DESCRIPTION
Toray AmberTool® HXR56 is a low temperature curing epoxy composite tooling prepreg, fully impregnated into a carbon multiaxial backing ply construction. This two-layer product facilitates 3-D construction while allowing efficient lay-up, reducing overall tooling costs. HXR56 prepreg is co-compatible with our heritage AmberTool® HX56 carbon 205gsm 2x2 twill reinforcement surface ply. After a suitable post cure, an end use temperature of 180°C (356°F) is achieved.

FEATURES
► Reduction in number of ply laminates
► Reduction in debulk stages
► Reduction in waste
► Improved cutting efficiency
► Low initial cure temperature
► Capable of freestanding post cure
► Maximum 180°C (356°F) tool end use temperature
► Low coefficient of thermal expansion (CTE)
► Low volatile content
► 50 hours out life at 18°C (64°F)

PRODUCT TYPE
40–55°C (104–131°F) Low Temperature Curing Epoxy Tooling Prepreg

TYPICAL APPLICATIONS
► Small-to-medium-sized autoclave tooling with fast cure, more efficient processing, excellent surface finish, and reduced overall tool cost

SHELF LIFE
| Out Life: | 50 hours at 18°C (64°F) |
| Storage Life: | 6 months at -18°C (0°F) |

Out life is the maximum time allowed at ambient temperature before cure.

To avoid moisture condensation:
Following removal from cold storage, allow the prepreg to reach room temperature before opening the polythene bag.
Typically, the thaw time for a full roll of material will be 4 to 6 hours.

TYPICAL NEAT RESIN PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Density</td>
<td>1.23 g/cm³ (77lbs/ft³) at 23°C (73°F)</td>
</tr>
<tr>
<td>Tₚ (DMA) after 190°C (374°F) post cure</td>
<td>Onset: 185°C (365°F); Peak tan δ: 209°C (408°F)</td>
</tr>
</tbody>
</table>
**PRODUCT DATA SHEET**

**TORAY AMBERTOOL® LAY-UP REINFORCEMENTS**

<table>
<thead>
<tr>
<th>Fiber Type</th>
<th>Weight (gsm)</th>
<th>Weave Style</th>
<th>Standard Resin Content w/o</th>
<th>Format</th>
<th>Molded Thickness (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HX56 Standard modulus 3K carbon</td>
<td>205</td>
<td>2x2 twill</td>
<td>46 (surface ply)</td>
<td>400 mm x 400 mm squares or roll</td>
<td>0.23</td>
</tr>
<tr>
<td>HXR56 101 Standard modulus 50K carbon</td>
<td>610</td>
<td>±45° bi-axial</td>
<td>36 (bulk ply)</td>
<td>400 mm x 400 mm squares</td>
<td>1.30</td>
</tr>
<tr>
<td>Standard modulus 12K carbon</td>
<td>650</td>
<td>2x2 twill</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Supplied as 400 mm squares only

**REINFORCEMENTS AVAILABLE**

**RHEOLOGY**

0.5°C/min Ramp

- $T_{gel} = 80.1^\circ C$
- $T_{gel} = 100$ mins
- $\eta_{min} = 3.75$ Pa.s
- $T_{\eta_{min}} = 70.6^\circ C$
- $T_{\eta_{min}} = 1$ hr 21 mins

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**Master pattern**

- 2 plies HX56 205gsm 2x2 twill
- 4 plies HXR6
- 610gsm/650gsm co-laminated

Supplied as 400 mm squares only
**POST CURE TIME**

<table>
<thead>
<tr>
<th>Post Cure Schedule A</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Ramp</td>
<td>1°C (1.8°F)/min to 60°C (140°F)</td>
</tr>
<tr>
<td>Ramp</td>
<td>1°C (1.8°F)/min to 90°C (194°F)</td>
</tr>
<tr>
<td>Ramp</td>
<td>1°C (1.8°F)/min to 120°C (248°F)</td>
</tr>
<tr>
<td>Ramp</td>
<td>1°C (1.8°F)/min to 150°C (302°F)</td>
</tr>
<tr>
<td>Ramp</td>
<td>1°C (1.8°F)/min to 170°C (338°F)</td>
</tr>
<tr>
<td>Ramp</td>
<td>1°C (1.8°F)/min to 190°C (374°F)</td>
</tr>
<tr>
<td>Cool to 50°C (122°F) at 2.5°C/ min (4.5°F/ min)</td>
<td></td>
</tr>
</tbody>
</table>
POST CURE SCHEDULE A

Heat-up rate 1.0°C/min (1.8°F/min)
Dwell time 1 hour at 90°C (194°F)
Dwell time 2 hours at 60°C (140°F)
Dwell time 1 hour at 120°C (248°F)
Dwell time 1 hour at 150°C (302°F)
Dwell time 1 hour at 170°C (338°F)
Dwell time 6 hours at 190°C (374°F)
Cool-down rate 2.5°C/min (4.5°F/min)

POST CURE SCHEDULE B
An alternative post cure schedule may also be used as follows.

Heat-up rate 20°C/hour (36°F/hour)
Dwell time 6 hours at 190°C (374°F)
Cool-down rate 2.5°C/min (4.5°F/min)
PRODUCT DATA SHEET

HANDLING SAFETY
Observe established precautions for handling epoxy resins and fibrous materials. Ensure adequate ventilation and wear gloves and protective clothing. For further information, refer to our Safety Data Sheet available from Toray Advanced Composites.

PROCESSING
Processing parameters and instructions are provided in the Toray AmberTool® material processing information guide from Toray Advanced Composites at www.toraytac.com/tooling.

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