

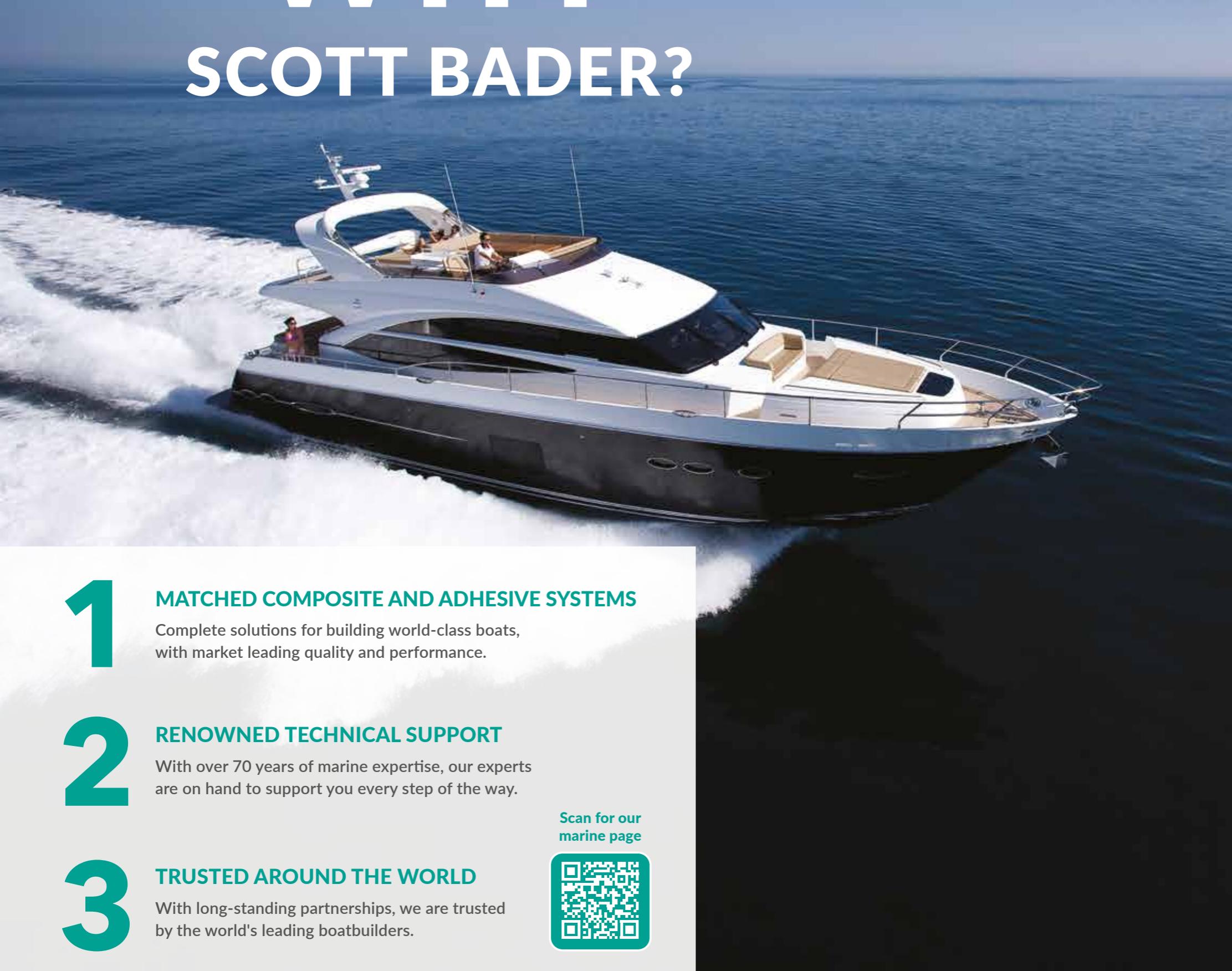


SCOTT BADER

# MARINE



# WHY SCOTT BADER?



**1** **MATCHED COMPOSITE AND ADHESIVE SYSTEMS**  
Complete solutions for building world-class boats, with market leading quality and performance.

**2** **RENNED TECHNICAL SUPPORT**  
With over 70 years of marine expertise, our experts are on hand to support you every step of the way.

**3** **TRUSTED AROUND THE WORLD**  
With long-standing partnerships, we are trusted by the world's leading boatbuilders.

Scan for our marine page



## WELCOME TO MARINE TECHNOLOGY EXCELLENCE

Scott Bader has been the undisputed expert in marine technology for 70 years and continues to drive future innovations today.

We pioneered the use of fibre reinforced plastic (FRP) in the marine industry and it was a Scott Bader resin that was used in the first ever composite boat in 1951 – the Tod 12 Dinghy<sup>1</sup>.

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<sup>1</sup> <http://www.cvrda.org/dinghydata/tod-12ft/>

# MARINE PRODUCTS AND APPLICATIONS

## Small fixings

Crestomer® Advantage cartridges  
Crestabond® M1 & M7 series cartridges  
Metal to GRP

## Deck to hull bonding

Crestomer® 115\*PA series  
Crestafix® 621CC series  
Crestafix® 630PA  
Crestomer® Advantage cartridges  
Crestabond® M1 & M7 series

## Core bonding

Crestomer® 1196PA  
Crestafix® 90-84PA  
Crestafix® B72R  
None - infused hulls with integral cores don't need a core bonding adhesive

## Closed mould infusion resins

Crystic® 701PA  
Crystic® 703PA  
Crystic® VE679-03PA

## Gelcoats for weather and blister resistance

Spray: LS 30PA Excel  
Brush: LS 31PA Excel  
Brush: Crystic® LS 88PA  
Spray: Crystic® LS 97PA

## Skin coats for surface finish and water resistance

Crystic® VE690PA  
Crystic® VE679PA  
Crystic® VE671PAT  
Crystic® 489PA

## Hand lay-up laminating resins - styrene control

Crystic® 2 Series LSE  
Crystic® LS 451PA

## Interior finishing

Fairing and corner filling: Crestafix® F26R  
Internal surfaces: Crystic® TC506PA, TC507PA  
Bulkhead bonding:  
Crestomer® 115\*PA series

## Engine room protection

Fire protection: Crystic® Fireguard  
Crystic® GSC1001PA

## Engine bed stiffeners and stringer bonding

Crestomer® 115\*PA series  
Crestafix® 621CC series  
Crestafix® 630PA

## Diesel resistant bonding

Crestafix® 630PA  
Crestomer® 1152PA  
Crestabond®

## Fuel storage safety

Laminates for diesel resistance:  
Crystic® VE690PA  
Crystic® VE661PA  
Crystic® VE661-03PA and VE679-03PA



ClassNK



## QUALITY ASSURED

Before a product goes to market it will have completed Scott Bader's rigorous development programme. All new gelcoats are tested under the most extreme conditions, including 12 months continuous exposure in Florida in order to satisfy the accelerated weather programs and blistering tests.

Once tested, each batch of gelcoat manufactured has to pass stringent quality control tests that ensure consistent quality, colour, surface finish and handling. Products are then approved by the key industry standards as appropriate, such as Lloyds, ClassNK, DNV-GL and RINA.



**ClassNK**



## “ HEAR WHAT CUSTOMERS SAY

“Scott Bader's technical team are always quick to respond and willing to help. Their products are adapted to suit the environment (heat exposed location) in which we work, from resins to bonding pastes, their products are durable and easily applicable with straight forward instructions.”

Talia Maggi Vice President of the Commercial Division, Gulf Craft



“Scott Bader are an integral partner for Princess Yachts. We value the high quality of the materials supplied and the responsive technical support we receive. Their advice and technical recommendations, based on a detailed understanding of our manufacturing process, helps us to optimise our production lines from a chemistry standpoint whilst maintaining the high level of quality Princess Yachts is renowned for. Scott Bader, with their unique Commonwealth ownership structure, excellent products and focus on innovation, give us full confidence in both their products and our long-standing relationship.”

Paul Mackenzie Chief Operating Officer, Princess Yachts



“We've a great working relationship with Scott Bader for over 20 years, helping us to offer innovative, market leading ribs to our customers.”

Rudie Garton, Technical Manager, Ribeye Boats



## CRYSTIC® MATCHED PERFORMANCE SYSTEMS

If you're looking for the ultimate in aesthetics and blistering resistance then look no further! After decades of commercial use, the benefits of using Crystic® Matched Performance Systems have been shown to extend beyond eliminating blistering:

Optimum laminate construction



Resin and fibreglass laminate

Skin coat

Gelcoat

- Exceptional aesthetics
- Improved strength and rigidity
- Greater strength to weight ratios
- Better fuel economy and performance
- Superior water resistance

GELCOAT	SKIN COAT	RESIN
<b>Spray application</b>		
LS 30PA Excel	VE 690PA	2.420PA
		LS 451PA
LS 97PA	489PA	2.406PA
		2.446PA
VE 679PA		VE 679PA
		LS 451PA
<b>Hand lay-up</b>		
LS 31PA Excel	VE 690PA	2.420PA
		LS 451PA
LS 88PA	489PA	2.406PA
		2.446PA
65PA	VE 679PA	VE 679PA
		LS 451PA
<b>Closed mould</b>		
LS 30PA Excel	VE 690PA	701PA
		702PA
LS 88PA	489PA	703PA
		VE 679PA
65PA		VE 679-03PA

### CHECK OUT THE WHOLE CRYSTIC® PRODUCT RANGE



Scott Bader has an extensive gelcoat, resin and pigment paste range, ask your local Scott Bader contact for more details.

#### Crystic® matched performance range overview

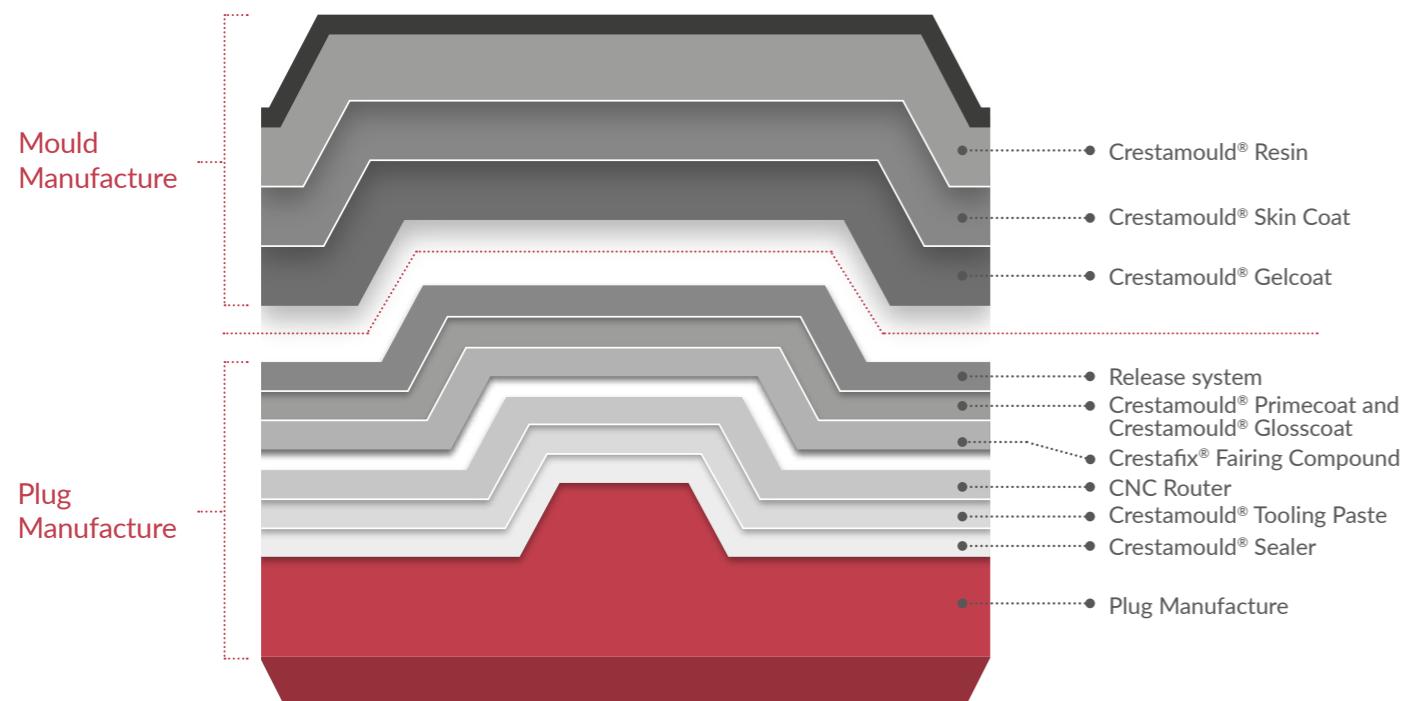
PRODUCT	DESCRIPTION	VISCOSITY (Poise)	GELTIME (mins)*	TENSILE STRENGTH (MPa)*	TENSILE MODULUS (GPa)*	ELONGATION AT BREAK (%)	APPROVALS
<b>Gelcoats</b>							
LS 30PA Excel	Superior weathering Iso/NPG spray gelcoat	Thix.	9	52	3.4	2.8	Lloyds
LS 31PA Excel	Superior weathering Iso/NPG brush gelcoat	Thix.	9	52	3.4	2.8	Lloyds
LS 97PA	An exceptional isophthalic spray gelcoat with excellent u.v. resistance, gloss retention and water resistance	Thix.	7	51	3.8	2.8	Lloyds
LS 88PA	An exceptional isophthalic brush gelcoat with excellent u.v. resistance, gloss retention and water resistance	Thix.	8	60	3.85	2.8	Lloyds
<b>Skin coats</b>							
VE 690PA	Pre-accelerated DCPD modified vinyl ester resin to create an enhanced surface finish	Thix.	15	60	2.7	4.3	Lloyds
489PA	Isophthalic skin coat with excellent durability and blister resistance	Thix.	12	76	3.5	4.0	Lloyds
VE 679PA	Pre-accelerated DCPD modified vinyl ester resin to create an enhanced surface finish	Thix.	34	60	2.7	4.3	Lloyds
<b>Resins</b>							
2.420PA	Orthophthalic resin with low styrene emission, low exotherm and long geltime	Thix.	63	44	3.7	1.3	Lloyds
2.406PA	Orthophthalic resin with low styrene emission, low exotherm and rapid wet out	Thix.	11	54	3.7	1.7	Lloyds
2.446PA	Orthophthalic resin with low styrene emission, rapid wet out and fast hardening ideal for rapid mould turnaround	Thix.	25	50	3.8	1.5	Lloyds
LS 451PA	High performance low styrene DCPD modified resin to create an enhanced surface finish	Thix.	20	46	2.7	2.5	Lloyds
701PA	Closed mould isophthalic resin with low viscosity and controlled exotherm characteristics	1.6	59	66	3.6	2.5	Lloyds
703PA	Closed mould DCPD resin with low viscosity and controlled exotherm characteristics	1.6	64	38	3.1	1.3	Lloyds
VE 679-03PA	Pre-accelerated, non-thixotropic VE/DCPD resin for vacuum infusion	1.85	60	64	3.3	2.3	Lloyds

\*A variety of cure systems were used. Results are from a variety of different catalyst systems and cure programs and should be used for indicative comparison only. See individual product datasheets for more information.

The quality of your mouldings can only be as good as the quality of your mould, making it essential that you use an appropriate and quality tooling system, like Scott Bader's Crestamould® Matched Tooling System.

Using chemically matched products that work together, the high-performance Crestamould® Matched Tooling System delivers an excellent standard of mould production with great benefits to your project:

- Significantly increases the lifetime of moulds in production
- Enhanced gloss finish and gloss retention compared to competitive products
- Easy to apply to required thickness
- Trouble-free de-moulding, even complicated shapes
- Reduced water marking
- Reduced fibre print through for a much smoother gelcoat surface
- Fast mould production



## CRYSTIC® MOULDGUARD

Crystic® Mouldguard is a tough temporary coating specially designed for protecting moulds and mouldings.

Often, decommissioned moulds are stored outside where they are subjected to standing water, UV light, dirt and frost so they become damaged or scratched. Most moulders would agree that they rarely achieve the same quality of surface that they had before being decommissioned. Crystic® Mouldguard offers a simple solution.

## MOULD MANUFACTURE

### 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. Easy to apply with good coverage, there is no gassing ensuring a very low porosity surface. It cures with a standard MEKP catalyst. and is available in both spray and brush.

### 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® Resin

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

## 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 and Crestafix® F24 VE 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 and F24 VE are suitable 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

Previously not possible, Crestamould® B21 sealing resin enables laminating with polyester resin on top of polystyrene foams. Just one coat applied by brush will seal the surface ready for laminating with polyester resins two hours after application.



## CRYSTIC® GC LS 30PA EXCEL

Crystic® GC LS 30PA Excel is a superior weathering Iso-NPG gelcoat specifically designed for marine applications. It is pre-accelerated and formulated for spray application.

- Enhanced air release system for porosity control during spray application
- Stability performance suitable for warmer climates
- Specially formulated ISO-NPG UV-resistant base resin chemistry
- Ease of application
- Compatible with MEKP curing peroxides – no gassing
- Consistent batch-to-batch quality and colour consistency
- High gloss
- Excellent repair characteristics
- Long term weathering resistance
- Excellent porosity control
- Excellent blistering and osmosis resistance

Crystic® GC LS 30PA Excel has been developed to have excellent intrinsic water and weather resistance. The viscosity profile ensures even coverage with minimal drainage and low film porosity.



### Colour stability testing and measuring

The prime objective was to develop gelcoats with exceptional gloss retention and colour retention, reducing the yellowing of white and cream-coloured gelcoats. Measuring the colour change was a critical factor for the project.

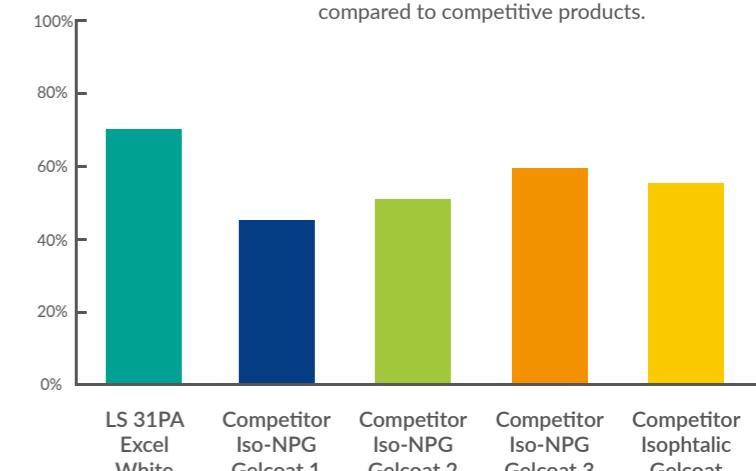
### Comparative colour change testing

Crystic® LS 30PA/31PA EXCEL was tested against a range of existing "best in class" white gelcoats. Accelerated QUV testing was carried out in advance of the longer-term Florida 12 Month UV exposure test results. Four sets of gelcoat plaques were tested at the same time with 12 months continuous exposure in Florida in comparison with the best-in-class marine approved Iso-NPG.

### Results

Crystic® LS 30PA/31PA EXCEL gelcoat clearly provided better colour stability. Similarly, Crystic® LS 3PA0/31PA EXCEL achieved the same critical performance requirement meaning Scott Bader has a high degree of confidence using Crystic® LS 30PA/31PA EXCEL for white hulls below the water line.

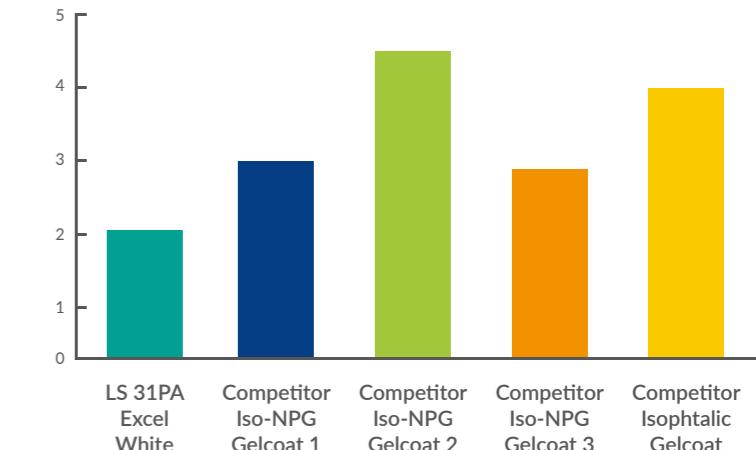
### Gloss retention

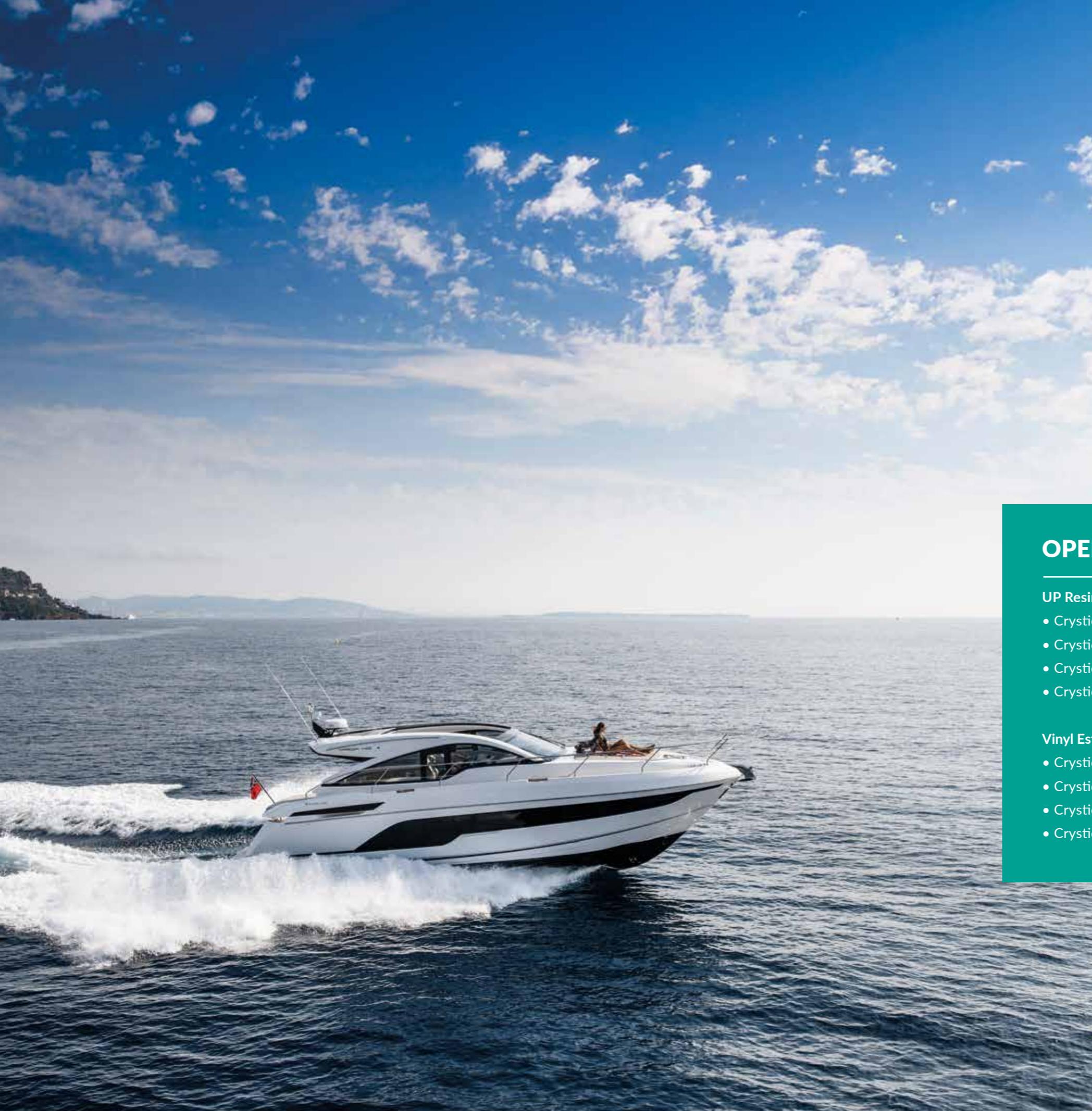


12-month Florida weathering highlighting the superior gloss retention of LS 31PA Excel compared to competitive products.

### Colour change (dE)

12-month Florida weathering demonstrating the significantly reduced yellowing of LS 31PA Excel compared to competitive products.





**CRYSTIC®**

## MOULDINGS MADE TO LAST

An unrivalled and ever-growing range of open and closed mould marine approved matched resins.

### Skin coat resins

Scott Bader offers an outstanding range of high-performance skin coat resins for the composite marine industry, with excellent blister resistance which significantly reduces the occurrence of print through, to produce durable mouldings with an enhanced surface finish.

### Resins

We were the pioneers of glass fibre composites over 70 years ago and still leaders in a wide range of resins for the composites marine sector.

## OPEN MOULD

### UP Resin

- Crystic® 2-series PA - LSE resin
- Crystic® LS 451PA - DCPD resin
- Crystic® 489PA - isophthalic
- Crystic® 491PA - Isophthalic

### Vinyl Ester + Vinyl Ester DCPD modified resins

- Crystic® VE 671PAT
- Crystic® VE 690PA
- Crystic® VE 679PA
- Crystic® VE 677PA

## CLOSED MOULD

### UP Resin

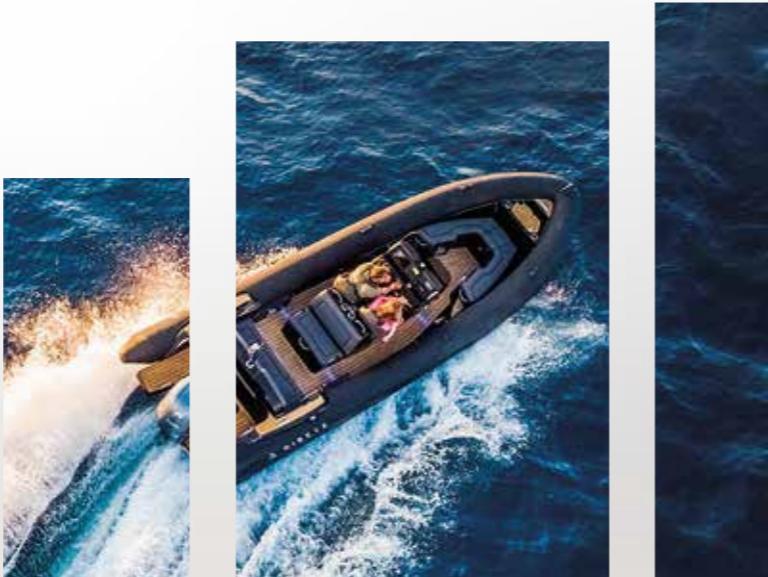
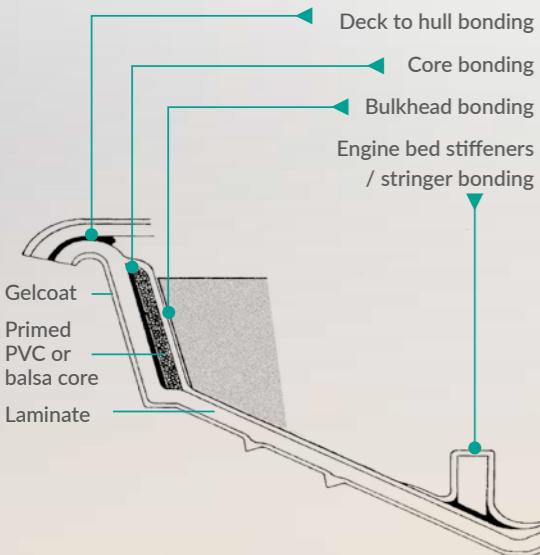
- Crystic® 701PA
- Crystic® 702PA
- Crystic® 703PA
- Crystic® 785PA

### Vinyl Ester

- Crystic® VE 679-03PA
- Crystic® VE 677-03PA



Crestomer® structural adhesives are used by the world's leading boatbuilders to improve performance, save time, and achieve considerable weight savings.



## Crestomer® product range overview

PRODUCT	DESCRIPTION	APPROVALS	APPEARANCE	WORKING TIME (mins)	Fixture Time (hrs)***	TENSILE STRENGTH (MPa)	TENSILE MODULUS (MPa)	TENSILE ELONGATION (%)	SPECIFIC GRAVITY (g/cc)
1150PA	High performance structural adhesive with shorter fixture time	Lloyds, ClassNK	Mauve gel	50*	5	22 - 25	1000 - 1500	100 - 120	1.05
1151PA	Adhesive for bulk application Amine accelerated	Lloyds, ClassNK	Green/ yellow gel	25**	2.5	22 - 25	1000 - 1500	100 - 120	1.05
1152PA	High performance structural adhesive	Lloyds, RINA, DNV-GL, ClassNK	Mauve Gel	50*	10	22 - 25	1000 - 1500	100 - 120	1.05
1153PA	High performance structural adhesive with long open time	Lloyds, RINA, ClassNK	Mauve gel	90*	8.5	22 - 25	1000 - 1500	100 - 120	1.05
1154PA	High performance structural adhesive with a lower modulus	Lloyds	Mauve gel	90	8.5	22-25	400-800	100-120	1.05
1186PA	Multi-purpose structural adhesive	Lloyds	Grey paste	50*	5.5	13 - 16	700 - 900	4 - 7	1.30
1196PA	Low density structural core bonding adhesive	Lloyds, DNV-GL	Pink paste	50*	6.5	19 - 22	1000 - 1500	4 - 7	0.60
Advantage 30 <sup>1</sup>	High performance structural adhesive for bonding a wide range of substrates. Minimal surface preparation required. Pre-packed in cartridges	Lloyds, DNV-GL	White paste	30	2.5	22 - 25	400 - 600	100 - 120	1.15

## Crestomer® dispensing equipment

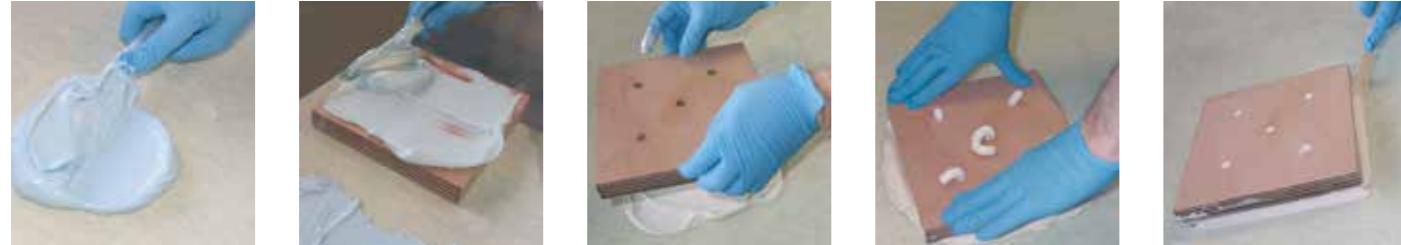
- Crestomer® Advantage 30 cartridges can be used with a manual or pneumatic gun. Suitable dispense guns and static mixers are available from Scott Bader
- Crestomer® adhesives can be dispensed directly from pails and drums using a manual or automated dispensing machine/ putty gun
- Scott Bader technical support can provide advice on appropriate dispensing equipment



\*2% medium reactivity MEKP at 25°C \*\*2% Perkadox® BT-50 at 25°C \*\*\*Time taken at 23°C to achieve 1.4MPa strength in lap-shire tests according to BS ISO 4587.

<sup>1</sup>Minimum order quantity 3000 cartridges each.

Bonding pastes are designed specifically for applications requiring a high performance adhesive. The Crestafix® range has been carefully formulated to ensure ease of application, while retaining exceptional handling properties.



## OUR RANGE OF BONDING PASTES

### General purpose

Materials suitable for non-structural GRP applications. The extensive range includes both orthophthalic and isophthalic bonding pastes with a variety of features, ensuring customers can find the right material for their application.

### Fast cure

Materials suitable for non-structural GRP applications that cure very rapidly for either repair or fast assembly applications.

### Low density

Also referred to as a core bonder, a low density paste is used to bond polyester laminates and to also to bond polyester laminates to balsa, PVC and PU core materials in sandwich structures.

### Fibre filled

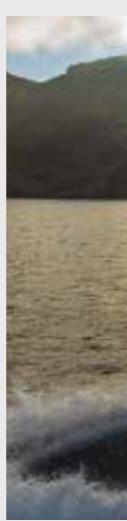
Bonding pastes containing short glass fibres to maximise bonding strength and provide excellent gap filling and bridging properties.

### High performance

These materials are formulated with the addition of unique Scott Bader urethane acrylate polymers, providing improved fatigue resistance and bonding strengths, particularly when compared to general purpose bonding pastes. These materials can be used for some structural applications.

### Fairing compounds

Bonding pastes which are smooth, fast setting and easily sandable. They are used for smoothing out rough fibreglass surfaces.



## Crestafix® adhesive product range overview

CATEGORY	NAME	DESCRIPTION	WORKING TIMES* (mins)*	COLOUR CHANGE	TENSILE ELONGATION (%)	LAP SHEAR STRENGTH (MPa)**	SPECIFIC GRAVITY (g/cc)
GENERAL PURPOSE	B39W	Pumpable polyester-based bonding paste with gap filling properties	55	None (grey)	1	4	1.05
	90-82PA	General purpose orthophthalic bonding paste	12	Blue to white	2	5	1.35
HIGH PERFORMANCE	621CC 45	Urethane acrylate/ isophthalic polyester bonding paste	25	Blue to grey	3	10	1.25
	621CC 85	Urethane acrylate/ isophthalic polyester bonding paste	50	Blue to grey	3	10	1.25
	630PA	Vinyl ester bonding paste	60	Deep purple to brown	3	7	1.10
FAST CURE	90-78PA	Fast cure orthophthalic bonding paste	8	None (white)	1	5	1.30
LIGHT WEIGHT	90-84PA	Lightweight orthophthalic bonding paste with low exotherm	30	Blue to cream	6	4	0.60
FIBRE FILLED	90-80PA	Polyester bonding paste with short fibres	12	Blue to grey	2	4	1.25
CORE-BOND	B72R	Lightweight, polyester-based core adhesive for foams and balsa	55	Blue to white	2	5	0.70
FAIRING COMPOUND	F26R	Fast setting polyester-based fairing compound with good sanding properties	3	None (light pink)	1	2	0.70
	F24VE	Lightweight, 100% vinyl ester resin fairing compound for use below the waterline	10	None (grey)	1	2	0.70

### Bonding pastes dispensing equipment

- Pails and drums can be dispensed using an automated 50:1 dispensing machine
- Scott Bader technical support can provide advice on appropriate dispensing equipment and catalyst usage

\*1-2% medium reactivity MEKP @25°C Refer to TDS for specific catalyst levels.  
\*\*Values are based on substrate failure.



Toughened, two component primerless structural adhesives designed for bonding composites, thermoplastics and metals, making them ideal for the marine 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



PRODUCT	COMPOSITES	METALS										PLASTICS			
		STAINLESS STEEL	ALUMINIUM	POWDER COATED STEEL	COLD ROLLED STEEL	GALVANISED	ABS	ACRYLIC	POLYCARBONATE	PVC	PP/PE & TPO				
M1 range	●	●	●	●	●		●	●	●	●					
M1 HV	●	●	●	●	●		●	●	●	●					
M7 range	●	●	●	●	●	●	●	●	●	●					
PP-04	●	●	●		●		●	●	●	●	●				

#### 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	VISCOOSITY (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
M1-05	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	Universal bonder	Off white	1:1	30,000 - 70,000	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.

# TROUBLESHOOTING

When handled correctly, gelcoats provide a durable and reliable finish. Here are some common reasons behind why some faults may occur:



## Colour tearing

- Pigment separated from resin
- Improper spray technique
- Long geltime, sagging

## Parallel cracks

- Flex cracking
- Gelcoat too thick
- Laminate too thin / flexible

## Blisters on laminates

- Water ingress
- Damp reinforcement
- Air voids

## Colour specks

- Poorly ground / mixed pigments
- Contamination
- Poorly maintained equipment

## De-wetting (brush)

- Brush gelcoat applied too thinly
- Incompatible release system
- Contamination

## Sagging

- Gelcoat too thick
- Geltime too long
- Viscosity / thixotropy too low

## Colour separation

- Insufficient mixing
- Sagging, drainage
- Poor gelcoat application

## Star cracking

- Reverse impact
- Gelcoat too thick
- Crack pattern transferred from mould

## Gelcoat blisters

- Air voids on release
- Unreacted catalyst
- Solvent contamination

## De-wetting (spray)

- Spray gelcoat applied too thinly
- Incompatible release system
- Contamination

## Wrinkling

- Insufficient cure
- Gelcoat too thin
- Back-up too early

## Gelcoat peeling

- Contamination
- Gelcoat too fully cured
- Geltime too long - release wax dissolved

## Colour mottling

- Poor pigment compatibility
- Viscosity too low
- Gelcoat low in thixotropy

## Crazing

- Chemical attack
- Excessive heat
- Contamination

## Fibre pattern

- Gelcoat too thin
- High exotherm in laminate
- Insufficient cure / released too soon

## Water-marking / etching

- Areas of thin, double gelcoating on mould
- Two colours gelcoated on mould
- Solvent attack

## Dimpling

- Too heavy wet-on wet spray application
- Insufficient consolidation
- Contamination

## Porosity

- Gelcoat too viscous to release air
- Gelled too quickly, entrapping air
- Cold gelcoat and / or mould
- Spray gelcoat applied with too high or low catalyst / gelcoat pressure



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