



Crestafire®

FST Performance Products

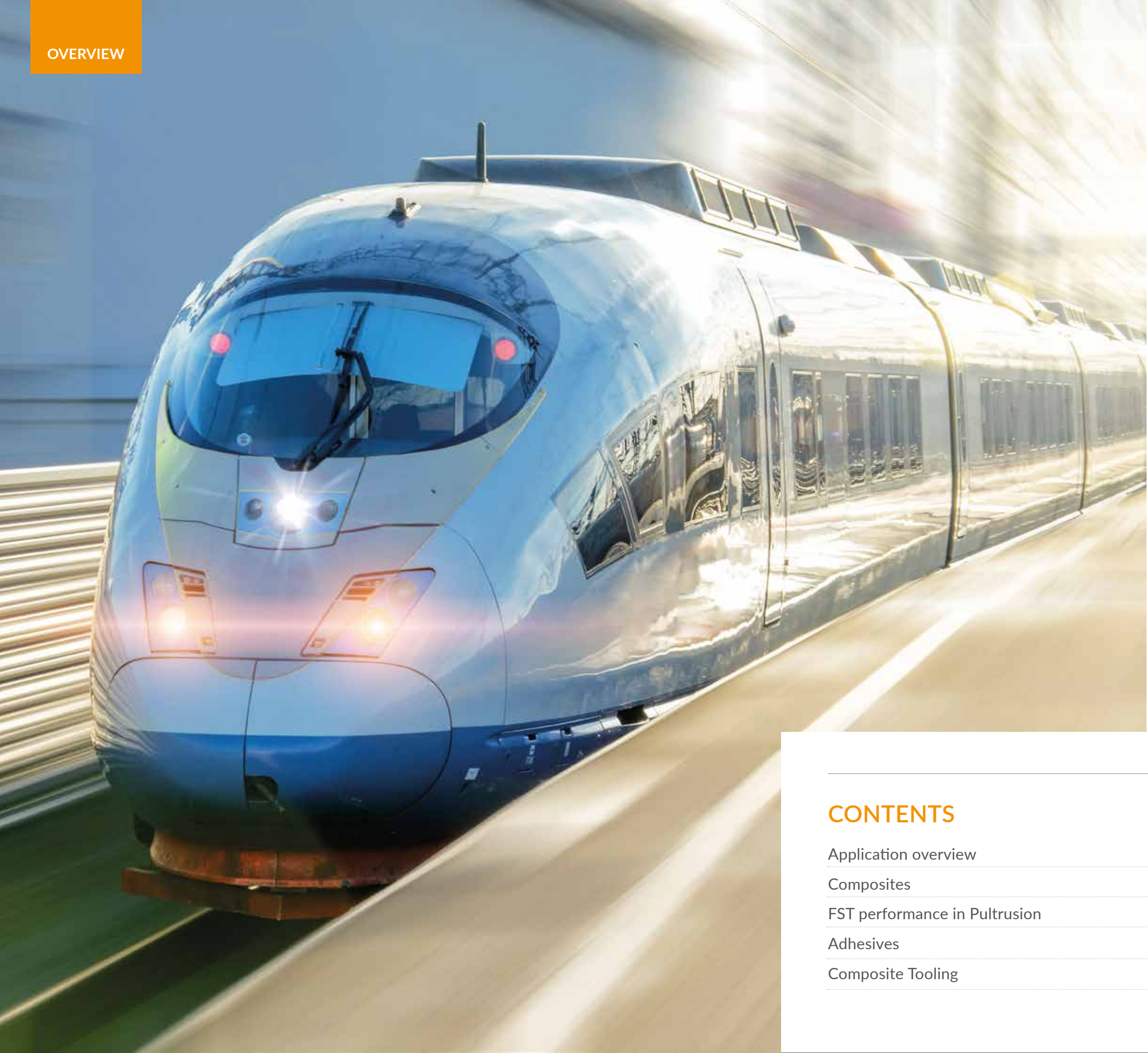
Rail product guide

Fire, smoke and toxic fume
systems for EN45545-2/NFPA130



SCOTT BADER

Making a **positive** difference



FIRE, SMOKE & TOXIC FUME
SYSTEMS FOR EN45545-2
AND NFPA130

- Complete systems for FST composite parts
- EN45545-2 HL2/HL3 and NFPA130
- Crestafire® resins and gelcoats
- Crestabond® structural adhesives
- Crestamould® tooling systems



A global manufacturer of adhesives, resins and gelcoats.

Established

1921

Employee-owned

since **1951**

18 global offices

800 colleagues

1 joint venture

7 worldwide manufacturing sites

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APPLICATION OVERVIEW



- 1 Nose cone
- 2 Front cab
- 3 Stone guard skirt
- 4 Driver desk, interior parts
- 5 HVAC panels
- 6 Side skirts
- 7 Window frames
- 8 Cabin interior upper panels
- 9 Seat backside
- 10 Door panels
- 11 Cabin interior side panels, screen holders

FST RAIL SYSTEMS
AND CERTIFICATES



FIRE RETARDANT SYSTEMS	APPLICATION	CAN ACHIEVE
Crestafire® GCS 1001PA / LEO® GC X2PA + Crestafire® P1-3001PA	Spray, Hand Lay, RTM, Vacuum Infusion	EN45545-2 HL2 R1 / R7 / R17
Crestafire® GCS 1001PA / LEO® GC X2PA + Crystic® VE679-03PA	Spray, Vacuum Infusion	EN45545-2 HL2 R1 / R7 / R17
Crestafire® GCS 1001PA / LEO® GC X2PA + Crestapol® 1261	Vacuum Infusion	EN45545-2 HL2 R17
Crestafire® GCS 1005PA + Crestafire® P2-2001PA	Spray, Vacuum Infusion	EN45545-2 HL3 R1 / R7 / R17
Crestafire® GCS 1005PA + Crestapol® 1212/ATH	Spray, Hand Lay, RTM, Vacuum Infusion	EN45545-2 HL3 R1 / R7 / R17
Crestafire® GCS 1005PA + Crestapol® 1213A	Spray, RTM, Vacuum Infusion	EN45545-2 HL3 R1 / R7 / R17
Crestafire® LEO® GC X3PA + Crestapol® 1211A	Spray, RTM, Vacuum Infusion	EN45545-2 HL3 R7

Fireguard® GC70PA / AG + Crestapol® 1212/ATH	Spray, Hand Lay, RTM, Vacuum Infusion	NFPA 130 ASTM E162 / ASTM E662
Crestapol® 1212/ATH	Hand Lay, RTM, Vacuum Infusion, Pultrusion	NFPA130 ASTM E162 / ASTM E662

Fireguard® GC76PA + Crestafire® GCS1001PA + Crestafire® P1-3001PA	Spray, Hand Lay, RTM, Vacuum Infusion	EN45545-2 HL2 R1 / R7 / R17
Fireguard® GC76PA + Crestapol® 1212/ATH	Spray, Hand Lay, RTM, Vacuum Infusion	EN45545-2 HL3 R1 / R7 / R17



PRODUCT	APPLICATION METHOD	PRODUCT DEFINITION	COLOUR
Gelcoat			
GCS1001PA / GCX2 PA	Spray	Polyester based gelcoat, intumescent technology, formulated to EN45545-2 standard to meet HL2	Grey
GCS1005PA / GCX3PA	Spray	Polyester based gelcoat, intumescent technology, formulated to EN45545-2 standard to meet HL3	White
GC 70PA / AG	Spray	Polyester based gelcoat, standard fire-retardant technology for low smoke and surface spread of flames, colorable and with anti graffiti properties	Various
GC76PA FR / AG	Brush and Spray	Polyester based gelcoat, superior FST properties, colorable and with anti graffiti properties	Various
Resin			
P1-3001PA	Infusion, Closed Mould and Hand Lay	Polyester based, filled resin	White
P2-2001PA	Infusion, Closed Mould	Vinyl ester and DCPD base, lightly filled resin	Light yellow
 P1-8001	Hand Lay	Bio sourced resin, capable of HL3, hot cure process	Dark brown
 P1-8003	Vacuum Infusion and RTM	Bio sourced resin, capable of HL3, hot cure process	Dark brown
Crestapol® 1211A	Infusion and Closed Mould	Urethane acrylate technology, filled resin	-
Crestapol® 1212	Infusion, Closed Mould and Pultrusion	Urethane acrylate technology, to be filled with ATH	Clear
Crestapol® 1213A	Infusion and Closed Mould	Urethane acrylate technology, highly filled with ATH	-
Crestapol® 1261	Infusion, Closed Mould	Urethane acrylate technology	-



FST PERFORMANCE IN PULTRUSION

Crestapol® intelligent resin technology is a series of low viscosity urethane acrylate-based resins, designed for pultrusion.

With the addition of ATH, Crestapol® resins achieve EN45545-2 HL2 for the manufacture of fire-retardant pultruded parts.

Crestapol® 1212 and 1214 are designed for pultrusion so they can be processed on standard pultrusion equipment without modification.

Features:

- Significantly enhanced line speed
- High reactivity
- Excellent mechanical performance
- Pigmentable

FIRE REQUIREMENT	MINIMUM ATH LOADING (parts per thousand)	CRESTAPOL® 1212 RESULTS
French NFP 92-501	170	M1
French NFP 16-101	170	F0
UNE 23721 : 1990 UNE 23727 : 1990	170	M1
DIN 5510	100	S4/SR2/ST2
ASTM 162	100	Is = 10 (limit <35) Meets Federal Railroad Admin for surface flammability
ASTM 662	100	Ds (max) = 119 Dm (1.5) = 1 Dm (4) = 4
ASTM E84	165	Smoke index 110, Flame index 15
ISO 5658	170	HL2
ISO 5659-2	170	HL2
ISO 5660-1&2	170	HL2



PULTRUSION GUIDELINES TYPICAL FORMULATION	
Crestapol® 1212 and 1214	100 pbw
ATH	100 - 200 pbw
BYK W996 [#]	3 - 6 pbw
TBPB [*]	1 pbw
TBP ^{**}	0.5 pbw
(Dispersed in solvent)	1.0 pbw
PAT 654 (internal release agent) [†]	1 - 3 pbw
Pigment (if required)	2 - 5 pbw
Die temperature:	140°
(First section unheated to prevent gelation at die entrance)	
Start up approx	0.2 metre/minute

[#] Registered trademark of BYK-Chemie GmbH
^{*} Tert-Butyl peroxybenzoate
^{**} Di (4-tert-butylcyclohexyl) peroxydicarbonate
[†] PAT 654 is produced by CRC Limited

CRESTABOND®

Primerless MMA Structural Adhesives

A range of toughened, two component acrylic adhesives designed for bonding composites, thermoplastics and metals, ideal for the rail industry.

Key information:

CRESTABOND® FEATURES	CUSTOMER BENEFITS
Primerless adhesives	Dramatically enhances production efficiency and reduces consumable costs
Minimal surface preparation	Reduces dust emissions and preparation time
Excellent fatigue and impact resistance	Confidence in the longevity of the finished product
Range of working and fixture times	Optimises production cycles to reduce manufacturing costs
Good gap filling capability	Adhesive can be used in multiple applications
Bonds dissimilar substrates	Provides flexibility in structural designs

Crestabond® dispensing equipment:

- The Crestabond® cartridges can be used with a manual or pneumatic gun. Suitable dispense guns and static mixers are available from Scott Bader
- Crestabond® adhesives can be dispensed directly from pails and drums using an automated 1:1 or 10:1 dispensing machine
- Scott Bader technical support can provide advice on appropriate dispensing equipment



Crestabond® pack sizes:

- Cartridges

M1 (10:1) range

 - 50ml side-by-side
 - 400ml coaxial
 - 825ml side-by-side
- M7 and PP (1:1) Range

 - 50ml side-by-side
 - 400ml side-by-side

Bulk

 - 20 Litre/ 18kg pails
 - 200 Litre/ 180kg drums



Crestabond® adhesive selection guide

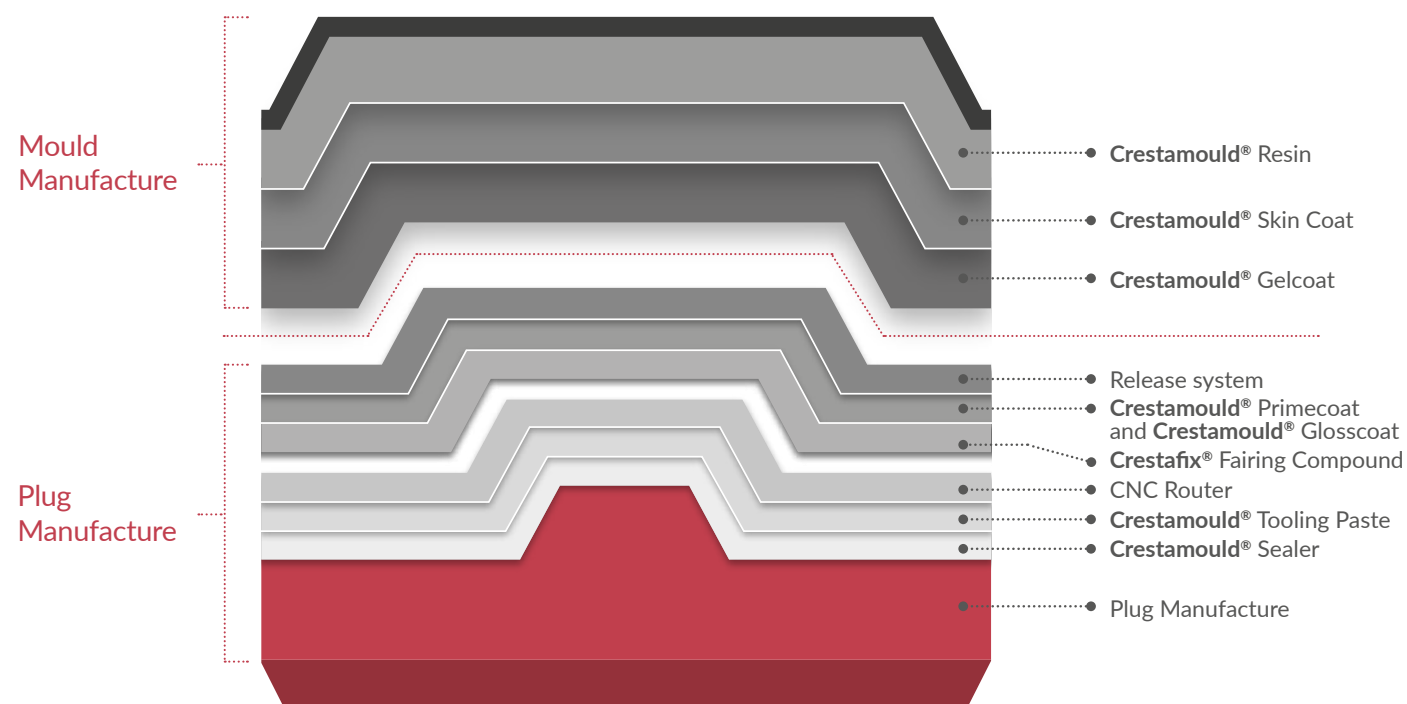
Choose the appropriate Crestabond® adhesive product with optimal working and fixture times that will ensure long-term adhesion and durability.

PRODUCT	DESCRIPTION	COLOUR	MIX RATIO BY VOLUME	VISCOSITY (cP)	WORKING TIME (mins)	FIXTURE TIME (mins)*	TENSILE STRENGTH (MPa)	TENSILE MODULUS (MPa)	ELONGATION AT BREAK (%)	GAP FILL (mm)
M1-02	Universal bonder	Dark grey	10:1	100,000 - 140,000	1 - 2	2 - 3	12 - 16	600 -1000	80 - 100	1 - 15
M1-04	Universal bonder	Dark grey	10:1	100,000 - 140,000	3 - 5	8 - 10	16 - 20	600 -1000	80 - 100	1 - 15
M1-04 SL	Universal Bonder	Dark Grey	10:1	10,000 - 30,000	4 - 7	10 - 12	16 - 20	600 - 1000	80 - 100	1 - 5
M1-05	Universal bonder	Dark grey	10:1	100,000 - 140,000	4 - 7	12 - 18	16 - 20	600 -1000	80 - 100	1 - 15
M1-10	Universal bonder	Dark grey	10:1	100,000 - 140,000	8 - 12	16 - 23	16 - 20	600 -1000	80 - 100	1 - 15
M1-20	Universal bonder	Dark grey	10:1	100,000 - 140,000	16 - 22	25 - 35	16 - 20	600 -1000	80 - 100	1 -25
M1-30	Universal bonder	Dark grey	10:1	200,000 - 240,000	25 - 35	60 - 80	18 - 22	600 -1000	100 - 130	1 - 50
M1-60HV	Universal bonder	Green	10:1	340,000 - 380,000	50 - 70	150 - 180	22 - 26	1200 - 1600	50 - 70	1 - 50
M1-90HV	Universal bonder	Green	10:1	340,000 - 380,000	80 - 100	210 - 240	22 - 26	1200 - 1600	50 - 70	1 - 50
M7-04	Universal bonder	Off white	1:1	30,000 - 70,000	3 - 5	12 - 15	22 - 25	1200 - 1700	6 - 10	1 - 5
M7-05	Universal bonder	Off white	1:1	30,000 - 70,000	4 - 7	18 - 22	22 - 25	1200 - 1700	25 - 30	1 - 5
M7-15					10 - 20	30 - 45	22 - 25	1200 - 1700	25 - 30	1 - 5
PP-04	Low surface energy bonder	Off white	1:1	70,000 - 140,000	3 - 5	165 - 180	12 -17	800 - 1200	2 - 5	0.5 -5

Based on laboratory results
*Time taken at 23°C to achieve 1.4MPa strength in lap shear tests according to BS ISO 4587



Our Crestamould® matched tooling systems offer a fast and effective way to produce moulds for the manufacture of rail components. Our low-profile laminating and infusion resins minimise shrinkage to improve the dimensional accuracy of moulds combined with gelcoat and skincoat products to deliver a high quality and robust mould surface.



MOULD MANUFACTURE

Crestamould® Resin

Crestamould® Rapid Tooling Resin (RTR) 4010PA is a rapid tooling resin which incorporates outstanding handling properties, lower viscosity, improved shrinkage control and is catalysed with standard MEKP catalyst. It enables faster mould making and eliminates surface distortion.

Crestamould® Skin Coat

Crestamould® Skin Coats VE679PA and VE690PA are pre-accelerated thixotropic DCPD modified vinylester resins that have been developed as a skin coat in tooling applications. They have excellent blister resistance and reduced print through.

Crestamould® Gelcoat

Crestamould® Gelcoat 15PA is a superior performance vinylester tooling gelcoat for making moulds designed to have a long service lifetime and retain high gloss levels after multiple pulls. It is easy to apply and achieves good coverage. There is no gassing of the gelcoat ensuring a very low porosity surface and it cures with a standard MEKP catalyst. Available in both spray and brush.

PLUG MANUFACTURE

Crystic® Primecoat

Crystic® Primecoat is a high build, polyester coating material which allows the rapid surfacing of patterns constructed from materials such as wood, MDF and GRP. It can be applied wet-on-wet up to a thickness of 1.5mm in one operation without sagging or draining from vertical surfaces.

Crystic® Glosscoat

Crystic® Glosscoat is a polyester coating designed to be applied over prepared Crestamould® Primecoat to give a glossier and more durable surface. The material hardens rapidly and can be easily sanded to a smooth surface which can be polished to high gloss.

Crestafix® Fairing Compound

A water resistant, low-density polyester-based fairing compound, Crestafix® F26 has excellent adhesion to cured fibre-reinforced polyester and vinylester laminates. The material sands easily, gives a hard finish after a full cure, yet is not brittle and has good impact strength. Crestafix® F26 is a suitable base for all marine finishes such as polyester, urethane and epoxy paints.

Crestamould® Tooling Paste

Designed for milling of large plugs or direct limited production moulds with CNC multiple axis machines, Crestamould® T29 is a modified polyester compound, available in sprayable or extrudable versions.

Crestamould® Sealer

Laminating with polyester resin on top of polystyrene foams has never been possible despite various impractical methods of protection from preventing the styrene foam from dissolving when in contact with polyester resin. Crestamould® B21 sealing resin solves this problem – just one coat applied by brush will seal the surface and laminating with polyester resins can begin two hours after application.

SCOTT BADER GROUP COMPANIES



Head Office
Scott Bader Company Limited
Wollaston, England
Tel: +44 (0) 1933 663100
Email: enquiries@scottbader.com

Scott Bader France
Amiens, France
Tel: +33 3 22 66 27 66
Email: enquiries@scottbader.com

Scott Bader Spain
Barcelona, Spain
Tel: +34 93 583 17 68
Email: enquiries@scottbader.com

Scott Bader Germany
Weiden, Germany
Tel: +49 961 401 84474
Email: enquiries@scottbader.com

Scott Bader Ireland
Dublin, Ireland
Tel: +353 1801 5656
Email: enquiries@scottbader.com

Scott Bader Scandinavia
Falkenberg, Sweden
Tel: +46 346 10100
Email: enquiries@scottbader.com

Scott Bader Eastern Europe s.r.o.
Praha 6, Czech Republic
Tel: +420 (0) 485 111 253
Email: enquiries@scottbader.com

Scott Bader Croatia
Zagreb, Croatia
Tel: +385 1 240 6440
Email: enquiries@scottbader.com

Scott Bader North America
Mocksville, NC, USA
Email: info@scottbader-na.com

Scott Bader ATC
Drummondville, Canada
Tel: +1 (819) 477 1752
Email: enquiries@scottbader.com

Scott Bader South Africa
Hammarisdale, South Africa
Tel: +27 31 736 8500
Email: enquiries@scottbader.com

Scott Bader Middle East
Dubai, United Arab Emirates
Tel: +971 481 50 222
Email: enquiries@scottbader.com

Scott Bader Asia Pacific
Shanghai, China
Tel: +86 (21) 5298 7778
Email: enquiries@scottbader.com

Scott Bader Japan KK
Yokohama, Japan
Tel: +81 (0) 45 620 3745
Email: Otoiawase@scottbader.com

Scott Bader Australia
Perth, Australia
Tel: +61 (08) 9418 4555
Email: enquiries@scottbader.com

Scott Bader India
Scott Bader Pvt. Ltd, Mumbai, India
Tel: +91 22 4220 1555
Email: enquiries@scottbader.com

NovaScott Especialidades Químicas Ltda
Civit II, Serra, ES 29165-973, Brazil
Tel: +55 27 3298 1100
Email: enquiries@scottbader.com

Scott Bader Italy
Emilia Romagna, Italy
Tel: +39 3454534391
Email: enquiries@scottbader.com

Scott Bader Turkey
Istanbul, Turkey
Tel: +90 542 207 01 86
Email: enquiries@scottbader.com