



Gelcoat Blister Repair and Prevention

TECHNICAL BULLETIN 1000 4/11

The following specification is for the repair and prevention of gelcoat blistering in fiberglass hulls. Close attention to detail is essential to obtain maximum results. When applied properly, the Pettit Protect system will reduce water absorption in fiberglass hulls. However, many factors influence the tendency for a hull to blister, including poor manufacturing and lay-up technique, under or over-catalyzation of polyester resin, water soluble contaminants in the laminate, etc. Therefore no coating system can guarantee that gelcoat blisters will not recur at some point in the future.

The painting specification is broken down into three sections based on the severity of the blistering problem. Each section is independent of the others and contains full surface preparation and application details for each situation.

I. PREVENTIVE MAINTENANCE OF NEW OR NON-BLISTERED HULLS

II. REPAIR OF HULLS WITH MINOR BLISTERING

III. REPAIR OF HULLS WITH SEVERE BLISTERING

I. PREVENTIVE MAINTENANCE OF NEW OR NON-BLISTERED HULLS

1. If the boat is new or has never been bottom painted, scrub the hull thoroughly with a detergent and water solution. Flush the hull thoroughly with plenty of water to ensure complete removal of the detergent solution and water soluble contaminants.

Or

If the boat has been bottom painted, remove the existing paint with Pettit 9051 Bio-Blast bottom paint remover, or remove by sanding with 80-grit production paper. All traces of antifouling paint (or any other paint or coating) must be removed completely.

2. Clean and prep the surface thoroughly using Pettit 92 Bio-Blue or wash the surface several times with Pettit 95 Fiberglass Dewaxer, changing rags frequently to ensure that all contaminants are removed from the hull.

3. Sand the gelcoat thoroughly with 80-grit production paper. All surfaces should be a uniform dull, frosty finish. Inadequate sanding of the surface will result in eventual failure of paint adhesion.

4. Remove sanding residue with Pettit 120 Brushing Thinner and plenty of clean rags.

5. Mix both components of the Pettit Protect 4700/4701 Gray or 4100/4101 White High Build Epoxy Primer thoroughly. Then mix the two components together in the ratio of 3 parts of Component A to 1 part of Component B by volume. Allow to stand 15 minutes at approximately 70° before using.

(Allow to stand at least 30 minutes if temperature is between 50° and 65°F). Do not mix more material than can be used within the specified pot life shown.

Air Temperature	Induction Time	Pot Life
90° F	10 minutes	2.5 hours
70° F	15 minutes	5 hours
50° F	30 minutes	10 hours

6. Apply three coats of Pettit Protect 4700/4701 High Build Epoxy Primer. Wet film thickness should be 7 mils per coat, which yields 4 mils dry film thickness. Avoid applying more than 10 wet mils per coat as this may result in solvent entrapment. A wet film thickness gauge should be used to monitor paint application. Total dry film thickness (DFT) for a three coat application should be 12 mils minimum for maximum coating performance. If this has not been achieved with three coats, additional coats are recommended until 12 dry mils is reached. Apply the Pettit Protect High Build Epoxy Primer per the recoat schedule below.

Hull Temperature	Recoat Window
90° F	2 hrs - 14 days
70° F	3 hrs - 14 days
50° F	6 hrs - 14 days



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If the maximum dry time between coats of High Build Epoxy Primer is exceeded, you must sand the previous coat thoroughly with 80-grit production paper before applying the next coat. Failure to sand will result in poor adhesion between coats and eventual coating delamination. Recoating before the minimum dry time may result in solvent entrapment, also causing coating failure.

7. Apply the first coat of Pettit antifouling paint over the last coat of Pettit Protect within the specified overcoating schedule shown below.

Hull Temperature	To Bottom Paint (Hours)
90° F	3 - 6
70° F	5 - 8
50° F	7 - 10

If these dry times are exceeded, you must sand the last coat of epoxy thoroughly with 80-grit production paper before applying antifouling paint or apply another coat of epoxy if recoat window has not been exceeded. Do not apply antifouling paint before the minimum dry time, as mud cracking of the antifouling may result.

8. Allow the system to cure thoroughly before launching the boat. Follow the recommended launch times shown below.

Temperature	Minimum Launch Time After Last Coat of Epoxy
90° F	48 hours
70° F	72 hours
50° F	120 hours

II. REPAIR OF HULLS WITH MINOR BLISTERING

1. Remove existing antifouling paint with Pettit 9051 Bio Blast Paint Remover or by sanding with 80-grit production paper.
2. Clean and prep the surface thoroughly using 92 Bio-Blue or wash the surface several times with Pettit 95 Fiberglass Dewaxer, changing rags frequently to ensure that all contaminants are removed from the hull.
3. Sand the surface thoroughly with 80-grit production paper and rewash with Pettit 120 Brushing Thinner to remove the sanding residue.
4. Puncture all blisters and grind out any bad gelcoat or laminate.
5. Rinse the entire surface with fresh water to remove the water-soluble contaminants leaching from the blistered areas and let dry.
6. Check the moisture content of the hull with a moisture meter. Take numerous readings along the length of the hull both above and below the waterline. When the hull has approached maximum achievable dryness, the moisture meter readings will be around 2 - 3%. Do not proceed with the blister repair until all readings are below 3%, as moisture trapped in the hull will lead to further blistering and a wet substrate cannot provide permanent bonding.
7. Apply West System 105/205 or System Three SilverTip Epoxy following instructions for application. Apply the epoxy to the blister cavities by brush making sure all blister surfaces are thoroughly saturated with epoxy resin. Let dry 3-5 hours at 77°F. then proceed to step 8 or allow the epoxy to cure hard and then lightly scrub it with plenty of fresh water and a Scotch-brite pad or soft scrub brush to remove any amine blush formed during curing.
8. Sand West System Epoxy with 80-grit production paper and wash with Pettit 120 Brushing Thinner to remove the sanding residue.
9. Mix Pettit 7000/7001 EZ-Fair Epoxy Fairing Compound according to the label instructions. Knife or squeegee the compound into the blister cavities until they are flush with the surface and allow to cure hard. Wipe off excess fairing compound before it hardens to avoid unnecessary sanding. When completely hardened, sand the fairing compound smooth with 80-grit production paper and wipe clean with Pettit 120 Brushing Thinner.



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10. Mix both components of the Pettit Protect 4700/4701 Gray or 4100/4101 White High Build Epoxy Primer thoroughly. Then mix the two components together in the ratio of 3 parts of Component A to 1 part of Component B by volume. Allow to stand 15 minutes at approximately 70° before using. (Allow to stand at least 30 minutes if temperature is between 50° and 65°F). Do not mix more material than can be used within the specified pot life shown.

Air Temperature	Induction Time	Pot Life
90° F	10 minutes	2.5 hours
70° F	15 minutes	5 hours
50° F	30 minutes	10 hours

11. Apply three coats of Pettit Protect 4700/4701 Gray or 4100/4101 White High Build Epoxy Primer. Wet film thickness should be 7 mils per coat, which yields 4 mils dry film thickness. Avoid applying more than 10 wet mils per coat as this may result in solvent entrapment. A wet film thickness gauge should be used to monitor paint application. Total dry film thickness (DFT) for a three coat application should be 12 mils minimum for maximum coating performance. If this has not been achieved with three coats, additional coats are recommended until 12 dry mils is reached. Apply the Pettit Protect High Build Epoxy Primer per the recoat schedule below.

Hull Temperature	Recoat Window
90° F	2 hrs - 14 days
70° F	3 hrs - 14 days
50° F	6 hrs - 14 days

If the maximum dry time between coats of High Build Epoxy Primer is exceeded, you must sand the previous coat thoroughly with 80-grit production paper before applying the next coat. Failure to sand will result in poor adhesion between coats and eventual coating delamination. Recoating before the minimum dry time may result in solvent entrapment, also causing coating failure.

12. Apply the first coat of Pettit antifouling paint over the last coat of epoxy within the specified overcoating schedule shown below.

Hull Temperature	To Bottom Paint (Hours)
90° F	3 - 6
70° F	5 - 8
50° F	7 - 10

If these dry times are exceeded, you must sand the last coat of epoxy thoroughly with 80 grit production paper before applying antifouling paint or apply another coat of epoxy if recoat window has not been exceeded. Do not apply antifouling paint before the minimum dry time, as mud cracking of the antifouling may result.

13. Allow the system to cure thoroughly before launching the boat. Follow the recommended launch times shown below.

Temperature	Minimum Launch Time After Last Coat of Epoxy
90° F	48 hours
70° F	72 hours
50° F	120 hours

III. REPAIR OF HULLS WITH SEVERE BLISTERING

Surface Preparation and Hull Drying

In the case of a severely blistered boat, it is generally recognized that complete removal of the gelcoat is necessary in order to correctly address the blistering problem. Gelcoat removal may be accomplished by grinding, sanding, sandblasting, water blasting, or gelcoat peeling. Sandblasting and gelcoat peeling are by far the fastest ways to remove gelcoat, and when performed by a skilled professional yield a surface which will readily accept the coating system applied over it. Complete removal of the gelcoat should only be performed upon the advice of a qualified Marine Surveyor.



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1. Remove all existing antifouling paint and/or gelcoat by sanding, sandblasting, or gelcoat peeling. Make sure all blistered areas have been opened up and any bad laminate removed.
2. Flush the entire surface with fresh water to remove water-soluble contaminants leaching from the blistered gelcoat or laminate.
3. If the gelcoat has been peeled, it is possible that the surface may actually be too smooth and may require sanding with 80-grit production paper. Sandblasted surfaces should be checked for adequate surface roughness as well.

All surfaces should possess the equivalent surface roughness of that obtained by sanding with 80-grit production paper.

4. Clean the surface with Pettit 120 Brushing Thinner.
5. Check the moisture content of the hull with a moisture meter. Take numerous readings along the length of the hull both above and below the waterline. When the hull has approached maximum achievable dryness, the moisture meter readings will be around 2-3%. Do not proceed with the blister repair until all readings are below 3%, as moisture trapped in the hull will lead to further blistering.
6. While the hull is drying out, wash the surface frequently with fresh water to remove water solubles weeping from the laminate as it dries. These washings will not appreciably affect the moisture content of the hull or retard the drying process. The removal of water-soluble contaminants is critical to the success of a blister repair system and must not be neglected.
7. Apply West System 105/205 or System Three SilverTip Epoxy following instructions for application. Apply the epoxy to the blister cavities by brush making sure all blister surfaces are thoroughly saturated with epoxy resin. Allow the epoxy to cure hard and then lightly scrub it with plenty of fresh water and a Scotch-brite pad or soft scrub brush to remove any amine blush formed during curing. If the surface is very porous additional coats of epoxy should be applied.
8. When the final coat of West System 105/205 or System Three SilverTip Epoxy has cured hard, scrub with fresh water and a Scotch-brite pad or soft bristled brush to remove any amine blush formed during curing and sand thoroughly with 80-grit production paper. Wipe clean with Pettit 120 Brushing Thinner.
9. Mix Pettit 7000/7001 EZ-Fair Epoxy Fairing Compound according to the label instructions. Knife or squeegee the compound into the blister cavities until they are flush with the surface and allow to cure hard. Wipe off excess fairing compound before it hardens to avoid unnecessary sanding. When completely hardened, sand the fairing compound smooth with 80-grit production paper and wipe clean with Pettit 120 Brushing Thinner.
10. Mix both components of the Pettit Protect 4700/4701 High Build Epoxy Primer thoroughly. Then mix the two components together in the ratio of 3 parts of Component A to 1 part of Component B by volume. Allow to stand 15 minutes at approximately 70° before using. (Allow to stand at least 30 minutes if temperature is between 50° and 65°F). Do not mix more material than can be used within the specified pot life shown.

Air Temperature	Induction Time	Pot Life
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11. Apply three coats of Pettit Protect 4700/4701 Gray or 4100/4101 White High Build Epoxy Primer. Wet film thickness should be 7 mils per coat, which yields 4 mils dry film thickness. Avoid applying more than 10 wet mils per coat as this may result in solvent entrapment. A wet film thickness gauge should be used to monitor paint application. Total dry film thickness (DFT) for a three coat application should be 12 mils minimum for maximum coating performance. If this has not been achieved with three coats, additional coats are recommended until 12 dry mils is reached. Apply the Pettit Protect High Build Epoxy Primer per the recoat schedule on the following page.



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12. Apply the first coat of Pettit antifouling paint over the last coat of epoxy within the specified overcoating schedule shown below.

Hull	To Bottom Paint (Hours)
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13. Allow the system to cure thoroughly before launching the boat. Follow the recommended launch times shown below.

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