Crestomer® structural adhesives are used in a wide range of demanding applications in a variety of markets. The key features and benefits for customers are:

- Structural adhesives
- Considerable weight savings versus traditional GRP joining techniques
- Excellent impact and fatigue performance
- Low VOC emissions

A Record Of Achievement

Crestomer’s outstanding performance record and unique properties have fundamentally challenged conventional thinking among moulders, who have been sceptical of the performance possibilities with adhesives. Freed from the constraints of traditional fabricating techniques, FRP moulders are now capitalising on the design flexibility, time and cost savings that structural adhesives can offer. Crestomer® is now used in a wide range of demanding applications across the marine, transport, building and construction sectors within the FRP industry.

Chemistry and Bonding

Crestomer® Dispensing Equipment

- Crestomer® Advantage 10, 30 and 60 cartridges can be used with a manual or pneumatic gun. Suitable dispense guns and static mixers are available from Scott Bader.
- Crestomer® adhesives can be dispensed directly from pails and drums using a manual or automated dispensing machine/potter gun.
- Scott Bader technical support can provide advice on appropriate dispensing equipment.
Fillet joints constructed using Crestomer® 1152PA are stronger and aesthetically superior to FRP laminated joints as well as being quicker to manufacture and giving far lower styrene emission.

There are three different ways in which a joint can fail.

- **Substrate failure** indicates that the adhesive is stronger than the materials being bonded together.
- **Cohesive failure** is a failure of the bulk adhesive itself and is characterised by a film of adhesive being left on both sides of the failed joint.
- **Adhesive failure** occurs in the bond line between the adhesive and substrate and is characterised by the film of adhesive being left on one side of the failed joint.

### Crestomer® Product Range Overview

<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Approvals</th>
<th>Appearance</th>
<th>Working time (min)</th>
<th>***Failure time (hours)</th>
<th>Tensile strength (MPa)</th>
<th>Tensile modulus (MPa)</th>
<th>Tensile elongation (%)</th>
<th>Specific Gravity (g/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1150PA</td>
<td>High performance structural adhesive with shorter fixture time</td>
<td>Lloyd's, Class NK</td>
<td>Mauve Gel</td>
<td>10</td>
<td>22 - 25</td>
<td>1000 - 1500</td>
<td>100 - 120</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td>1154A</td>
<td>Adhesive for full application Amine accelerated</td>
<td>Lloyd's, DNV-GL, Class NK</td>
<td>Green/Yellow Gel</td>
<td><strong>25</strong></td>
<td>2.5 22 - 25 1000 - 1500 100 - 120 1.05</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1158PA</td>
<td>High performance structural adhesive</td>
<td>Lloyd's, DNV-GL, Class NK</td>
<td>Mauve Gel</td>
<td>10</td>
<td>22 - 25</td>
<td>1000 - 1500</td>
<td>100 - 120</td>
<td>1.05</td>
<td></td>
</tr>
<tr>
<td>1159PA</td>
<td>High performance structural adhesive with long open time</td>
<td>Lloyd's, RINA, Class NK</td>
<td>Mauve Gel</td>
<td>90</td>
<td>8.5 22 - 25 1000 - 1500 100 - 120 1.05</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1189PA</td>
<td>High performance structural adhesive</td>
<td>Lloyd's, DNV-GL, Class NK</td>
<td>Grey Paste</td>
<td>10</td>
<td>22 - 25</td>
<td>1000 - 1500</td>
<td>100 - 120</td>
<td>1.05</td>
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<td>1190PA</td>
<td>High density structural core bonding adhesive</td>
<td>Lloyd's, DNV-GL</td>
<td>Pink Paste</td>
<td>10</td>
<td>22 - 25</td>
<td>1000 - 1500</td>
<td>100 - 120</td>
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</thead>
<tbody>
<tr>
<td>Advantage 10</td>
<td>High performance structural adhesive</td>
<td>Lloyd's, White Paste</td>
<td>10</td>
<td>1.2 22 - 25 400 - 600 100 - 120 1.15</td>
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### Bond Strengths With Different Substrates

Crestomer® can be used to bond many substrates. The following tables give typical examples of bond strengths and types of failure mode observed when bonding various substrates with different products from the Crestomer® range. All figures shown are for lap shear strengths (MPa).

#### Crestomer® 1152PA

<table>
<thead>
<tr>
<th>Substrate</th>
<th>FRP</th>
<th>Marine Ply</th>
<th>Aluminium*</th>
<th>Stainless Steel*</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRP</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Marine Ply</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aluminium*</td>
<td>-</td>
<td>15</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stainless Steel*</td>
<td>-</td>
<td>-</td>
<td>12</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Crestomer® 1186PA

<table>
<thead>
<tr>
<th>Substrate</th>
<th>FRP</th>
<th>Marine Ply</th>
<th>Aluminium</th>
<th>Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRP</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Marine Ply</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Aluminium</td>
<td>-</td>
<td>10</td>
<td>-</td>
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</tr>
<tr>
<td>Stainless Steel</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>-</td>
</tr>
</tbody>
</table>

#### Crestomer® 1196PA

<table>
<thead>
<tr>
<th>Substrate</th>
<th>FRP</th>
<th>Balsa PVC Foam (80kg/m3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRP</td>
<td>10</td>
<td>-</td>
</tr>
</tbody>
</table>

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**Pack Size**

The Crestomer® range is available in 20 litre kegs and 200 litre drums. Weights vary depending on S.G. Crestomer® Advantage 10, 30 and 60 are packed in 10:1 380ml coaxial cartridges. Manual and pneumatic guns plus static mixers are also on the product range.

**Adhesive failure modes**

- **Substrate failure** is a failure of the bulk adhesive itself and is characterised by a film of adhesive being left on both sides of the failed joint.
- **Adhesive failure** occurs in the bond line between the adhesive and substrate and is characterised by the film of adhesive being left on one side of the failed joint.

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* Butanox® M-50 at 25°C
** 2% Perkadox® BT-50 at 25°C
*** Time taken at 23°C to achieve 1.4MPa strength in lap-share tests according to BS ISO 4587
Crestomer® adhesives are one of a wide variety of materials that can be used in bonded assemblies. Compared to other adhesives, Crestomers offer the following benefits:

- Monomer type identical to polyester resins
- Cured with conventional peroxides
- Low exotherm during cure
- Available in a range of working and fixture times
- Ease of application
- Cost effective

High exotherm in an adhesive can cause the substrate to distort and give poor aesthetic characteristics to the parts being bonded. The chemistry of Crestomer® adhesives ensures that high exotherm temperatures, a characteristic of some other adhesives do not occur. The graph shows the exotherm temperatures of Crestomer® adhesives over a range of test temperatures.

Crestomer® products have been successfully used by leading global boatbuilders to improve the performance of their products, to make productivity improvements through time savings in construction and to provide considerable weight savings. The following diagram shows areas where Crestomer® structural adhesives can be used in FRP boatbuilding.
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