### Mechanical Properties

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit ISO Standard</th>
<th>Test Conditions</th>
<th>Unit</th>
<th>Product Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability UL 94</td>
<td></td>
<td></td>
<td></td>
<td>Radilon® A RV300RG 3900 BK</td>
</tr>
<tr>
<td>Melting temperature</td>
<td>°C</td>
<td>DSC</td>
<td></td>
<td>Radilon® A RV300HRG 3900 BK</td>
</tr>
<tr>
<td>Flexural modulus</td>
<td>MPa</td>
<td>23°C</td>
<td></td>
<td>RV300RKC 339 BK 07056</td>
</tr>
<tr>
<td>Tensile strength at break</td>
<td>MPa</td>
<td>23°C</td>
<td></td>
<td>Radilon® A NER GF300RKC</td>
</tr>
<tr>
<td>Charpy notched impact strength</td>
<td>kJ/m²</td>
<td>23°C</td>
<td></td>
<td>Radilon® D RV300RG 3900BK</td>
</tr>
</tbody>
</table>

**Property retention after ageing.**

Temperatures of up to 135°C. Improved performance in the most severe operating conditions. Considered a top-of-the-class material.

Automotive cooling liquid resistant. For use at temperatures of up to 135°C. Improved performance and an increased service life of the components.

Automotive cooling liquid resistant PA6.6-GF30 standard grade.

Automotive cooling liquid resistant PA6.6-GF30 to be a top-of-the-class material.

RadiciGroup High Performance Polymers

RadiciGroup Automotive Thermal Polymers

RadiciGroup Automotive Cooling Polymers

RadiciGroup Automotive Heating Polymers

The information provided in this document corresponds to our knowledge on the subject as of the date of publication. The information may be subject to revision as new knowledge and experience become available. Data provided fall within the normal range of product properties and relate only to the specific designated material. The data may not be valid for such material outside the normal range of properties.

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Since RadiciGroup High Performance Polymers cannot anticipate all the variations occurring in end-use conditions, RadiciGroup High Performance Polymers makes no warranties and disclaims all responsibility for such variations.

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RadiciGroup does not recommend or suggest any specific use of its products, and all such recommendations or suggestions are made at the user’s own risk. RadiciGroup disclaims all responsibility for such recommendations and suggestions. RadiciGroup’s products are not to be used for space, aircraft, or atomic energy applications, or in an atomic reactor, unless RadiciGroup has agreed in writing to do so.

RadiciGroup’s special products are designed for special applications only and are suitable for use only in accordance with RadiciGroup’s special product specifications. RadiciGroup does not recommend or suggest any use of its special products, and all such recommendations or suggestions are made at the user’s own risk. RadiciGroup disclaims all responsibility for such recommendations and suggestions.

www.radicigroup.com
## Global Presence

In addition to RadiciGroup’s diverse range of high-quality plastic products, RadiciGroup Automotive is introducing a series of high performance PA and PPA products for use in the most critical applications. RadiciGroup Automotive has been selected as the exclusive supplier of the Radilon® Aestus T1, a high-performance material designed to operate even under the most extreme conditions. With its automotive cooling liquid resistant properties and temperature resistance up to 135°C, Radilon® Aestus T1 is the ideal choice for applications requiring exceptional performance. RadiciGroup offers a comprehensive range of technical support services to ensure the successful implementation of Radilon® Aestus T1 in automotive applications. For more information, please contact RadiciGroup Automotive at info.plastics@radicigroup.com.

### Technical Specifications

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>1.183 g/cm³ @ 23°C</td>
</tr>
<tr>
<td>Water absorption</td>
<td>0.62% @ 23°C</td>
</tr>
<tr>
<td>Flammability</td>
<td>UL 94 HB/ HB</td>
</tr>
<tr>
<td>Melting temperature</td>
<td>314°C ± 1°C</td>
</tr>
<tr>
<td>Charpy notch impact strength</td>
<td>179/1.03 kJ/m² @ 23°C</td>
</tr>
<tr>
<td>Flexural Modulus</td>
<td>1780 MPa @ 23°C</td>
</tr>
<tr>
<td>Tensile modulus</td>
<td>527 MPa @ 23°C</td>
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<tr>
<td>Elongation at break</td>
<td>3.5% @ 23°C</td>
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<tr>
<td>Tensile strength at break</td>
<td>180 MPa @ 23°C</td>
</tr>
<tr>
<td>Heat deflection temperature</td>
<td>75°C @ 1.8 MPa</td>
</tr>
<tr>
<td>Parallel shrinkage</td>
<td>0.3% ± 0.1%</td>
</tr>
</tbody>
</table>

### Theoretical Information

- Automotive cooling liquid resistant
- Suitable for continuous use at temperatures of up to 135°C
- High thermal resistance in contact with automotive cooling liquids
- Ideal for high-performance applications in automotive cooling systems
- Meets high-performance demands in critical applications
- Exceptional property retention after aging

### Contact Information

- **e-mail:** info.plastics@radicigroup.com
- **Ph.:** +55 11 4136 6500
- **CEP:** 18147-970 Araçariguama – São Paulo – BR
- **Rua Giuseppe Marchiori, 497**

### Additional Information

- RadiciGroup Automotive is the exclusive supplier of Radilon® Aestus T1, a high-performance material designed for extreme conditions.
- RadiciGroup offers comprehensive technical support services to ensure successful implementation in automotive applications.
- Contact info.plastics@radicigroup.com for more information.

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**HIGH PERFORMANCE POLYMERS**

Autotecharnical cooling liquid resistant PA6.6-GF30 standard grade. RadiciGroup Automotive has been selected as the exclusive supplier of the Radilon® Aestus T1, a high-performance material designed to operate even under the most extreme conditions. With its automotive cooling liquid resistant properties and temperature resistance up to 135°C, Radilon® Aestus T1 is the ideal choice for applications requiring exceptional performance. RadiciGroup offers a comprehensive range of technical support services to ensure the successful implementation of Radilon® Aestus T1 in automotive applications. For more information, please contact RadiciGroup Automotive at info.plastics@radicigroup.com.
### MECHANICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit ISO Standard</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile strength at break</td>
<td>MPa</td>
<td>180</td>
</tr>
<tr>
<td>Flexural Modulus</td>
<td>MPa</td>
<td>8000</td>
</tr>
<tr>
<td>Elongation at break</td>
<td>%</td>
<td>3.5</td>
</tr>
<tr>
<td>Charpy notched impact strength</td>
<td>kJ/m²</td>
<td>10</td>
</tr>
<tr>
<td>Water absorption</td>
<td>%</td>
<td>1.7</td>
</tr>
<tr>
<td>Flammability</td>
<td>UL 94</td>
<td>HB</td>
</tr>
<tr>
<td>Density</td>
<td>g/cm³</td>
<td>1.35</td>
</tr>
<tr>
<td>Melting temperature</td>
<td>°C</td>
<td>260</td>
</tr>
<tr>
<td>Heat deflection temperature</td>
<td>°C</td>
<td>240</td>
</tr>
</tbody>
</table>

### THERMAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit ISO Standard</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile modulus</td>
<td>MPa</td>
<td>9900</td>
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<tr>
<td>Elongation at break</td>
<td>%</td>
<td>3.8</td>
</tr>
<tr>
<td>Heat deflection temperature</td>
<td>°C</td>
<td>240</td>
</tr>
<tr>
<td>Charpy notched impact strength</td>
<td>kJ/m²</td>
<td>10</td>
</tr>
<tr>
<td>Water absorption</td>
<td>%</td>
<td>1.7</td>
</tr>
<tr>
<td>Water absorption</td>
<td>%</td>
<td>1.7</td>
</tr>
<tr>
<td>Density</td>
<td>g/cm³</td>
<td>1.35</td>
</tr>
<tr>
<td>Melting temperature</td>
<td>°C</td>
<td>178</td>
</tr>
<tr>
<td>Heat deflection temperature</td>
<td>°C</td>
<td>200</td>
</tr>
<tr>
<td>Charpy notched impact strength</td>
<td>kJ/m²</td>
<td>10</td>
</tr>
<tr>
<td>Water absorption</td>
<td>%</td>
<td>1.7</td>
</tr>
</tbody>
</table>

### COOLING & HEATING SYSTEM MATERIALS

**Radilon® A**
- Automotive cooling liquid resistant PA 6.6-GF30 grade designed to operate even under the most severe operating conditions. Considered to be a top-of-the-class material.
- Current applications: automotive cooling liquid resistant PA6.6-GF30 standard grade.

**Radilon® D**
- Automotive cooling liquid resistant PA6.6-GF30 standard grade.
- Current applications: automotive cooling liquid resistant PA6.6-GF30 standard grade.

**Radilon® Aestus T1**
- Automotive cooling liquid resistant PA6.6-GF30 standard grade.
- Current applications: automotive cooling liquid resistant PA6.6-GF30 standard grade.

**Radilon® NER GF300RKC**
- Automotive cooling liquid resistant PA6.6-GF30 standard grade.
- Current applications: automotive cooling liquid resistant PA6.6-GF30 standard grade.

**Radilon® RV330RG 3900BK**
- Automotive cooling liquid resistant PA6.6-GF30 standard grade.
- Current applications: automotive cooling liquid resistant PA6.6-GF30 standard grade.

**Radilon® RV400RG 3900BK**
- Automotive cooling liquid resistant PA6.6-GF30 standard grade.
- Current applications: automotive cooling liquid resistant PA6.6-GF30 standard grade.

**Radilon® RV300RKC 339 BK 07056**
- Automotive cooling liquid resistant PA6.6-GF30 standard grade.
- Current applications: automotive cooling liquid resistant PA6.6-GF30 standard grade.

**Radilon® RV300RG 3900 BK**
- Automotive cooling liquid resistant PA6.6-GF30 standard grade.
- Current applications: automotive cooling liquid resistant PA6.6-GF30 standard grade.

**Radilon® RV400RG 3900 BK**
- Automotive cooling liquid resistant PA6.6-GF30 standard grade.
- Current applications: automotive cooling liquid resistant PA6.6-GF30 standard grade.

**Radilon® RV330RG 3900 BK**
- Automotive cooling liquid resistant PA6.6-GF30 standard grade.
- Current applications: automotive cooling liquid resistant PA6.6-GF30 standard grade.
For hoses, special materials have been developed that can be processed using gas injection technology (GIT) or water injection moulding (WIT) 30/28° C. Glass-fibre filled material, RadiciGroup High Performance Polymers offers Radilon® A RV300HRG to a standard hydrolysis-resistant PA6.6-GF30. After ageing in a 50/50 glycol/water mix at 130°C, D RV300RG shows tensile strength retention of 68% and Charpy unnotched retained toughness of 74%, which is 15% more than a standard PA6.6-GF30.

For all car cooling system applications, our glycol resistant filled polyamides (PA 6.6, PA 6.10 and PPA) ensure:

- Excellent chemical resistance to engine compartment fluids
- High thermal resistance in contact with engine cooling fluids
- Inlet, outlet pipes, thermostat housings
- Expansion (overflow) tanks
- Radiator tanks
- A range of solutions for car cooling systems...

A typical example would be the thermostat housing right at the engine head. Our product, which has been approved by most car manufacturers, is used for very critical applications where components must work under severe operating conditions, such as high temperatures and/or pressures. A similar trend can also be seen in tensile strength (Chart 2). An increase in the ageing time needed to reach 50% of the original value is higher for Radilon® RV300HRG 3900 BK than for standard PA6.6-GF30. At the end of ageing, Radilon® RV300HRG shows tensile strength retention of 66%, which is 15% more than a standard PA6.6-GF30.

As shown in Chart 6, the property retention of Radilon® RV300HRG 3900 BK is higher than the standard hydrolysis-resistant PA6.6-GF30. At the end of ageing, Radilon® RV300HRG shows tensile strength retention of 66%, which is 15% more than a standard PA6.6-GF30.

As shown in Chart 8, the property retention of Radilon® RV300HRG 3900 BK is higher than the standard hydrolysis-resistant PA6.6-GF30. At the end of ageing, Radilon® RV300HRG shows Charpy unnotched retention of 74%, which is 15% more than a standard PA6.6-GF30.

The material can be used for the most critical applications where the requirements are:

- High thermal resistance in contact with engine cooling fluids
- Inlet, outlet pipes, thermostat housings
- Expansion (overflow) tanks
- Radiator tanks
- A range of solutions for car cooling systems...

As shown in Chart 10, and 11 compare the mechanical properties of Radilon® A RV300HRG 3900 BK and standard hydrolysis-resistant PA6.6-GF30. The difference is clear, but it is important to note that Radilon® A RV300HRG 3900 BK is recommended for those applications where constant temperature are required.

As shown in Chart 10, and 11 compare the mechanical properties of Radilon® A RV300HRG 3900 BK and standard hydrolysis-resistant PA6.6-GF30. The difference is clear, but it is important to note that Radilon® A RV300HRG 3900 BK is recommended for those applications where constant temperature are required.

As shown in Chart 10, and 11 compare the mechanical properties of Radilon® A RV300HRG 3900 BK and standard hydrolysis-resistant PA6.6-GF30. The difference is clear, but it is important to note that Radilon® A RV300HRG 3900 BK is recommended for those applications where constant temperature are required.

As shown in Chart 10, and 11 compare the mechanical properties of Radilon® A RV300HRG 3900 BK and standard hydrolysis-resistant PA6.6-GF30. The difference is clear, but it is important to note that Radilon® A RV300HRG 3900 BK is recommended for those applications where constant temperature are required.

As shown in Chart 10, and 11 compare the mechanical properties of Radilon® A RV300HRG 3900 BK and standard hydrolysis-resistant PA6.6-GF30. The difference is clear, but it is important to note that Radilon® A RV300HRG 3900 BK is recommended for those applications where constant temperature are required.
Injection molding products resistant to engine cooling liquids: extending PA6.6 applications to highly critical components

Radilon® A RV300RG is a material for injection molding used for cooling circuit components, such as radiator tanks, thermostats, and the like. With either of these technologies, the use of Radilon® products allows you to obtain hoses for the most critical applications.

Radilon® A RV300RG exhibits excellent resistance to coolant for the most critical applications.

Charts 9 and 10 show how the product with high glycol resistance behaves in contact with an engine cooling liquid. After immersion of 200 hours at 135°C, a slight decrease in tensile strength is observed. These tests were performed to induce the most severe material approval process.

New solutions for high performance demands: PA6.10 and PPA

Radilon® Aestus T1 RV330RG 3900BK is recommended for those applications where coolant temperatures are above 130°C. Radilon® Aestus T1 RV330RG 3900BK has 50% higher hydrolysis resistance than standard hydrolysis-resistant PA6.6. A typical example would be the thermostat housing right at the engine head. Our product, which has been approved by a number of important end users, opens up new possibilities, as it can be used as a replacement for metals and special glass-fibre filled materials, RadiciGroup High Performance Polymers offers Radilon® products for the most critical applications.

As shown in Chart 10 it is property retention of Radilon® A RV300HRG, 3900 BK is higher than the standard hydrolysis-resistant PA6.6-GF30. This characterization was done using a strict testing method requiring an autoclave to cover all the OEM hydrolysis resistance requirements. The new grades extend the use of polymers to very critical applications, where standard hydrolysis-resistant PA6.6 grades cannot guarantee the required performance level.

These tests were performed to induce the most severe material approval process, where standard hydrolysis-resistant PA6.6 grades cannot guarantee the required performance level.
Injection molding products resistant to engine cooling liquids: extending PA6.5 applications to high critical components

Radilon® A RV300RG is an ideal product for injection molding use due to its vibration and fatigue resistance and high chemical resistance to engine compartment fluids. It is suitable for applications requiring superior hydrolysis resistance at high temperatures and/or pressures.

For hoses, special materials have been developed that can be processed using gas injection technology (GIT) or water jet technology (WJT).

Radilon® A RV300RG has been specifically designed to cover all the OEM hydrolysis resistance requirements. The new grades extend the use of polymers to very critical applications, where components must work under severe operating conditions, such as high temperatures and/or pressures. It can be used in all kinds of applications, including system components, where standard hydrolysis-resistant PA6.6 grades cannot guarantee the required performance level.

New solutions for high performance demands: PA6.10 and PPA

Radilon® D RV300RG, an innovative product with high glycolysis resistance, is a high-performance polymer that exhibits twice the impact strength of Radilon® A RV300RG at a temperature of 120°C, with ageing extended up to 3000 hours.

The PA6.10 product is a partially bio-based polymer as sebacic acid is used for the polymerization process.

Aesthetic resistance to engine compartment fluids at a temperature of 120°C, with ageing extended up to 3000 hours.
Radilon® products are designed for engine cooling liquid systems, extending PA6.5 applications to highly critical components.

Radilon® RV300HRG is a material for engine cooling liquid systems, similar to injection technology (WIT). With either of these technologies, the use of Radilon® products allows you to obtain hoses for the most critical applications.

For hoses, special materials have been developed that can be processed using gas injection technology (GIT) or water injection technology (WIT). With either of these technologies, the use of Radilon® products allows you to obtain hoses for the most critical applications.

with high quality internal surfaces, which drastically reduce the pressure drop caused by surface roughness and satisfy in injection technology (WIT). With either of these technologies, the use of Radilon® products allows you to obtain hoses for the most critical applications.

Charts 1 through 11 show how the product with high glycolysis resistance behaves in contact with an engine cooling liquid. The experiment is performed in 135°C, with ageing extended up to 3000 hours. These tests were performed on Radilon for the material approval process.

Commitment to innovation in products for the automotive industry and more...

Radilon® High Performance Polymers can provide a complete range of materials ideal for car engine cooling systems. The novel products offer the best mechanical properties, resistance to high temperatures, and chemical resistance to the most critical environments. These materials meet the most demanding engine requirements, making Radilon® the ideal choice for these applications, where standard hydrolysis-resistant PA6.5 grades cannot guarantee the required performance level.
Global Presence

Automotive cooling liquid resistant. For use at temperatures of up to 135°C.

Improved mechanical properties and excellent dimensional stability.

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COOLING & HEATING SYSTEM MATERIALS

HIGH PERFORMANCE POLYMERS

MANAGEMENT

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