YACHT TIPS

GRP Blister Repair

How to do repair an Osmosis blister

Guidance on how undertake a localised Osmosis blister or damage repair

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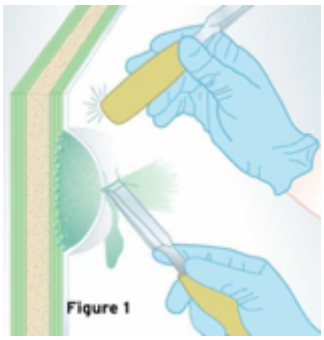
GELCOAT BLISTER REPAIR

HOW TO REPAIR A LOCALISED OSMOTIC BLISTER ON A GRP HULL. FIRSTLY, THERE'S NOTHING COMPLICATED ABOUT BLISTER REPAIR AND THIS CAN BE CARRIED OUT BY ANY ONE PROVIDED THEY FOLLOW THE FOLLOWING BASIC INSTRUCTIONS.

PPE & RISK ASSESSMENT

It starts by getting properly kitted out to do the job with correct Personal Protection Equipment (PPE) as a guide you will need to wear a protective overall, gloves, eye protection and a mask as a minimum. You should also spend a little time considering the risks and hazards involved with the task and be prepared. (Risk assessment)

Task One: open the blister

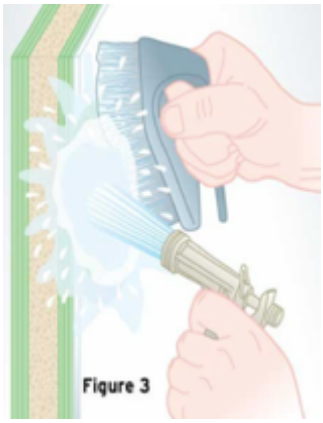


Start by breaking open the blister. This is best done with a sharp chisel however be careful as the blister will have pressurised acidic liquid within it and this can spray out, so wear eye protection and use the corner of a sharp chisel at arm's length **(Figure 1).** Damage can extend beyond the dome, so reverse the chisel and use the handle as a plastic mallet to tap the laminate all around the blister area. Solid laminate will sound sharp, voids will sound dull. Mark the perimeter of suspect areas. Once the blister is open, wash the cavity and the adjacent hull to flush away traces of the osmotic fluids.

Task Two: GRIND OUT CAVITY

Once the cavity and hull dry, grind away the remains of the broken dome carefully with 50mm sanding disc (Roloc) or some other sanding or grinding bit in a drill or rotary tool **(Figure 2).** Chamfer the perimeter of every blister to transform it into a shallow dimple. Typically, you'll be removing only gelcoat, but if you discover damaged laminate, you'll need to grind this away until you reach healthy laminate. Wetting laminate with can help you to differentiate between damage and good laminate. Damaged or dry laminate will show white fibres while healthy laminate will appear dark and translucent with the fibres not evident. Whether a depression ends up spoon-, saucer-, or plate-size will be determined by how far out you have to grind to encounter a solid bond between gelcoat and laminate. Anywhere the exposed edge exhibits separation between gelcoat and laminate, keep expanding the perimeter until you get to good solid laminate.

Task Three: DRYING the cavity



Preparing the cavity is probably the most important part of a good repair and is often the bit that boats yards tend to overlook due to time constraints. Wash and scrub the cavity with hot water and a stiff brush until squeaky clean and rinse with lots of water **(Figure 3).** This will remove any of the chemicals left by the previous blister and remove any dust or contaminates that could start another blister in the repair. Once this is done the cavity and the underlying laminate needs to be left to dry for at least a week to ten days.

TIP: If you are not sure if the laminate is dry enough seal the entire perimeter of a square cut out of a clear plastic bag enough to cover the blister with PVC tape, and leave this for two or three days. If the weather is warm enough for a sensible person to be working on a boat and there's still moisture in the laminate, it will con-dense onto the inside of the clear plastic. In the likely event that the plastic is dry, you're good to go. If it's fully coated with condensation, your repair will benefit from giving the open blisters at least a couple of low-humidity weeks to dry out.

TASK FOUR: PREPARING THE CAVITY TO REBUILD

Before starting the repair give the blister cavity a final wash with hot water to flush away any contaminants that the drying process has brought to the surface. This will not raise the water content of the laminate so you can start work on the repair as soon as the surface is dry again.

The only resin choice for individual blister repairs is marine epoxy resin as this adheres better to damaged area then polyester resins. You need a high-performance epoxy such as West System 105. If the ambient temperature allows, use the regular hardener (for example, West 205), which delivers slightly better moisture exclusion than a slower hardener. You'll be filling the blisters in two or perhaps three steps, and it's essential that each happens before the previous application reaches full cure so that they join together chemically.

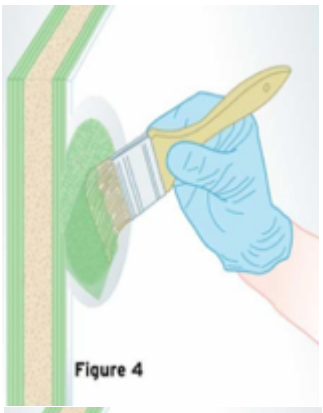


Figure 4

The first step is to mix up a small amount of epoxy. Using a small disposable brush, paint the interior of each blister cavity with the epoxy **(Figure 4).** It is this coat that forms the bond with the existing laminate, so you want the epoxy to completely saturate any fibres and penetrate pores and crevices as much as possible. If you go however immediately to the next step, your filler cloth is going to skid on the wet epoxy and slide out of the cavity. To avoid this, wait until your wet-out coat to partially cure. When it has stiffened but remains tacky, the blister is ready for filling.

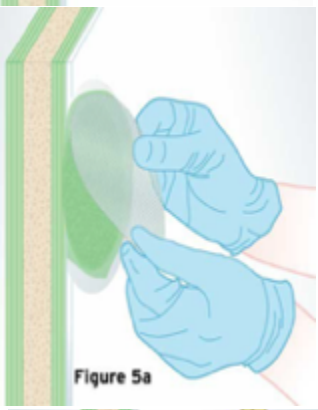


Figure 5a

TASK FIVE: Replacing the fiberglass reinforcement

The next task is to replace fiberglass reinforcement as needed to fill the cavity. The binders used in fiberglass matting often make it incompatible with epoxy resin, so the best choice is six to 10-ounce fiberglass cloth. Cut the cloth into discs slightly larger than the flat part of the depressions and press the first disc into the tacky wet-out coat then saturate the cloth with further epoxy resin. You may need to thickening the resin slightly with colloidal silica if you experience difficulty with the resin draining out of the weave. Add and saturate as many layers of cloth as necessary to restore the laminate to its original thickness **(Figure 5 & 5B).** Allow this lay-up to cure for around 30 minutes before filling the remainder of the cavity.

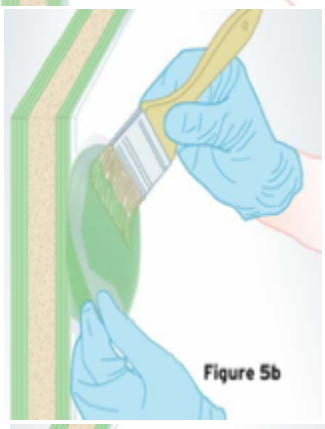


Figure 5b

TASK SIX: FILLING AND FAIRING THE REMAINDER OF THE CAVITY

For this you want to again mix up a small amount of epoxy resin, and then stir in colloidal silica (West 406, Aerosil/Cabosil, for instance) to thicken the resin to the consistency of creamy peanut butter. The filler in this case is also the barrier coat, and colloidal silica will not compromise the resin's resistance to moisture penetration. Use a flexible plastic spreader to trowel the filler into the cavity and smooth and fair it **(Figure 6).**

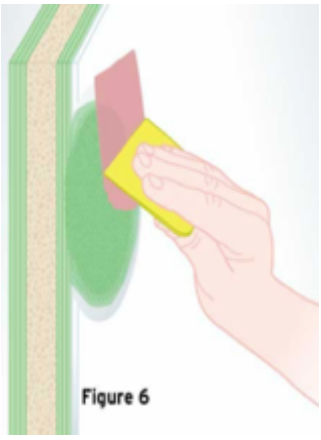


Figure 6

Take extra time to try to match the surface of the fill perfectly to the hull. As colloidal silica makes the cured filler resistant to sanding, extra time here pays generous dividends. Epoxy does not shrink, so there's no need to overfill.

TIP: A topcoat of epoxy resin not thickened after partial cure of the filler can improve the fairness of the repair. The final hurdle is to let the epoxy cure overnight and then use a Scotch-Brite pad and plenty of water to remove the waxy coating that forms over the cured epoxy. Follow that with sanding with 100-grit paper to fair and scuff the surface of the epoxy, ready for applying the antifouling paint. Repairing a few new blisters every year can be a low-cost, long-term strategy.