Advanced Gelcoats, Adhesives and Crestapol® Resins for Land Transport Applications

JEC, 8th March 2016

Tom Kugelstadt
Company introduction

For land transport we offer:

- Crystic® Gelcoats
- Crestabond® Adhesives
- Crestapol® Resins
About Scott Bader

Scott Bader Headquarters
Wollaston, UK

Over 65 Years’ of Reliability, Experience and Innovation
Production and R&D Locations

**CANADA**
- Drummondville, Québec
- Employees: 22

**USA**
- Stow, Ohio
- Capacity Toll Manufacturing
- Employees: 8

**Brazil**
- Serra, Es, Brazil

**INDIA**
- Mumbai, India
- Employees: 250

**HEADQUARTERS ENGLAND**
- Wollaston
- Capacity 45,000T pa
- Employees: 250

**FRANCE**
- Amiens
- Capacity 35,000T pa
- Employees: 90

**CROATIA**
- Zagreb
- Capacity 20,000T pa
- Employees: 63

**UNITED ARAB EMIRATES**
- Dubai
- Capacity 40,000T pa
- Employees: 75

**ASIA PACIFIC**
- Shanghai, China
- Employees: 5

**INDIA**
- Mumbai, India

**SOUTH AFRICA**
- Hammarsdale
- Capacity 9,000T pa
- Employees: 75

**Saudi Arabia**
- AL Khobar, Saudi Arabia

**BRAZIL**
- Serra, Es, Brazil

**GERMANY**
- Weiden
- Capacity 20,000T pa
- Employees: 5

**USA**
- Stow, Ohio
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- Employees: 22

**ASIA PACIFIC**
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Scott Bader Group Turnover in 2015 was €200m
Crystic® Gelcoats
For
Land Transport
Crystic® Gelcoats have been used in the Transport Market for over 50 years in Luxury Cars, Recreational Vehicles, Buses, Trucks, Vans, Caravans, Horse Boxes, Rail...
Crystic® Gelcoats for land transport are designed to excel in the following areas -

- Excellent long-term performance
- Minimal porosity
- Easy to sand
- Excellent gloss retention
- Superior flexibility – crack resistance
- Excellent fire performance properties, especially when in combination with Crestapol FR resins.
Weathering Tests

• Florida (12 months)
• Xenon (1000 hours)
• QUVA (1000 hours)

Blistering Test

• 12 month water immersion at 40°C
Iso & Iso-NPG Spray Gelcoats for Superior Weathering with low styrene emissions

• **Crystic® LS96PA Spray Gelcoat**
  Low styrene content gelcoat with good handling properties

• **Crystic® LS97PA Spray Gelcoat**
  Low styrene content superior weathering gelcoat with excellent water resistance

• **Crystic® LS30PA Iso-NPG Spray Gelcoat**
  Superior Weathering Iso/NPG Spray Gelcoat

• **Crystic® Ecogel**
  Market leading technology spray gelcoat with only 16% styrene content which may cut styrene emissions by over 50%
New Technology Fire Retardant, Halogen Free, designed to protect Composites from Fire

- **Crystic® Fireguard Gelcoat 70PA**
  Low Smoke and Low Surface Spread of Flame Spray Gelcoat for the Most Stringent Fire Approvals (HL2 for EN45545 when combined with Crestapol 1212.)

- **Crystic® Fireguard Gelcoat 72PA**
  Low Surface Spread of Flame Spray Gelcoat

- **Crystic® Fireguard 75PA (IMS) Excel**
  Intumescent fire retardant gelcoat for spray application
  Meets BS476 Part 7 class 1 with 1355PA and M1 with Crestapol 1212
Crestabond® Adhesives
For
Land Transport
Two component Methacrylate Adhesives (Activator & Adhesive)

Based on Acrylic technology

High performance, high strength

Room temperature cure

Range of cure speeds

Ability to bond dissimilar substrates

Alternative to Urethanes and Epoxies

3 main groups of substrates to bond to: Metals, Composites & Plastics
<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Colour</th>
<th>Mix ratio by volume</th>
<th>Viscosity (cP)</th>
<th>Working Time (mins)</th>
<th>Fixture Time (mins)</th>
<th>Tensile Elongation (%)</th>
<th>Tensile Strength (MPa)</th>
<th>Tensile Modulus (MPa)</th>
<th>Gap Fill (mm)</th>
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<tbody>
<tr>
<td>M1-04</td>
<td>Universal Bonder</td>
<td>Grey</td>
<td>10:1</td>
<td>100,000 - 140,000</td>
<td>3 - 5</td>
<td>8 - 10</td>
<td>70</td>
<td>14 - 17</td>
<td>400 - 600</td>
<td>1 - 15</td>
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<tr>
<td>M1-05</td>
<td>Universal Bonder</td>
<td>Grey or Black</td>
<td>10:1</td>
<td>100,000 - 140,000</td>
<td>4 - 7</td>
<td>12 - 18</td>
<td>70</td>
<td>14 - 17</td>
<td>400 - 600</td>
<td>1 - 15</td>
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<tr>
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<td>10:1</td>
<td>100,000 - 140,000</td>
<td>16 - 22</td>
<td>25 - 35</td>
<td>70</td>
<td>16 - 19</td>
<td>600 - 850</td>
<td>1 - 25</td>
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<tr>
<td>M1-30</td>
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<td>Grey or Black</td>
<td>10:1</td>
<td>200,000 - 240,000</td>
<td>25 - 35</td>
<td>60 - 80</td>
<td>&gt;100</td>
<td>17 - 20</td>
<td>750 - 1000</td>
<td>1 - 50</td>
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<tr>
<td>M1-60</td>
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<td>Grey</td>
<td>10:1</td>
<td>200,000 - 240,000</td>
<td>50 - 70</td>
<td>150 - 180</td>
<td>&gt;100</td>
<td>16 - 18</td>
<td>650 - 850</td>
<td>1 - 50</td>
</tr>
<tr>
<td>M1-90HV</td>
<td>Universal Bonder</td>
<td>Off White</td>
<td>10:1</td>
<td>340,000 - 380,000</td>
<td>80 - 100</td>
<td>210 - 240</td>
<td>60</td>
<td>20 - 25</td>
<td>1400 - 1800</td>
<td>1 - 50</td>
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<tr>
<td>M7-05</td>
<td>Universal Bonder</td>
<td>Off White or Black</td>
<td>1:1</td>
<td>30,000 - 70,000</td>
<td>4 - 7</td>
<td>18 - 22</td>
<td>35</td>
<td>23 - 25</td>
<td>1200 - 1700</td>
<td>1 - 5</td>
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<tr>
<td>M7-15</td>
<td>Universal Bonder</td>
<td>Off White or Black</td>
<td>1:1</td>
<td>30,000 - 70,000</td>
<td>10 - 20</td>
<td>30 - 45</td>
<td>33</td>
<td>22 - 24</td>
<td>1200 - 1700</td>
<td>1 - 5</td>
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Pack Sizes
- 10:1 = 50ml side by side cartridges
- 10:1 = 400ml co-axial cartridges
- 10:1 = 825ml side by side cartridges
- 1:1 = 50ml side by side cartridges
- 1:1 = 400ml side by side cartridges
- 20 litre pails (18kg)
- 200 litre drums (180kg)

Dispensing Equipment for Cartridges, 10:1 and 1:1
- Manual gun 10:1 and 1:1
- Pneumatic gun 10:1 and 1:1

Dispensing Equipment for Bulk Applications, 10:1 and 1:1
- 20 litre pails and 200 litre drums require machines that can be arranged via Scott Bader partners
Characteristics

- No primer required on any substrates
- Minimal surface preparation needed
- Excellent fatigue and impact resistance
- Range of working and fixture times
- Good resistance to water, diesel and other common chemicals
- Good gap filling capability: 1mm – 50mm
- High elongation reducing stress on parts
- Service temperature from -40°C to +100°C
Case Studies & Applications

- **Transportation Trailer Applications**

  Aluminium Corner Profiles

  Bonding Al stiffeners to ABS roof skin in horse boxes
Case Studies & Applications

- Transportation Bus Applications

One piece aluminium roof bonding

Body Panel Bonding.
Front and rear end caps, Roof profiles
Case Studies & Applications

• Transportation Truck Applications

Stowage Lockers

Truck Cabs (Hoods, Fairing, Bumpers, Wheels arches, Wing mirrors, etc.)
Case Studies & Applications

- Transportation Train Applications

- GRP front and rear end caps

- Aluminium panels, Stainless Steel fittings

- Internal Bonding (window surrounds, heating ducts, floors, ceiling panels, light boxes)
Crestapol® Resins
For
Land Transport
Tough low viscosity urethane-acrylate resin with rapid cure characteristics.

Can be filled as required for cost/surface finish benefits.

Mostly used in high volume RTM type applications where the rapid curing reduces cycle times and increases productivity.

Can be processed at ambient and elevated temperatures using composite and/or metal tooling.
Crestapol 1210® Cycle Time Advantages

Barcol Development of CP1210 vs Typical Polyester RTM Resin
With Matched Geltime (10 min)
Crestapol® 1212
High Performance Resin for highest levels fire smoke & toxic fume requirements for Land Transport applications.

Characteristics:

• Urethane Acrylate resin in styrene/methyl methacrylate
• Tough, low viscosity resin for closed mould, infusion and pultrusion
• Filled with ATH for the very highest Fire, Smoke and Toxic Fume performance
• High toughness for demanding applications
• High quality technical support for formulation development, production trials etc.
Fire Performance

High levels of Aluminium Trihydrate (ATH) can be incorporated to achieve a range of stringent fire, smoke & toxic fume standards. For example, 170phr ATH can achieve M1, F0 to the French Epiradiateur standards and HL2 for CEN/TS EN45545.
Crestapol® 1212
Processing Options

• Vacuum Infusion.

• Compression Moulding.

• Light RTM/RTM.

• Hand Lamination.
Crestapol® 1212
Rail Applications

- **China High Speed Train** - VIP Chairs
  - *FR Standard*: German DIN 5510, S4/SR2/ST2

- **Spain Madrid Metro** - Gate Post
  - *FR Standard*: Spanish M1 F1
- **Bangkok Subway** - Interior parts and Chairs

  ![Bangkok Subway Interior Parts](image1)

  **FR Standard:**
  - German DIN 5510, S4/SR2/ST2

- **Europe Train** - Carrier cover board

  ![Europe Train Carrier Cover Board](image2)

  **FR Standard:**
  - French NFP 92-501 M1 F2
Low viscosity urethane acrylate type resin suitable for infusion, RTM and similar processes at room temperature

**Key features:**
- Excellent mechanical performance and durability
- High temperature performance
  Tg 130°C / HDT 109°C
- Compatible with CF and general purpose sizing agents
- Can process/ manufacture as with a polyester/vinylester and achieve improved properties
- Compatible with high weathering performance (marine grade) polyester gelcoat technology.
Contact Us…

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