Scott Bader Crestapol

High Performance Urethane Methacrylate Resin Technology.

Scott Bader – Common Ownership Company

- Totally independent company with no external shareholders
- Able to think and act long term as a business- est 1921.
- Establish & maintain long term partnerships with customers and suppliers
- Balance business needs with social, charitable and environmental obligations for sustainability
- High integrity, honest and trustworthy
- Longstanding relationship with Andercol, Columbia & Novapol, Brazil.

Scott Bader Global Company Locations

www.scottbader.com

Scott Bader Ireland
Scott Bader U.K
Scott Bader France
Scott Bader Iberica
Scott Bader Asia Pacific
Scott Bader Inc.

Scott Bader Scandinavia AB
Scott Bader Germany
Scott Bader Eastern Europe
Scott Bader d.o.o. Croatia
Scott Bader South Africa
Scott Bader Middle East

Crestapol Resins

- **Crestapol Urethane Methacrylate resin technology.**
- **Widely adaptable/ 'tuneable' resin properties via selection of:-**
  - ***Urethane groups***
  - ***Chain extender groups***
  - ***End capping groups***
  - ***Monomers***
- **Allows a much wider range/ balance of properties to be achieved for demanding High Performance end applications compared to other typical thermosetting resins.**

Crestapol Resins

- **Wide performance Spectrum via selection of 'building blocks' in resin backbone. Allows developed of targeted High Performance resins for niche, speciality applications.**

- **For example, *two 'extremes'*:**

  - ***Crestapol 1080 UMa resin (V. High extension to break toughening resin).***
    - **Elongation at break- 120%**
    - **Gardner Impact strength- >200 Kg/cm2**

  - ***Crestapol 1234 UMa resin (V. High temperature performance resin)***
    - **Heat deflection under load- >300 deg C**
    - **Barcol hardness- >60**

Crestapol Resins – showcasing 2 market leading products.

- ***Crestapol 1212***
  - **Tough, rapid curing UMa resin to achieve the highest Fire, Smoke & Toxic fume performance standards.**

- ***Crestapol 1250lv***
  - **High performance UMa resin for Carbon Fibre applications.**

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Crestapol 1212

High Performance Resin for highest fire smoke & toxic fume applications.

Crestapol 1212

- Tough, low viscosity resin for Closed mould, infusion and pultrusion
- Can be heavily filled with ATH for very high Fire, Smoke and Toxic Fume performance
- High toughness for demanding applications

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Suitable Manufacturing Techniques & Markets

- Pultrusion
- Closed Mould
  - Resin Transfer Moulding
  - Infusion… .

- Off shore
- Transport
- Building and construction
- Marine
- Wind energy

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Crestapol 1212 – Resin Properties

Liquid resin properties

Density (25°C)	1.07 g/cm³
Viscosity (ICI cone & plate, 25°C	0.7 poise

Cast resin properties

Heat Deflection Temperature (HDT)	87°C
Ultimate Tensile Strength	71 MPa
Elongation at break	5.8%
Tensile modulus	2.9 GPa
Toughness, G_{IC}	450 (J/m²)
Barcol hardness	40

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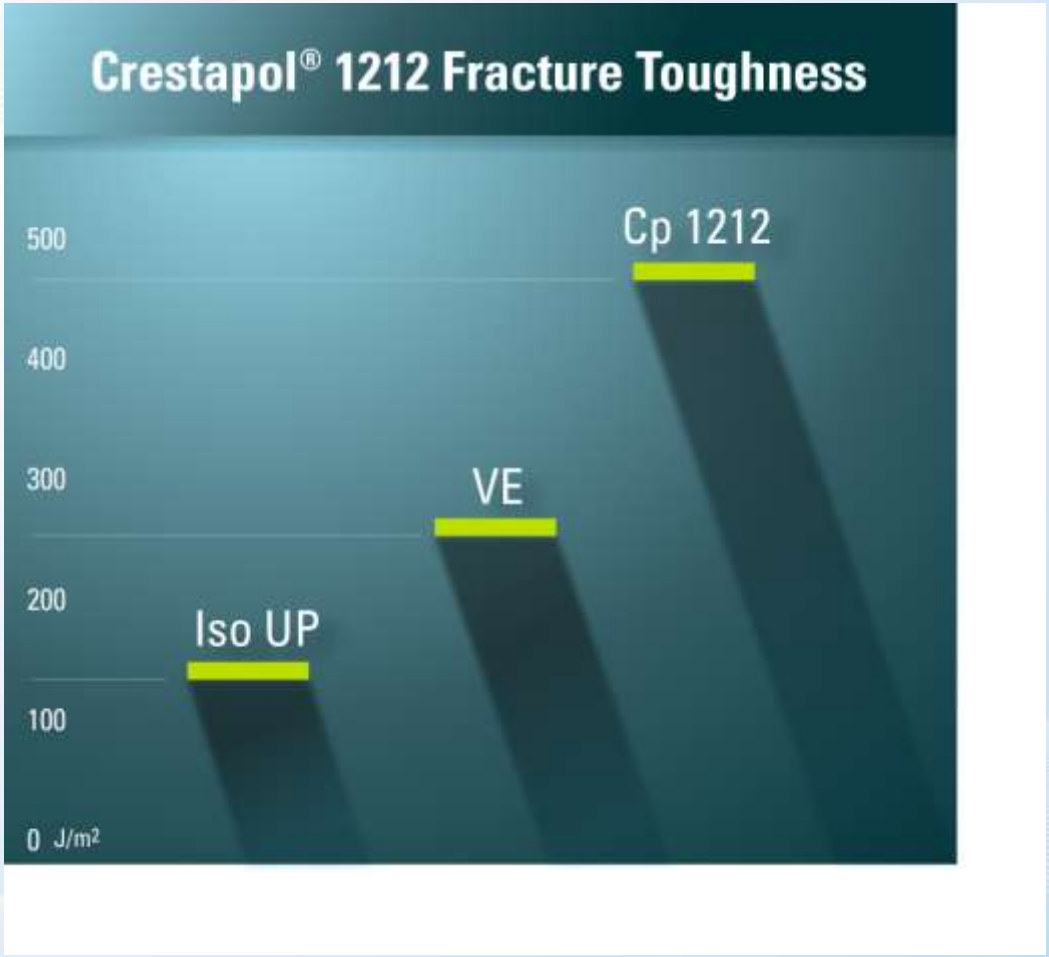
Crestapol 1212 – Fracture Toughness



Crestapol 1212 – FST Performance

Fire performance of Crestapol 1212 is achieved by addition of Aluminium Trihydrate.
Accredited to:-

NBR15708
French/ Spanish 'Epiradiateur' M1, FO
ISO 5658-2
BS 6853 Annex B 2
ASTM E162/ E662/ E84
DIN 5510
FIRESTARR EN 45545
BSS 7239

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Crestapol Resins- Railway/ rolling stock success stories

- ***Crestapol 1212 Composite parts have been used on a multitude of rail projects by International train builders, including***
  - ***Bombardier, Siemens, CAF, Chinese High Speed Metro…***

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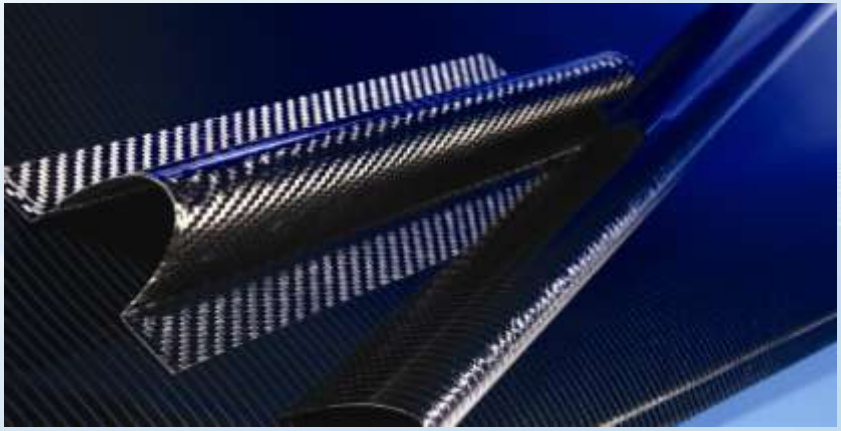
High Performance Crestapol 1250LV Resin Technology in Carbon Fibre Applications

Crestapol 1250LV

- Excellent mechanical performance and durability using only moderate temperature post-curing cycles
- High temperature performance – Tg 115-120°C / HDT 109°C
- Compatible with carbon fibre reinforcement materials and general purpose sizing agents
- Excellent surface finish with minimal fibre print through
- Ability to vary cycle time eliminates the need to stock different resin graded



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Crestapol 1250LV – Resin Properties

Cast resin properties

Heat Deflection Temperature (HDT)	109°C
Glass Transition Temperature (Tg)	120~130°C
Ultimate Tensile Strength	76 MPa
Elongation at break	3.2%
Tensile modulus	3.28 GPa
Toughness, G_{IC}	575 (J/m²)
Barcol hardness	38

Curing schedule; 24hrs at 23°C, 5hrs at 80°C, 3hrs at 120°C

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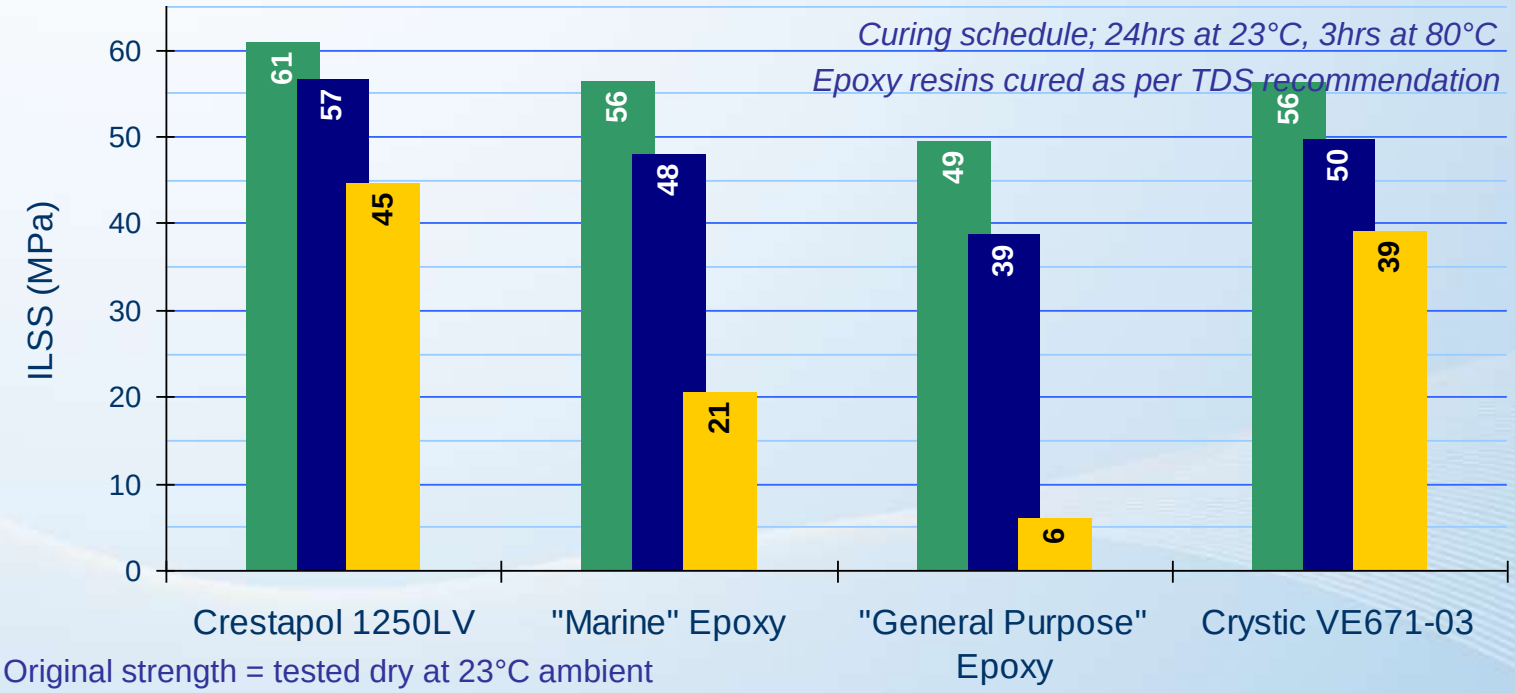
Crestapol 1250LV – Inter-Laminar Shear Strength

200GSM UD T700SC fibres 12K tow 50C size
ISO 14130

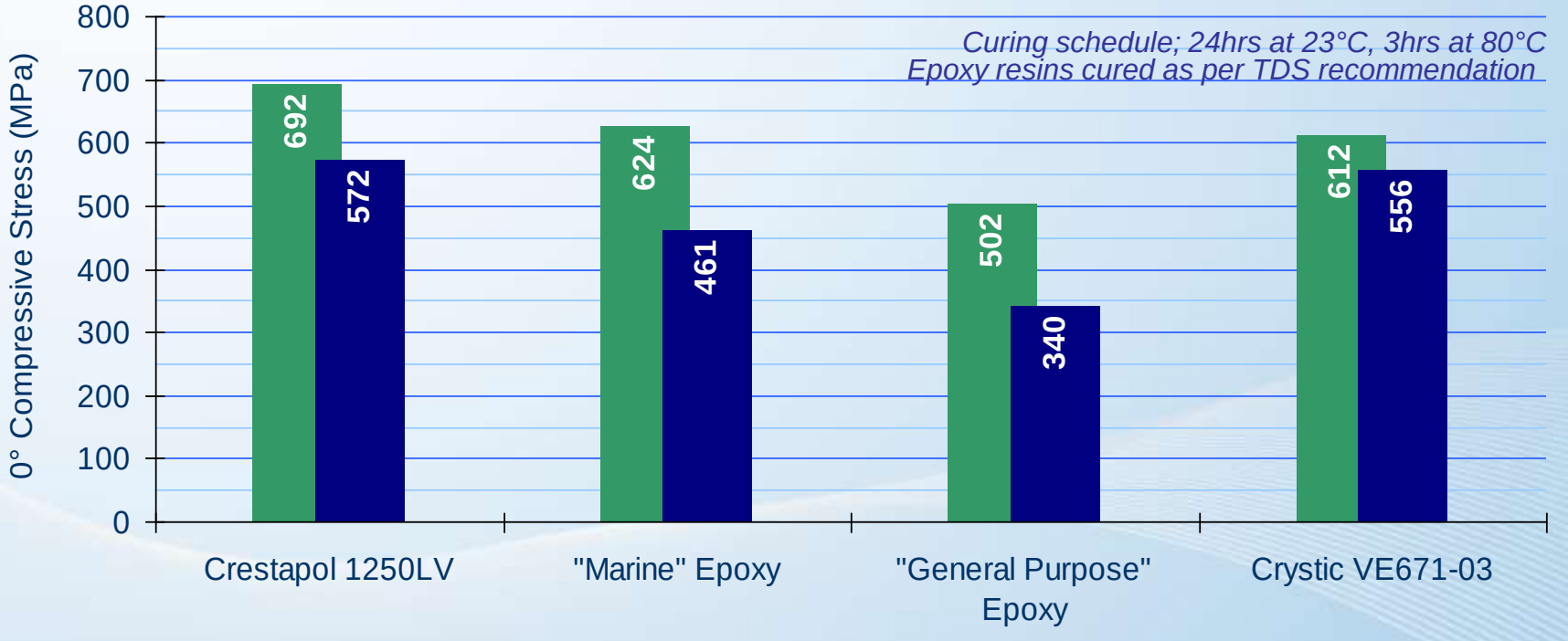
CP1250LV provides superior inter-laminar shear strength, environmental resistance and performance at temperature



Crestapol 1250LV – 0° Compression Strength

200GSM UD T700SC fibres 12K tow 50C size ISO 14126

CP1250LV provides excellent compression performance, inferring excellent fibre interfacial properties



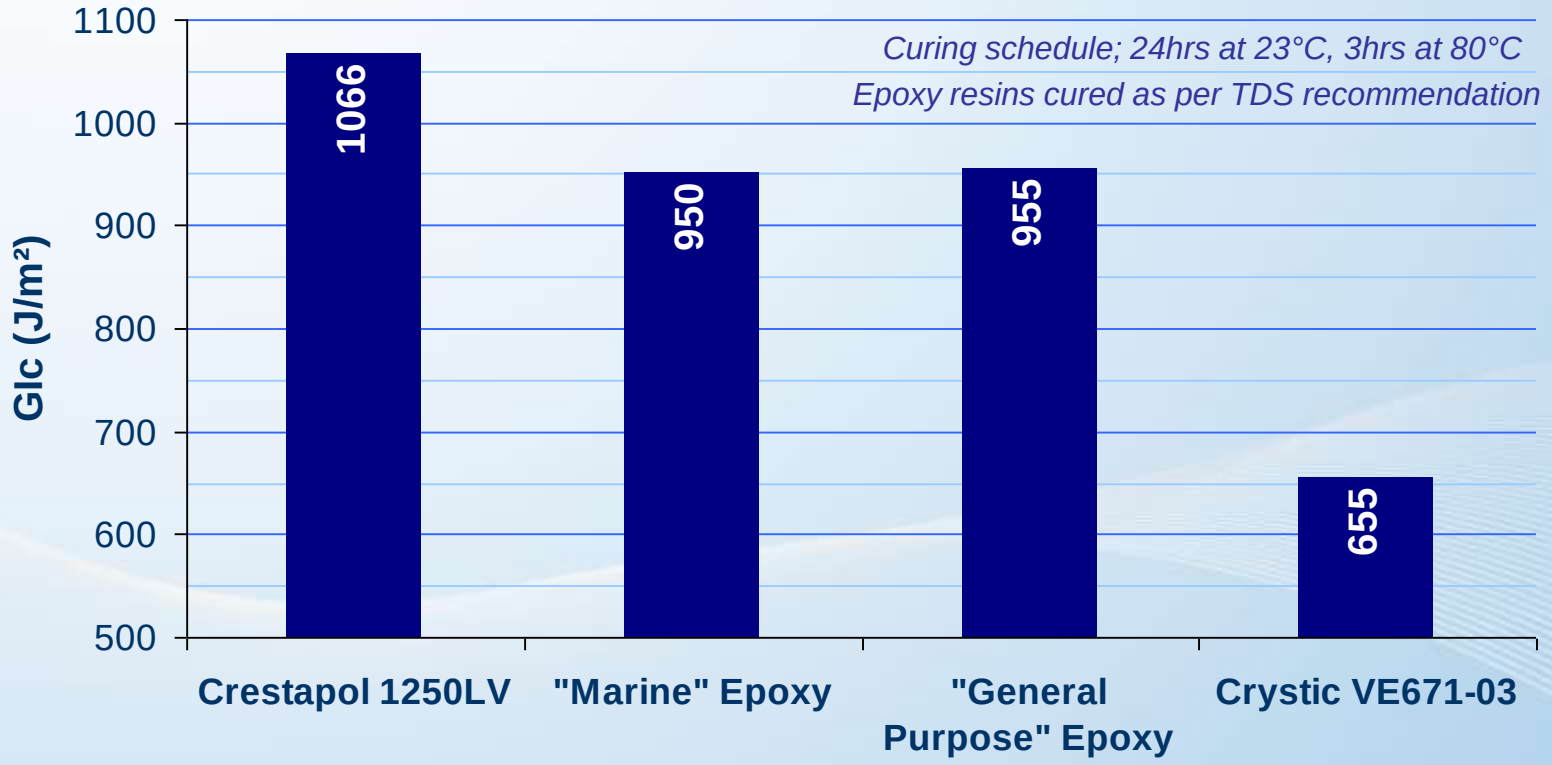
Original strength = tested dry at 23°C ambient

Post conditioned = tested at 23°C ambient after 4 weeks of +50° Salt Spray, -20°C freeze & +60°C dry cycles

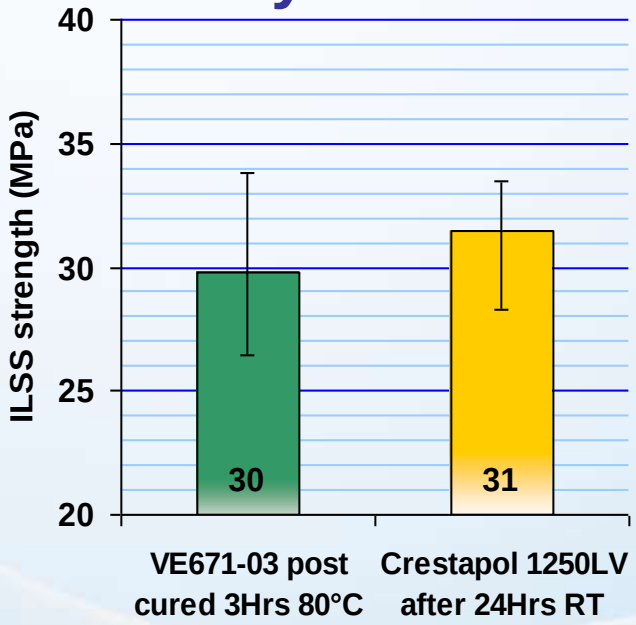
Crestapol 1250LV – Model | Fracture Toughness, G_{IC}

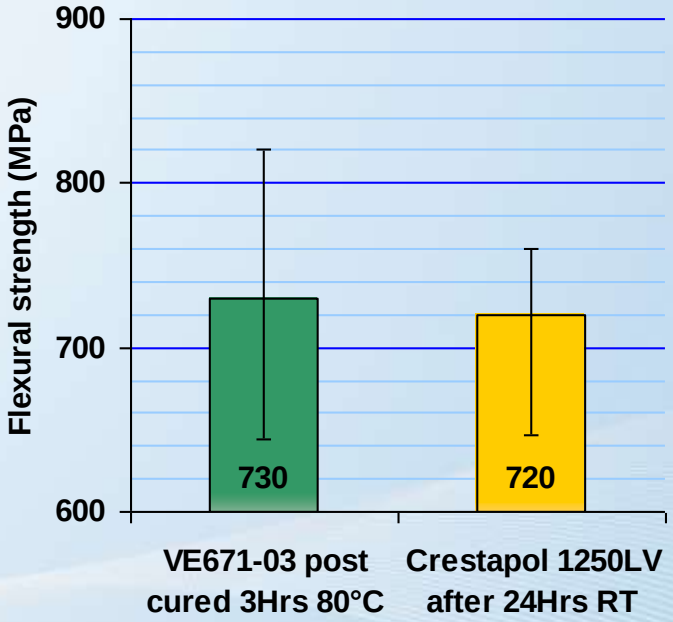
200GSM UD T700SC fibres 12K tow 50C size
ISO 15024:2001 DCB test

CP1250LV provides excellent delamination resistance



Room temperature processed, non-post cured UA resin can provide comparable mechanical performance to 3hrs 80°C post-cured Vinyl Ester





410gsm NCF T700SC fibres 12K tow 50C size [0/90/90/0]s
ILSS tests to ISO 14130, Flexural tests to ISO 14125

Cp1250lv-
4m WE blade

Crestapol 1250LV – Example Application

Resin supply partners to Axon Automotive Ltd -
'Winner of JEC Paris Innovation Award 2012 - Automotive' Stand T89

'Carbon Fibre Composites System delivering high strength and stiffness whilst retaining very low weight and great tailorability at lower cost'.

Scott Bader awarded a JEC Partners award in recognition of our work with Axon Automotive Ltd. Scott Bader Crestapol 1250LV - Axon Automotive's resin of choice.

Crestapol 1250LV

- Excellent mechanical performance and environmental resistance – high strength, durable structures
- Compatible with carbon fibres and glass fibres
- Infusion and closed mould processing at room temperature – low cost processing
- Compatibility with typical adhesives and UP gelcoats
- Robust and tailorable processing – a range of working times available from a single resin

Crestapol resin technology summary

- **Crestapol Urethane Methacrylate resin technology allows a very broad range of balanced properties to be achieved.**
- **Allows development of High Performance resins for niche, speciality applications:-**
  - **Crestapol 1212**
    - **Achieves the highest Fire, Smoke & Toxic fume performance standards whilst offering excellent mechanical properties.**
  - **Crestapol 1250lv**
    - **Excellent mechanical properties & environmental resistance with Carbon Fibre, with low cost processing. A genuine alternative to epoxy resins.**

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More information on these and other Scott Bader products are available on the Novapol stand

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Thank you for your attention

Neil Gray, Global Business Mgr, Crestapol resins.
neil_gray@scottbader.com
www.scottbader.com

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