>• Hot Water Moldability</li> <li>• Low Moisture Absorption</li> <li>• Lubricated</li> </ul>                                                                                                    |
| Uses                   | <ul style="list-style-type: none"> <li>• Automotive Applications</li> <li>• Automotive Electronics</li> <li>• Automotive Under the Hood</li> <li>• Bobbins/Spools</li> <li>• Camera Applications</li> <li>• Cell Phones</li> <li>• Connectors</li> </ul> | <ul style="list-style-type: none"> <li>• Electrical/Electronic Applications</li> <li>• General Purpose</li> <li>• Industrial Applications</li> <li>• Industrial Parts</li> <li>• Lawn &amp; Garden Equipment</li> <li>• Machine/Mechanical Parts</li> <li>• Metal Replacement</li> </ul> |
| RoHS Compliance        | • RoHS Compliant                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                          |
| Appearance             | • Black                                                                                                                                                                                                                                                  | • Natural Color                                                                                                                                                                                                                                                                          |
| Forms                  | • Pellets                                                                                                                                                                                                                                                |                                                                                                                                                                                                                                                                                          |
| Processing Method      | • Water-Heated Mold Injection Molding                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                          |

| Physical                 | Typical Value | Unit              | Test method |
|--------------------------|---------------|-------------------|-------------|
| Density                  | 1.46          | g/cm <sup>3</sup> | ISO 1183/A  |
| Molding Shrinkage        |               |                   | ASTM D955   |
| Flow                     | 0.50          | %                 |             |
| Across Flow              | 1.0           | %                 |             |
| Water Absorption (24 hr) | 0.26          | %                 | ASTM D570   |

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## polyphthalamide

| Mechanical             | Typical Value | Unit | Test method |
|------------------------|---------------|------|-------------|
| Tensile Modulus        | 12000         | MPa  | ISO 527-1   |
| Tensile Stress (Break) | 180           | MPa  | ISO 527-2   |
| Tensile Strain (Break) | 1.8           | %    | ISO 527-2   |
| Flexural Modulus       | 11000         | MPa  | ISO 178     |
| Flexural Stress        | 255           | MPa  | ISO 178     |

| Impact                         | Typical Value | Unit              | Test method |
|--------------------------------|---------------|-------------------|-------------|
| Charpy Notched Impact Strength | 8.2           | kJ/m <sup>2</sup> | ISO 179/1eA |
| Notched Izod Impact Strength   | 8.4           | kJ/m <sup>2</sup> | ISO 180/1A  |
| Unnotched Izod Impact Strength | 40            | kJ/m <sup>2</sup> | ISO 180/1U  |

| Thermal                                                  | Typical Value | Unit     | Test method |
|----------------------------------------------------------|---------------|----------|-------------|
| Deflection Temperature Under Load<br>1.8 MPa, Unannealed | 310           | °C       | ISO 75-2/A  |
| Melting Temperature (DSC)                                | 327           | °C       | ISO 3146    |
| CLTE                                                     |               |          | ASTM E831   |
| Flow : 0 to 90°C                                         | 2.0E-5        | cm/cm/°C |             |
| Flow : 150 to 250°C                                      | 1.4E-5        | cm/cm/°C |             |
| Transverse : 0 to 90°C                                   | 6.3E-5        | cm/cm/°C |             |
| Transverse : 150 to 250°C                                | 1.5E-4        | cm/cm/°C |             |

| Electrical                                     | Typical Value | Unit    | Test method |
|------------------------------------------------|---------------|---------|-------------|
| Surface Resistivity                            | 1.0E+16       | ohms    | ASTM D257   |
| Volume Resistivity                             | 1.0E+15       | ohms·cm | ASTM D257   |
| Dielectric Strength                            | 19            | kV/mm   | ASTM D149   |
| Dielectric Constant                            |               |         | ASTM D150   |
| 60 Hz                                          | 3.90          |         |             |
| 1 MHz                                          | 3.70          |         |             |
| Dissipation Factor                             |               |         | ASTM D150   |
| 60 Hz                                          | 6.0E-3        |         |             |
| 1 MHz                                          | 0.016         |         |             |
| High Amp Arc Ignition (HAI)                    | PLC 0         |         | UL 746A     |
| High Voltage Arc Resistance to Ignition (HVAR) | PLC 0         |         | UL 746A     |
| High Voltage Arc Tracking Rate (HVTR)          | PLC 0         |         | UL 746A     |
| Hot-wire Ignition (HWI)                        | PLC 1         |         | UL 746A     |

| Flammability                       | Typical Value | Unit | Test method    |
|------------------------------------|---------------|------|----------------|
| Flame Rating <sup>1</sup> (0.8 mm) | HB            |      | UL 94          |
| Glow Wire Flammability Index       | 800           | °C   | IEC 60695-2-12 |
| Glow Wire Ignition Temperature     | 800           | °C   | IEC 60695-2-13 |

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| Injection              | Typical Value  | Unit |
|------------------------|----------------|------|
| Drying Temperature     | 120            | °C   |
| Drying Time            | 4.0            | hr   |
| Suggested Max Moisture | 0.030 to 0.060 | %    |
| Rear Temperature       | 318 to 324     | °C   |
| Front Temperature      | 327 to 332     | °C   |
| Processing (Melt) Temp | 329 to 343     | °C   |
| Mold Temperature       | 66 to 93       | °C   |

### Injection Notes

Injection Pressure: 3 to 4 in/sec

### 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.

## Notes

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

<sup>1</sup> These flammability ratings are not intended to reflect hazards presented by these or any other materials under actual fire conditions.



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