

Take Care of Your Umbilicals And They'll Take Care of You

By Chris Gabel of Ocean Eye, Inc.

Greetings fellow divers. This issue, I thought that an appropriate subject would be umbilicals. If you had the fortunate experience to attend Underwater Intervention 2008 in New Orleans (for more on the 2009 event, visit underwaterintervention.com), you would have seen a plethora of choices when it comes to umbilical design. Our goal here is to cover some of the design aspects of the present day commercial umbilical and go over some basic maintenance.

UMBILICALS 101

First, I think it would be prudent to go back to basics. According to the US Navy's umbilical manual, which is available for download at www.supsalv.org, the umbilicals consist of at least a .375-inch inner diameter (ID) breathing gas hose, a .25-inch ID pneumofathometer hose, a communications cable, and a strengthening member. It also mentions that the communications cable and strengthening member may be a single integrated unit.

Now some of you out there may be thinking about the new .25-inch hose that's being talked about and tested for shallower water diving. As of this writing, I have not heard that the .25-inch type is being approved for civilian use, although there are undoubtedly people testing that configuration out for themselves.

There are currently two configurations for the .25-inch hose that I know of. One consists of just using the .25-inch breathing hose for shallow depths and the other uses a small air cylinder with an attached first stage. That assembly is attached directly to the diver. For more information or questions on the .25-inch breathing hose, a good reference would be to contact Mike Ward at Dive Lab. For this article, I am going to refer to the current .375-inch standard.

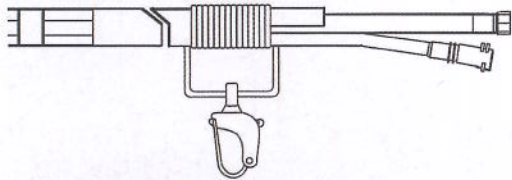
YOU SAY TOMATO...

There are several different ways that the umbilicals can be physically put together. The first is the straight, or non-twisted, umbilical. This is a common set up where the pneumo



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DIVING EQUIPMENT & MAINTENANCE



(Below) At right is a standard twisted umbilical. On the left is a twisted setup with an anti-foul, abrasion-resistant outer guard.



Stainless-steel fittings

line, communication line, breathing air line, and strengthening member are laid out and taped together. The strengthening member is assembled so that strain is on the strengthening member line and not on the rest of the assembly.

Taping occurs every 18 to 24 inches. The US Navy suggests using Polyken or duct tape. You can also use color codes if you wish. That way topside can more readily tell the length of the umbilical over the side.

Another set up is the twisted umbilical. This is where all of your umbilical members are twisted to create one unit. This is more common on commercially manufactured umbilicals.

There are also variations on the twisted theme, such as a twisted umbilical with an anti-foul, abrasion-resistant guard. One design looks a lot like the old Chinese finger torture toy. It consists of a cross weave pattern of material. This material can run the entire length of umbilical or be limited to 50 or so feet from the diver to topside.

Another variation has all of the umbilical members encased. In this instance, the entire umbilical is encased in a flexible material that will get cut, scraped, or chemically attacked first before sacrificing the internal members. It's a bit more

expensive, but if you're planning on diving contaminated water, then this is more of the configuration for you.

FITTINGS

The fittings come in two flavors. The tried and true brass fittings are the most common, at least on the East coast. The other option is stainless steel. The price of raw materials has made stainless steel one of the big buzzwords in the industry. The price of stainless and brass has become close to identical, therefore making stainless a viable alternative.

You also have the option of using "reusable" fittings. Although the theory of reusable fittings is sound, I've heard mixed reviews in practice. You need to use your own best judgment on the question of single-use versus multi-use fittings.

You should always visually check your fitting before and after each dive, as well as having them pull-tested at least annually. The US Navy describes their test as: "Using appropriate rigging components, attach the hose to a lifting device and to a 200-pound dead weight."

HOW TO INSPECT IT

Like your tires or anything else made of rubber or rubber-like material, there is

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This entire umbilical is encased in a flexible material that will protect the internal components from getting cut, scraped, or chemically attacked. This is the setup to use for hazmat diving.



a finite life expectancy. The US Navy states a maximum umbilical life of 12 years. That number is a guideline and not gospel.

There are a lot of variables that can determine the life of the umbilical. For instance, exposure to chemicals can be a factor in the life of the materials that make up the umbilical.

A pre-dive visual inspection is always your friend. You should inspect the umbilical for damage, bulges, swelling, cuts, and abrasions. If you think something doesn't look right, then the equipment should be sidelined until further inspection can be completed.

You should have your umbilicals pressure checked at least annually. I say annually for any of the major inspections, but that also depends on use. Some commercial outfits should have their umbilicals inspected quarterly – or more often than that – depending on application and frequency of use. Again, this is a matter of personal judgment.

Any electrical lines (for example communications cable, welding line, light and camera cables, etc.) must be waterproof. That translates to true underwater cable with appropriately installed waterproof ends.

I have to say it like that because of some of the rigs that I've seen out there. A Wal-Mart lamp cord with liquid tape doesn't count. Be smart: duct tape and tractor lights

are not your friends!

For you tenders out there, zapping your diver is not for fun and sport. Divers, treating your tender to a cocktail now and then can help avoid submerged discomfort, as well. Make sure that all power lines are in good working condition and free from deep cuts, abrasions, and defects. Make sure that the diver end is waterproof and secured properly.

HOW TO CLEAN IT

I'm not sure how many of you out there clean your umbilicals at least once a year. I've seen that some organizations consider cleaning the umbilical blowing the hose down. That, my friends, is not a thorough cleaning. It's getting most of the inspects and particulate matter out, but not cleaning the inside from nastiness such as oils.

Basically, you can make a great cleaning system consisting of a couple of garbage cans (clean and unused) and a submersible pump from the hardware store. You're going to be running some water through it, not putting out a fire, so it doesn't need to be more powerful than a decent steady flow.

My suggestion would be to take one can and put in fresh water mixed with a mild detergent such as Simple Green. Put the umbilical in the can, attaching one end to the pump. The other end can either be set inside the can or allowed to drain, your choice.

Run the Simple Green and water solution through the air line for a while. When you think it's clean, use the same process in the second can, but that should only contain clean potable water. This step washes the detergent and water mixture out, so the air line should be allowed to drain outside the can. Then, voilà, you have a much cleaner air line. The same process can be used on your pneumofathometer.

ANNUAL PULL & PRESSURE TESTS

Your umbilical needs to be inspected annually. What does that mean exactly? Well, that means that the umbilical should be pressure tested to 1.5 times the working pressure. That also means that the fitting should be pull-tested, preferably using a 200-pound dead weight.

Also, the umbilical should be cleaned and thoroughly visually inspected. I would have the annual inspection completed by trained professionals. That may be someone on your staff or a technician at a reputable commercial diving service center. After all, it's your life depending on the rubber tube to the surface.

I would like to thank Erich Vargas of Umbilicals International for some of the pictures used in this article. Remember, dive safe. **UW**

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