

MATERIAL WICKING



MATERIAL WICKING is typical of inflatable structures that use a fabric reinforced material having both inside and outside air retentive coatings. The image is an extreme exam-

ple of the wicking process and shows how effective the inner fabric scrim is in allowing air molecules to travel through the filament structure to any exposed, unsealed edge. Similar to a tire that has rubber coatings on both inside and outside of the fabric and steel reinforcing belts, it is the inside coating that provides the air retention properties and the outside that takes the environmental abuse of friction, chemistry, heat, etc. Any injury that compromises the internal coating allows air to permeate the fabric layer and slowly migrate to an exposed edge of the fabric where it will show up as “shaving cream foam”.

Migration is a very slow process and usually takes days for significant air loss to show up. Once the inside coating is compromised by some form of cut or abrasion the reinforcing fabric scrim can be “pressurized” if the repair process does not include sealing the newly exposed fabric edge. The

pressurized air will travel the least resistant line to an exposed edge or to a surface scuff and will show up as foam. Appearances aside, the seams do not leak as they are the strongest part of the boat, it is the edge of the material where the air has traveled some distance that is creating the foaming action. Simply put, migration causes foam, cuts and punctures cause bubbles. On larger holes, an inside patch restores the integrity of the inner coating. Smaller cuts and pinholes need to have the fabric edge sealed by coating the edge with glue before applying an external patch or placing a drop of glue into / onto the pinhole. If a boat has been repaired without an inside patch or adequate edge sealing, the best alternative for minimizing migration is to coat the inside with a layer of latex sealant.

Sooner or later, all inflatables will develop leaks when used in their designed environment. Proper edge sealing and repair techniques will allow the RDC Skiff Ice Rescue Craft to easily provide 10 to 20 years of USCG emergency response service. Please forward this to all USCG stations and cutters that deploy the RDC. As always, please get back to me with any comments or questions.

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WE HAVE AIR COMING OUT OF A SEAM AND CANNOT FIX IT. WHAT DO WE DO?

Inflatable boat materials went through a change in the 1990's away from synthetic rubbers (neoprene and hypalon) to weldable polymers.

One of the material properties which also changed is called in the industry “wicking” (actually air seepage). Wicking is the travel of air through the centre layer of reinforced materials - a polyester or nylon scrim (strong woven material).

Most hypalon materials – at least those with lightweight reinforcement – had very low wicking rates. What we have



done in the photo at left is fit 6 different polyurethane material samples under the valve, removed the O-ring seal, and inflated to standard operating pressure. This allows air to travel up the valve nut threads and access the valve hole at centre of each of the sample discs. The detergent solution

shows the air coming from the disc edges. Some samples wick more than others but in fact they all wick.

This arrangement has exactly the same effect as when you patch a puncture on the outside. It allows air to migrate through the scrim. Air will escape through nearby panel edges (at the seams). These are not seam leaks and cannot be fixed by patching. Air will also escape from every little scratch in the outside coating (normal wear-and-tear).

PATCHING:

Repair punctures always so that the integrity of the inside coating is restored.

On a small puncture this might mean pinching/puckering the material between your fingers so you can give the material edges a few coats of glue (allow to dry 30 minutes between coats). The first glue coat will soak into the scrim and so might the second, and with a third coat you should have a seal. Then a small patch on the outside will be fine.

Patch on the inside any larger puncture (say 25mm or more). This is not especially difficult to do and you don't have to be so careful about unsightly glue lines. Masking tape applied either side of the repair will keep the outside looking good too. If you do neat work the finished result will be all but invisible.