

# **DUI Drysuit Repair and Maintenance**

## **Seminar Outline**



### **Diving Unlimited International, Inc.**

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This repair manual is an adjunct to the DUI Repair Seminar presented at DEMA. It does not cover all possible repair methods. If you have not attended a DUI Repair Seminar you are encouraged to do so. Authorized DUI dealers are invited to participate in extensive hands-on training at the DUI factory in San Diego. If you have questions regarding procedures in this book or those not mentioned, please contact DUI Repair at 800-325-8439 or Repairs@DUI-Online.com.

## **Read All Materials Before Beginning**

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The solvents and glues used in repairing your drysuit should always be used in a well-ventilated area. MSDS (Material Safety Data Sheets) are available from DUI or from the manufacturer of the adhesive or solvent. Always follow manufacturer's directions when using glues or solvents.

**DUI Glue** - ***“DANGER: contains Toluene and Methyl Ethyl Ketone. Use only in well ventilated areas. Keep away from heat and flame. Avoid prolonged contact with skin. If swallowed, do not induce vomiting. Call physician immediately. KEEP OUT OF REACH OF CHILDREN. WARNING: Using this product will expose you to Toluene, a chemical known to cause birth defects or other reproductive harm.***

**Cotol-240®** - ***“DANGER: CONTAINS TOLUENE. Use only in well-ventilated area. Keep away from heat and flame. Avoid prolonged contact with skin. If swallowed do not induce vomiting call physician immediately. KEEP OUT OF REACH OF CHILDREN. WARNING: Using this product will expose you to Toluene, a chemical known to cause birth defects or other reproductive harm.***

**Aquaseal®** - ***CAUTION: contains Toluene. use only in well-ventilated area. Keep away from heat and flame. Avoid prolonged contact with skin. KEEP OUT OF REACH OF CHILDREN. Warning: Toluene is known to the State of California, based on laboratory tests, to cause birth defects or other reproductive harm.***

**Carboline®** - ***DANGER: FLAMMABLE, CONTAINS TOLUENE AND PETROLEUM DISTILLATE. Keep away from heat, sparks, open flame and CHILDREN. HARMFUL IF SWALLOWED. Do not induce vomiting. CALL PHYSICIAN IMMEDIATELY. VAPOR HARMFUL, AVOID PROLONGED BREATHING OF VAPORS.***

**Seal Cement (Repair kits)** - ***DANGER: Contains Toluene and Methyl Ethyl Ketone. Use only in well-ventilated areas. Keep away from heat and flame. Avoid prolonged contact with skin. If swallowed, do not induce vomiting. Call physician immediately. KEEP OUT OF REACH OF CHILDREN. WARNING: Using this product will expose you to Toluene, a chemical known to cause birth defects or other reproductive harm.***

If you have any questions, call DUI at 800-325-8439 or e-mail at Repairs@DUI-Online.com before beginning.

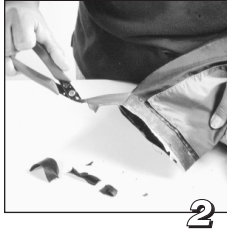
**NOTICE:** Care must be taken to follow the instructions explicitly. Except for replacement of defective product DUI assumes no liability for damage to suit due to improper installation or other fault.

In cold weather, condensation can build up on the adhesives. Allow approximately 5 extra minutes for curing before bonding items together. Adhesive will be set and ready to bond when dry. To test this, run your finger along the adhesive. When using black glue or neoprene cement it will go from shiny to dull in color when ready to bond.

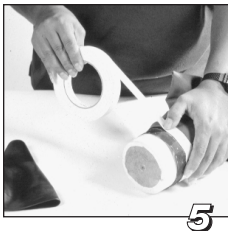
Solvent - DUI recommends the use of Cotel-240®. Use solvent sparingly. Never saturate material with solvent.

## Remove and Replace Latex Wrist Seals

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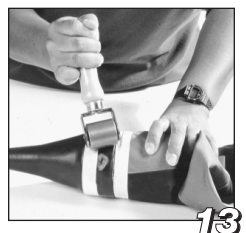


1. Using scissors cut the wrist seal off along the junction where the suit sleeve and seal meet. Do not cut the fabric of the drysuit. (You can use a hair dryer to remove the old wrist seal.)
2. If possible completely remove the old seal. This is the preferred method for installation. However, if time and situation do not permit, you can install the new seal over the existing one. After cutting old seal away from suit, sand the remaining portion. Clean with solvent.
3. Prepare two plugs to be used in sleeve ends for ease of wrist seal installation. You can use cardboard tubes, medium sized cans, small cylinders etc. to make plugs. Make sure the plug has no sharp edges which could damage suit.
4. Insert the sleeve plug down into the sleeve of the suit, letting the plug extend out two inches past the sleeve opening.
5. Using masking tape, tape one inch up from the end of the suit sleeve and tape the sleeve in place onto the plug.
6. Pull the seal into position over the plug until it overlaps the sleeve by one inch. This should be very close to the old seal position.

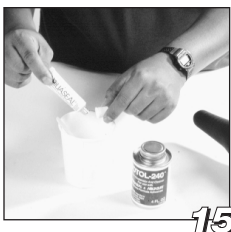
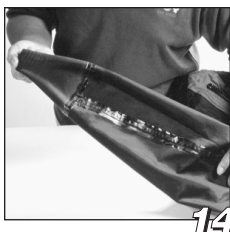




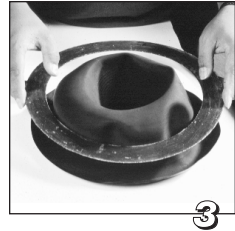
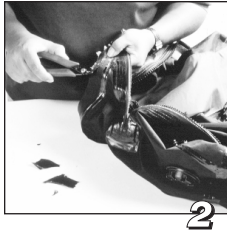
7. Using masking tape, tape the seal into place one inch below the sleeve end of the suit.
8. Fold the seal back over itself one inch. This will now expose the surface gluing area.
9. Sand the exposed area of the seal which is approximately one inch. This is critical for good adhesion.
10. Clean the sanded area with solvent.
11. Apply three even coats of DUI glue to the sanded area of the seal and the exposed area of the sleeve. Allow a ten-minute curing time between the first and second coat and five minutes between the third coat.



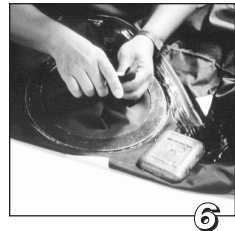
12. Fold the seal back over the sleeve, joining the two areas where the adhesive has been applied.
13. Use a seam roller to apply an even pressure to the joined area.
14. Turn the sleeve inside out exposing the junction of the seal and suit for sealing.
15. Seal by mixing one ounce of Aquaseal® and one ounce of Cotal-240® and apply two coats of the mixture around the INSIDE junction of the seal and suit. The coats should be 1/2" wide, 1/4" on the seal and 1/4" on the sleeve. Allow to dry for approximately 20 to 30 minutes.
16. Dust with unscented talcum powder.



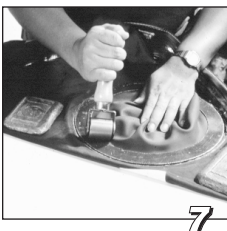
## Remove and Replace Latex Neck Seal



1. Turn the suit inside out. Using scissors cut the neck seal out of the suit along the junction of the seal and the suit. Do not cut the fabric of the drysuit. (You can also use a hair dryer to remove the seal.)
2. If possible completely remove the old seal. This is the preferred method for installation. However, if time and situation do not permit, you can install the new seal over the existing one. After cutting old seal away from suit, sand the remaining portion. Clean with solvent.
3. Turn the seal right side out (Note: the outside of the seal has raised ridges/trim lines) hold the seal by the neck opening and lay on a flat surface. Press the installation ring into place.



4. Turn the seal and installation ring over to expose the bottom of the seal. Sand around the base of the seal width of the ring which is approximately one inch. This is critical for good adhesion. Clean the sanded area with solvent.
5. Apply three even coats of DUI glue to the sanded area of the seal and the exposes area of the neck opening. Allow a ten-minute curing time between the first and second coats and five minutes between the third coat.



6. Starting on one side press the seal in place and slowly work your way around.
7. Use a seam roller to apply an even pressure to the joined area.
8. Peel up the installation ring and roll again.
9. Seal by mixing one ounce of Aquaseal® and one ounce of Cotol-240® and apply two coats of the mixture around the junction of the seal and suit on the INSIDE. The coats should be 1/2" wide, 1/4" on the seal and 1/4" on the sleeve. Allow to dry for approximately 20 to 30 minutes.
10. Dust with unscented talcum powder.

## Seal Trim Suggestions

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To trim a latex seal, turn the seal inside out so that you can see the cutting guides molded into the seal. The cutting guides are thin ridges that make it easy to trim the seal uniformly, insuring a better seal. Trim the seal with the largest, sharpest scissors you can find. Make as few cuts as possible. Avoid leaving a jagged edge on the seal. Trim only one ring off the seal at a time. Try the seal on. (It isn't necessary to put the whole drysuit on.) Adjust the seal. It should be snug but not tight. You can use the following guidelines on seal trimming. **These are guidelines only.**

### NECK SEALS

<u>Neck Size</u>	<u>Number of Lines Left</u>
14 1/2" - under	11
15-15 1/2"	9
16-16 1/2"	7
17" - up	5

### WRIST SEALS

<u>Men's Suit Size</u>	<u>Number of Lines Left</u>
Small, Small	Do Not Trim
Medium	5
Large	4
Large	3
XXLarge	3

<u>Women's Suit Size</u>	<u>Number of Lines Left</u>
Small, Small	Do Not Trim
Medium	6
Large	6
Large	5
XXLarge	5

# Testing Procedures

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## TO TEST DRYSUIT RIGHT SIDE OUT

1. Stop off the wrist seals with either soup cans or something tapered approximately the diameter of a soup can. Tie cans off with soft strips of material. An old T-shirt cut into strips works well. **Using anything like cord or nylon straps will cut the latex seal.** In some cases one can also use masking tape or plastic electrician's tape wrapped around several times very tightly.
2. Close the waterproof zipper.
3. Close the exhaust valve all the way.
4. Again using something that is tapered, put a small bucket or one-gallon juice can in the neck seal. Tie off with soft strips of material. Again an old T-shirt cut into strips works well. In some cases one can also use masking tape or plastic electrician's tape wrapped around several times very tightly.
5. Attach the suit inflation hose to the inflator valve.
6. When pressurizing the suit one must be careful and watch that the cans and seals don't come out. (Tapered pails like those used by children in a sandbox works very well when put in upside down.)
7. Pressurize the suit until the exhaust valve begins to leak. Then spray the suit down with a mixture of soapy water. We use dishwashing detergent diluted roughly 1-10. Locate the leaks and mark with chalk or a piece of bar soap—something that can be cleaned off afterwards.
8. The patches or application of Aquaseal® should be placed on the inside of the suit, not the outside. This way the patches are hidden and are not subject to outside abrasion.

## TO TEST DRYSUIT INSIDE OUT

This method is the best at finding leaks in the seams of any TLS or fabric style drysuit. Also if the drysuit still has a leak and it was not located testing right side out, this should find it.

1. Close the exhaust valve and turn the suit inside out.
2. Stop off the wrist seals with either soup cans or something tapered approximately the diameter of a soup can. Tie cans off with soft strips of material. An old T-shirt cut into strips works well. **Using anything like cord or nylon straps will cut the latex seal.** In some cases one can also use masking tape or plastic electrician's tape wrapped around several times very tightly.
3. Close the waterproof zipper by reaching your arm down through the neck seal. Drop the scuba regulator inside the neck seal and tie off the

neck seal around the hose using strips taken from an old T-shirt. Wrap several times tightly and then tie in a knot.

4. Pull the regulator up into the neck seal and depress the button on the regulator to inflate the suit. This creates the pressure gradient from the outside of the suit going to the inside of the suit.
5. Then spray the suit down with a mixture of soapy water. We use dish-washing detergent diluted roughly 1-10. Locate the leaks and mark with a white soft-lead pencil or a piece of bar soap—something that can be cleaned off afterwards.
6. Rinse with fresh water to remove soap.

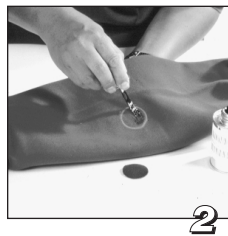
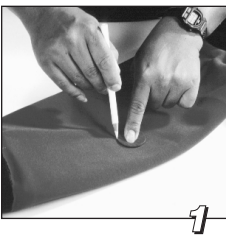
## Patching Leaks

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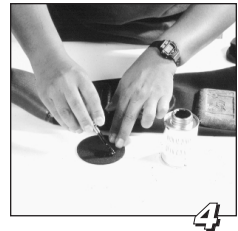
Leaks can be patched two ways. The first is with a material overpatch. This method is more time consuming but has a neater appearance when completed. The second method is using a sealant mixture. This method is a little quicker and easier and great for puncture repairs.

### **MATERIAL PATCH**

1. Locate and mark where the leak is. (If on a CF200 suit, glue the tear together before sealing patch.) Lay the suit inside out and on a flat surface. With scissors cut a patch of material  $\frac{1}{2}$ " to  $\frac{3}{4}$ " larger than the area marked.
2. On a fabric suit apply two coats of DUI glue to the marked area and to the patch. On a neoprene style suit apply three coats of DUI glue or neoprene glue to the marked area and to the patch. In both cases, allow 5 minutes between coats to dry.



3. Apply the patch to the suit, pressing it down as you move across the area insuring that you do not trap air under the patch. Using a seam roller, apply even pressure over the patch.
4. Seal by mixing  $\frac{1}{2}$  ounce of Aquaseal® and  $\frac{1}{2}$  ounce of CotoI-240® and apply two coats of the mixture to the edges of the patch. Allow to dry for approximately 20 to 30 minutes.





## **SEALANT PATCH**

1. Locate and mark where the leak is. Lay the suit inside out and on a flat surface.
2. Seal by mixing  $\frac{1}{2}$  ounce of Aquaseal® and  $\frac{1}{2}$  ounce of Cotol-240® and apply two coats of the mixture approximately one inch around the marked area. Allow to dry for approximately 20 to 30 minutes.

## **Kneepad Mounting Instructions**

1. Thoroughly clean the area of your suit with solvent where glue will be applied.
2. Get into your suit.
3. Mark the center of your knee. Place your kneepad where it will cover the largest wear area for you. The kneepad is generally centered on the knee.
4. Draw around your kneepads with chalk.
5. Remove your suit.
6. Lay your suit on a flat surface or table and redraw around the kneepads.
7. Draw another line one inch inside the first line. This should give you a one-inch wide band the shape of the kneepads. Mark the back of the kneepads with a one-inch wide band around the entire edge.
8. Inside the one-inch wide band on the kneepads and on your suit, paint three coats of black glue (neoprene glue), allowing 5 minutes between coats. Be sure the coats are well brushed into the rubber and cover the entire band area. When the last coat is tacky (about 3-4 minutes), press the accessory into place. Press down hard being careful to leave no wrinkles. Use a seam roller to apply even pressure to the joined area.

## **Accessory Pocket Mounting Instructions**

1. Clean the area of your suit thoroughly where glue will be applied with solvent.
2. Get into your suit. If you have a two-piece wetsuit, be sure to don the jacket.
3. Mark the place where the pocket is most comfortable for you to use. The recommended place is on the front or outside thigh area between the knee and hip. If you have a jacket, be sure the jacket does not cover the pocket. The top of the pocket should be approximately at the level of the crotch of the suit.
4. Draw around the pocket with chalk. If necessary, have a friend draw around the pocket while holding it in place.
5. Remove your suit.

6. Lay you suit on a flat surface or table and redraw around the pocket.
7. Draw another line one inch inside the first line. This should give you a one-inch wide band the shape of the pocket. Mark the back of the pocket with a one-inch wide band around the entire edge.
8. Inside the one-inch wide band on the pocket and on your suit, paint three coats of black glue (neoprene glue) allowing 5 minutes between coats. Be sure the coats are well brushed into the rubber and cover the entire band area. When the last coat is tacky (3-4 minutes), press the accessory into place. Press down hard being careful to leave no wrinkles. Use a seam roller to apply an even pressure to the joined area.

**NOTICE:** Care must be taken to follow the above instructions explicitly. This accessory will be replaced if defective in manufacture, labeling, or packaging. Except for such replacement, DUI assumes no liability for damage to suit due to improper installation or other fault.

## **Apeks Drysuit Inflation Valves**

To change direction of the inlet valve nipple, unscrew back of valve. **DO NOT REMOVE VALVE FROM SUIT.** Turn nipple to desired location. Tighten valve.

If valve area is leaking, unscrew the valve and apply a small portion of silicon sealant to the base of the valve and reseal valve.

## **CARE AND MAINTENANCE OF APEKS VALVES**

### Suit Inflation Valve

The suit inflation unit should ideally be rinsed in fresh water after use. It should then be connected to the air supply and blown through to clear any remaining water.

The inlet valves should be stripped down, cleaned and the “O” rings changed annually to guarantee trouble-free operation.

The inflator hose should be rinsed after use and the QD coupling occasionally lubricated with a light lubricating oil.

### Semi-Auto Dump

Valve/Cuff Dump Valves. The Apeks dump valves are maintenance free. The valves should be rinsed in fresh water after use and then the remaining water gently shaken off.

No annual servicing is required if the valves are working correctly.

**NOTE:** When Apeks suit valves are fitted to the drysuit, it is important that a rubber backing patch is first bonded to the outside of the suit before the valves are fitted to guarantee no leakage from around the edges of the valves.



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