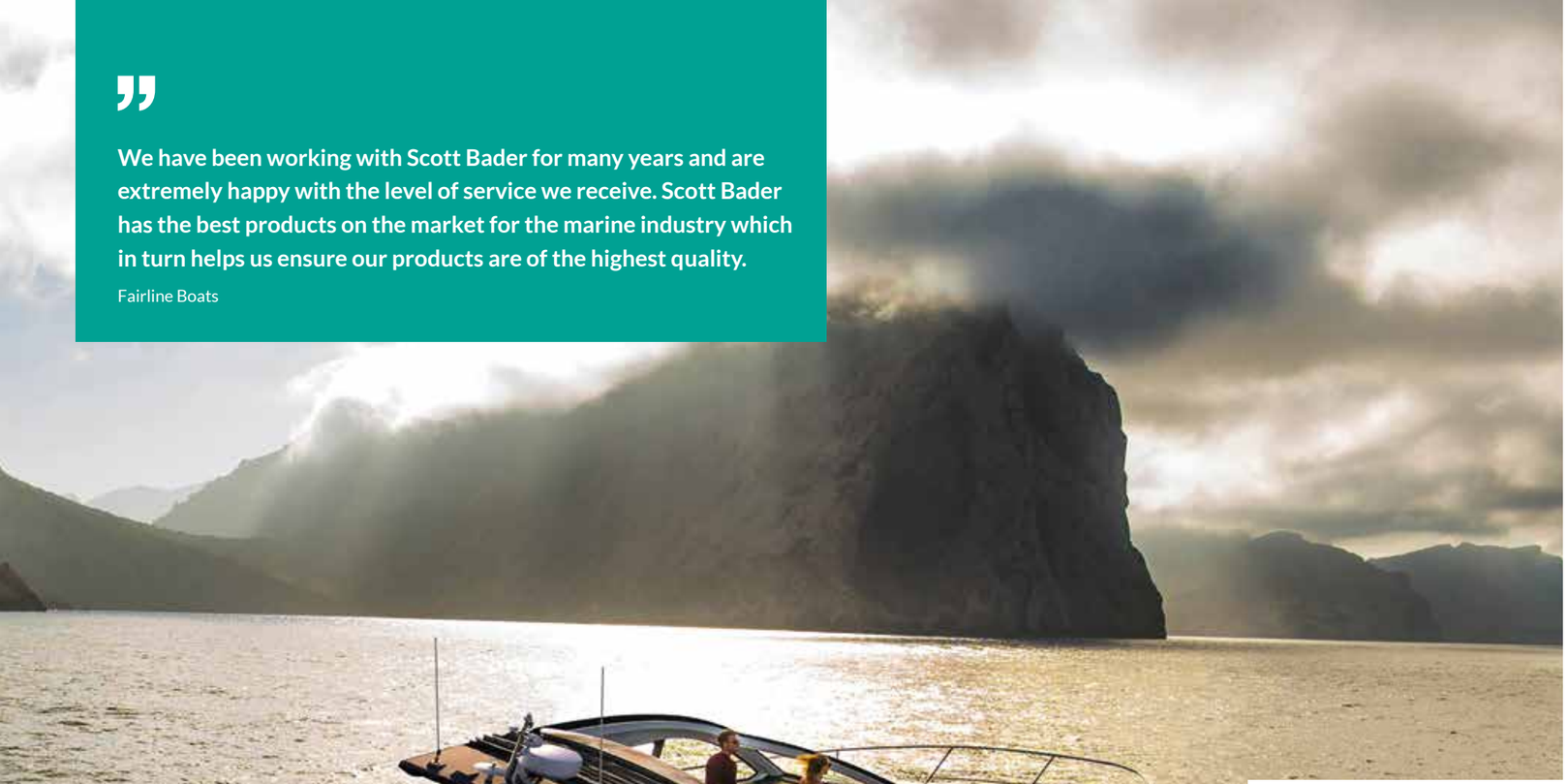
ADHESIVES

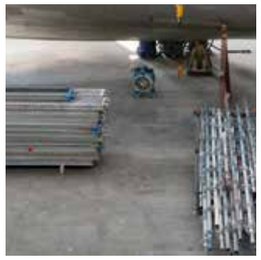
Bulkhead and stringer bonding guide

SCOTT BADER

*Making a **positive** difference*

> We have been working with Scott Bader for many years and are extremely happy with the level of service we receive. Scott Bader has the best products on the market for the marine industry which in turn helps us ensure our products are of the highest quality.
>
> Fairline Boats





WELCOME TO MARINE ADHESIVE EXCELLENCE

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

Crestomer® urethane acrylate structural adhesives have been used by the world's leading boat builders for over 50 years. With a reputation for quality, high strength, excellent impact and fatigue performance and their ability to achieve considerable weight savings, they have established themselves as the leading structural adhesive for marine applications. Crestomer® adhesives, alongside Scott Bader's leading technical support service, makes for a winning formula that has over 50 years' experience in the marine industry.

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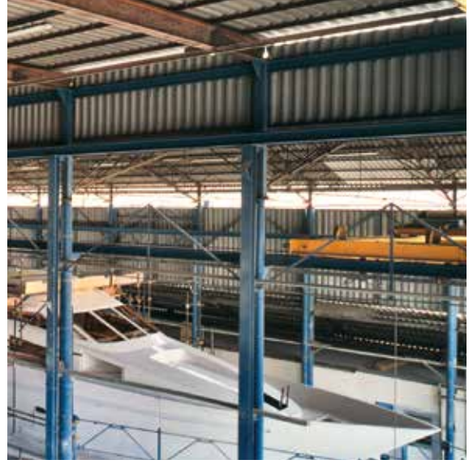
CRESTOMER®

Urethane Acrylate Structural Adhesives



BONDING A STRINGER SET INTO AN FRP BOAT HULL

Crestomer® structural marine adhesives are used by the leading boat builders around the world, using fibre reinforced plastic (FRP).

The unique chemistry of Crestomer® structural adhesives is perfectly suited to stringer set bonding because it is flexible enough to suit the varying gaps between hulls and stringers of FRP boats.

Crestomer® 1186PA's ability to offer full structural bonding at gap sizes ranging from 1mm to over 25mm makes it the perfect choice for this application and also offers significant superiority over polyester bonding pastes and GRP lamination in adhesion, impact resistance and resistance to crack propagation.

Attaching stringer sets using Crestomer® 1186PA delivers the following advantages over conventional laminated joints:

- ☑ Improved structural performance
- ☑ Potential labour savings of more than 60%
- ☑ Better internal aesthetics, cleaner looking joints
- ☑ Considerable weight savings
- ☑ Much cleaner and easier to use – improved working conditions
- ☑ Massively reduced styrene emissions
- ☑ Improved productivity

Application guide for attaching a prefabricated stringer set to a boat hull

1. No additional laminate preparation required as would be needed for a conventional laminated joint.

   Ensure surfaces are prepared properly.

   a. If the laminate is less than 72 hours old then it should simply be clean and free from contaminants.

   b. If it is over 72 hours old then a peel ply should be used in the area to be bonded. If a peel ply hasn't been used; if the laminate is over 72 hours old; or if the laminate uses a DCPD resin that has been exposed to UV light, then the following preparation of the surfaces to be bonded is recommended:

   (i) Solvent Wipe (IPA and leave for 10 minutes, or clean acetone)

   (ii) Abrade. The dust should be removed completely, preferably by vacuum cleaner

   (iii) Solvent Wipe (IPA and leave for 10 minutes, or clean acetone)

2. Fit the stringer set into the hull, dry to ensure a proper fit and mark out bonding areas on the hull.

3. Draw around the section using a marker pen. Make a note of the gap distance between the fitting and the hull.

4. Remove stringer set from hull.

5. Before starting application, mix Crestomer® adhesive to ensure catalyst/peroxide is fully dispersed. If using a machine, prime the gun to ensure proper mixing.

6. Apply Crestomer® to the areas between the lines and ensure a uniform thickness. Adhesive needs to be 10mm thicker than the gap to ensure a good bond.

7. Reset the stringer set onto the adhesive, ensuring that Crestomer® is touching both the hull and the stringer set.

8. Tidy edges, a radius joint is ideal, but not essential. The working time available for steps 6-8 will vary depending on material used, the temperature of the workshop and the catalyst levels. Crestomer® 1186PA working time using 2% medium reactivity MEKP at 25°C is 50 minutes.

9. Use weights if necessary to hold stringer set down while the Crestomer® cures.

10. Remove any non load bearing straps and jigs immediately and any load bearing jig after five and a half hours if using Crestomer® 1186PA.

Labour time and weight savings

Using Crestomer® 1186PA can achieve potential labour and weight savings of more than 60% compared to laminate. These are the typical figures for a 16 metre hull:

16 METER HULL	WEIGHT	LABOUR TIME
Laminate	115kg	6 hours 30 minutes
Crestomer®	40kg	1 hours 55 minutes
Saving using Crestomer®	75kg	4 hours 35 minutes
Percentage savings	65%	62%

BONDING BULKHEADS TO AN FRP BOAT HULL

Crestomer® structural marine adhesives are used by the leading boat builders around the world.

As for stringers, the unique chemistry of Crestomer® structural adhesives is perfectly suited to bulkhead bonding. Unlike other adhesives, Crestomer® products bond perfectly to all types of wood, including marine ply, teak, and pine, without any special preparatory treatment.

Crestomer® 1152PA specifically, also offers significant superiority over polyester bonding pastes and FRP lamination in adhesion, impact resistance and resistance to crack propagation

Bonding bulkheads to hulls with fillet joints using Crestomer® structural adhesives will deliver the following advantages over conventional laminated joints:

- ☑ Superior external cosmetics with zero print through of the joint
- ☑ Potential labour savings of more than 60%
- ☑ Better internal aesthetics, cleaner looking joints
- ☑ Considerable weight savings
- ☑ Much cleaner and easier to use – improved working conditions
- ☑ Improved productivity
- ☑ Significantly reduced styrene emissions

Application guide for bulkhead T-joint bonding

1 No additional laminate preparation required as would be needed for a conventional laminated joint. Ensure surfaces are prepared properly.

a. If the laminate is less than 72 hours old then it should simply be clean and free from contaminants.

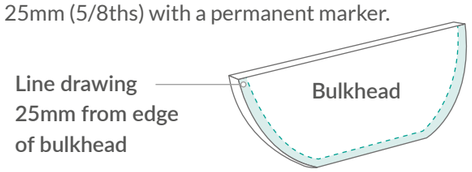
b. If it is over 72 hours old then a peel ply should be used in the area to be bonded. If a peel ply hasn't been used; if the laminate is over 72 hours old; or if the laminate uses a DCPD resin that has been exposed to UV light, then the following preparation of the surfaces to be bonded is recommended:

(i) Solvent Wipe (IPA and leave for 10 minutes, or clean acetone)

(ii) Abrade. The dust should be removed completely, preferably by vacuum cleaner

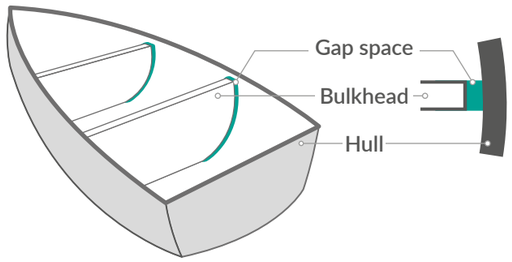
(iii) Solvent Wipe (IPA and leave for 10 minutes, or clean acetone)

2 Mark a line on either side of the bulkhead at 25mm (5/8ths) with a permanent marker.



3 Set bulkhead structure into hull so that gaps are uniform.

4 Measure the gap distance between the bulkhead and hull.



5 Select appropriate fillet tool, which should be the same as the gap size measured above **PLUS 15mm** i.e. a 10mm gap would need a 25mm fillet tool.

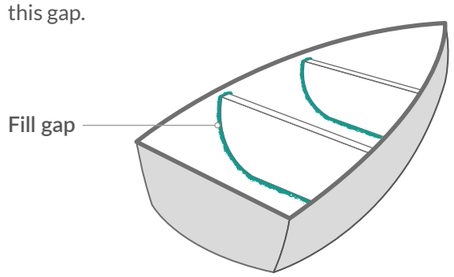
a. The fillet tool should be made of a rigid material, a laminate is perfect.

b. Cut a laminate at twice the width of the required fillet and cut a semi circle at one end.

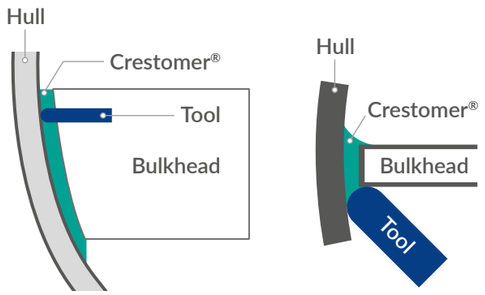
c. It is usually worth making two or three fillet tools of different radii.

6 Mix Crestomer® adhesive to ensure catalyst is fully dispersed. If using a machine, prime the gun to ensure proper mixing. If you would like advice on suitable machinery to use please get in touch with our Technical Support Department.

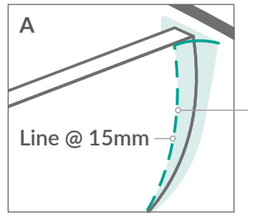
7 Apply catalysed material into the joint. The size of the bead applied depends on the gap size between the bulkhead and hull. Ensure that Crestomer® fills this gap.



8 With the fillet tool at a 90° angle to the joint, form a fillet and remove excess material, which can be reused.

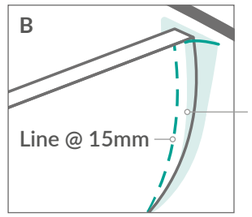


9 Ensure that the Crestomer® fillet at least touches the line mentioned in Step 2 (A). If the fillet is short of the line, a larger fillet tool is required (B). If the line cannot be seen, a smaller fillet tool can be used (C). The working time available for steps 6 – 9 using Crestomer® 1152PA is 50 minutes at 25°C using 2% medium reactivity MEKP.



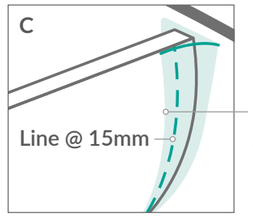
Good result: Structural

Material runs up to desired line



Go back to step 5: Not structural

Material runs short of desired line



Take care not to waste material unnecessarily: Structural but wasteful

Material runs over desired line

10 The support structure for the bulkheads can be carefully removed two hours after Crestomer® 1152PA was catalysed, but care should be taken to ensure no excessive loads are placed on the bulkheads for 12 hours.

11 If the support structure needs to be removed in under two hours, Crestabond® M1-30 can be used to form a 50mm long fillet at the top and bottom of each bulkhead and on each side. The rest of the fillet can then be formed with Crestomer® 1152PA.

The bulkhead support structure can then be carefully removed 80 minutes after the Crestabond® M1-30 has been applied.

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