Drysuit Maintenance Tips

In this edition's diver maintenance column, Ocean Eye, Inc.'s Chris Gabel touches on drysuit history, some differences between models, and a few tips on maintenance and light field repair.

For a brief history of the drysuit, we have to start with the development of the diving helmet. The first of these was the "smoke helmet," which was invented by Charles and John Dean in England in or around 1824.

The brothers faced two challenges with their helmet. First, when the diver leaned forward, the "smoke helmet" would flood. The other was the question of how to allow air to exhaust out of the helmet.

A short jacket was attached to the helmet and air was allowed to exhaust from the bottom of the garment. This also helped resolve the flooding problem as well. Thus, the first diver's dress was born.

The helmet was modified around 1834 by Augustus Seibe at the behest of the brothers Deane to turn it in to an underwater diving helmet.

It was George Edwards, however, that really invented the first full diver's dress, about 1838. It is Edwards that we should credit (blame?) for the invention of the first drysuit. Since then we've been inundated with many different designs, both in pattern and material. There are some differing versions of the story. This is just a very brief synopsis of the history. For more information, I would suggest visiting or contacting Leslie Leaney and the fine folks at the Historical Diving Society at www.hds.org.

Types of Drysuits

Let's go through some of the different types of drysuits on the market today. The various models from leading manufacturers in the commercial diving business all have their assets and liabilities. There is no such thing as the perfect drysuit – everything is a trade-off for the diver.

Of the different drysuits on the market today, some of the most popular are the tri-laminate, butyl rubber, crushed neoprene, and the vulcanized rubber drysuits. For the purposes of this discussion, we'll only be referencing these types of suits.

The tri-laminate is a sort of re-invention of the original diver's dress, of sorts. It uses modern synthetic materials to create a thin waterproof barrier. They are highly flexible, but provide very little thermal protection. They are also not as chemically-resistant as other drysuits.

Hunter's Pro-AM 1050 drysuit.

In contrast, the butyl rubber drysuit is highly resistant to chemicals – a very resilient suit. That said, like the tri-laminate suit, butyl rubber drysuits provide little in the way of native thermal protection. It's also the least flexible of the suits we're discussing here. Next on the list is the crushed neoprene drysuit. This is a very popular suit that gives a diver superior native thermal protection and is very malleable. The downside is that, like the tri-laminate, it's not very chemically resistant and is not usually field serviceable. Finally, on our list, we have the vulcanized rubber suit. This is a tough suit that has become very popular in the commercial, military, and public safety communities. Although it provides little thermal protection natively, it is only below butyl rubber for it's chemical resistant protection properties. The vulcanized rubber drysuits are also more flexible than the butyl rubber suits. They are also field serviceable.

One question that I am faced with is seal preference. Two of the most common are latex and crushed neoprene. I know, I know, you also have vulcanized rubber for the neck dams that can be installed to mate with dive helmets. In that case, you don't have a choice and a latex neck seal is commonly used underneath the neck dam. You're also talking about an environmentally sealed system which changes some of the rules. In that case, you're also diving dry gloves that, by definition, separate the wrist seals from the surrounding water.

So back to the question of latex or neoprene. That's a question that the diver himself (or herself) has to answer. A neoprene seal usually lasts longer and is not as prone to accidental damage as latex is. Latex, however, is more easily replaceable as well as being more flexible. The choice comes down to preference and mission.

Performance in Contaminated Water

One important point that I would like to shed some light on at this point of the article is referencing some important material concerning diving in contaminated water in relation to drysuits. There's some great literature

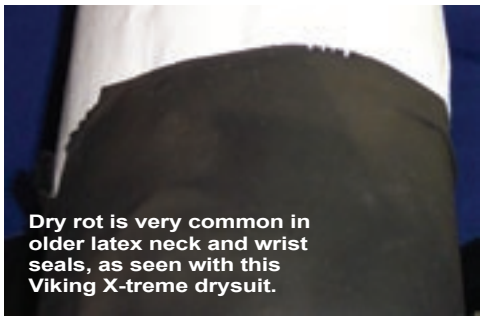
A good quality drysuit will serve you for years if taken care of properly. Like any other piece of equipment, the better you take care of it, the longer it's going to serve you.

that covers this very subject that I would like to present to you, the reader. An excellent guide to diving in contaminated water can be obtained from Trelleborg Viking, Inc. The booklet is entitled appropriately enough "Diving in Contaminated Water". The book can be ordered directly from Trelleborg or from Hammerhead Press' online store. Another valuable resource is the chart of chemical permeation test results provided again by Trelleborg Viking and can be found on the internet at www.trelleborg.com/protective/images/Dcw_tests.pdf. This report focuses on how chemicals react to the different suits that Trelleborg Viking, Inc. produces. It also gives you a baseline to compare other suits to as far as their length of service in different conditions. It's certainly not a comprehensive list of all hazardous materials that can be found in a marine environment, but it gives you a place to start.

Basic Maintenance

Let's go over some basic drysuit maintenance. One thing that all drysuits have in common is that they need to be maintained and checked thoroughly before and after every dive. Basic maintenance requires rinsing the suit in fresh water and allowing it to dry fully before stowage. Keep all of the suits, no matter which material and design you chose, out of direct sunlight whenever possible. Every manual states that you need to make that a priority, but we all know that's not always possible. Direct sunlight will break down the materials and lessen their operational lifespan. Visibly checking for rips and tears in the materials is also essential. The consequences of not thoroughly checking for cracks, punctures and material gaps can range from being uncomfortable due to cold water intake to being a deadly scenario if diving with hazardous materials.

One thing to pay particular attention to is dry rot. This is very common in older latex neck and wrist seals. You can see an example of this issue in figure 3. The micro cracking will be the first sign; this will later lead to breaches in the material. Direct sunlight and chemical exposure will have a direct effect on the length of time to failure. For other suit breaches that seem to defy explanation, there are a couple of field methods to find the leak. This is not a comprehensive list by any means but a quick and dirty way of finding out why you're getting wet. The first is to don the suit and jump into clear non-fouled water. Pressurize the suit and ask someone on deck or in the water to look for bubbles. If that method isn't possible, then don and pressurize the suit. Fill a spray bottle (if one is available) or bucket with soapy water. Coat the suit with the soapy water solution and again look for bubbles to identify the source of the leak. Depending on the kind of suit you're using will depend on the resolution of the leak.



Dry rot is very common in older latex neck and wrist seals, as seen with this Viking X-treme drysuit.

My first suggestion is to use field replaceable seals. These are available from several of the drysuit manufacturers. For instance, DUI offers their version of these in a product called ZipSeals. They work a lot like a freezer bag you get at a grocery store. Another version is offered by Trelleborg Viking, Inc. These ring seals consist of three parts. You have a rubber outer ring, a plastic inner ring, and the wrist seal itself. One convenience is that they don't use any proprietary part for the wrist seal. It simply sandwiches the wrist seal in between the inner and outer rings. You should be able to change a complete set in less than 5 minutes. They also make a similar setup for the neck seal. Depending on your application, these work well to becoming a bit cumbersome. There is one added bonus with the Viking ring system-their dry gloves fit over top with no additional modification. This means that you can dive with or without a dry glove system without having to change any other additional parts.


Diving Concepts' Duraflex Tek is an example of a tri-laminate drysuit.

For minor field repairs, many of the drysuit manufacturers include a field repair patch kit. This will take care of minor breaches in the skin of the suit but not usually the latex pieces. Those are going to require replacement. Some neoprene seals can be field patched, but that is going to depend on the kind of damage and its location.

Any repair is going to dictate that you start with a clean, dry surface. Follow the instructions provided by your suit manufacturer for minor repairs. If you don't feel comfortable making those repairs or the suit requires more time and attention than you have at the time, send it to a factory trained professional repair facility. Sending it to a properly trained repair facility is paramount if you're diving is hazardous conditions. Better to be confident that the fouled water doesn't make contact with the diver than potentially have the spend quality time in a hospital or worse.

A good quality drysuit will serve you for years if taken care of properly. It's like any other piece of equipment, the better you take care of it, the longer it's going to serve you. Don't hesitate to contact any repair facility, retailer, or manufacturer should you have any questions. Safety is the rule here. **UW**

Email your diving equipment maintenance and repair questions to Chris Gabel at cgabel@ocean-eye.net.