The Zen of Diving Drysuits

The editors wish to thank:

Si Tech (Sweden)
Aquata (Germany)
Dykkercentret (DK)
Thyge Dive (DK)

who contributed with valuable advice and technical assistance in preparing this article

Editor Peter Symes. Location: Thingvellir, Iceland

All the questions about drysuits you always wanted to know the answer to but never dared to ask: Why dive drysuits? Neoprene or membrane type? Purchasing a suit. Zippers and care. Getting the Bouyancy right. Diving the suits. Special training and tips.

Peter Symes with Andrey Bizyuikin

I am a confessed drysuit nuttie. I prefer my drysuit anytime, even on a hot summer day where I, while kitting up, will subject myself to bystander's snide comments about my apparent lack of Viking genes and tolerance to the elements. Not that I mind diving in wetsuits, which I often have to do whenever I go traveling with a limited luggage allowance, and I gladly admit that diving in wetsuits does tend to give you a more real experience of being in the wet element, whereas a drysuit does tend to isolate you, which, by the way, also has its advantages. Some would even

It is all about being comfortable

say that this is the very point of using drysuits. My point is, aside from the range of obvious technical advantages over wetsuits, there is this unique feeling of diving the suit, almost as in driving a car and becoming one with it through the seat of your pants.

Diving the suit

My drysuit is a vehicle too. It can be finely controlled and maneuvered to the point where I can ultimately come to rest and relax totally outstretched as if I was lying on a mattress. I have, in fact, often amused myself by the thought that the suit was like a waterbed that was just wrapped around you. It is all about comfort.

Being comfortable may mean a lot of things and most of them applies to diving drysuits. It is about protection from the environment, thermal protection first of all, but also against abrasion from sharp rocks, jagged wrecks, spiky sea creatures. And it is about taking as much of the strain out of the dive as possible, making it a pleasurable excursion or exploration into the underwater realm.

As for the thermal protection, there is a lot to be said. As most are well aware, unlike wetsuits, which are almost solely manufactured in neoprene, drysuits comes in two main types (with some overlaps and cross breeds): Neoprene and membrane suits (such as tri-laminate, rubber or nylon). Membrane suits are sometimes also called shell suits. The main difference being that neoprene provides thermal insulation in itself whereas membrane suits require an undergarment worn underneath for thermal protection. Entry level training taught us that the body loses heat 20 times more quickly in water than in air. This makes proper thermal protection priority-one in a good suit. Not only do we want to have a good time down below being cozy rather than cold and miserable, but once we get cooled off, our air consumption also goes up, risk of DCS increases, not to mention, dedicated hypothermia is dangerous and ultimately fatal. In all types of drysuits, air plays the dual role of both providing thermal protection and buoyancy, and fulfilling these two requirements simultaneously is the key.

PHOTOS OF DRYSUIT & DRYSUIT COMPONENTS ARE COURTESY OF THE MANUFACTURERS

Types of Drysuits

Some ask: Why crush the neoprene and ruin the insulating air bubbles?

PHOTO BY PETER SYMES

Technical Editor Andrey Bizyuikin

Neoprene or membrane?

This is a matter of a probably never ending dispute. Not quite as bad as a religious quarrel but the two camps each have their outspoken proponents. Speaking in very general terms, neoprene suits are generally more hydrodynamic due to their smoother surface, and as neoprene allows for some stretch the movement of joints, are less restricting. The downside is that neoprene drysuits compresses with depth, just like wetsuits, whereby they suffer from a loss of both buoyancy and thermal protection exactly there where you need it most. As the suit's buoyancy changes with depth, it also calls for slightly more precision in controlling the buoyancy at any stage. Finally, neoprene suits are generally viewed as requiring more weights than membrane suits, but *ultimately, this depends on the undergarment used.*

Membrane suits, on the other hand, don't compress. They are light-weight and easy to enter, but do require additional protective underwear, for example, Thinsulate underwear from 100 up to 400 gram or some of the special garments advertised on these pages. Membrane suits generally require less lead, but the amount of needed weights will also depend on the choice of undergarment.

Another and less important consideration is that membrane suits tend to be baggier and have a wrinklier appearance causing more drag, which however, to be fair, I haven't been able to really notice. Also, the membrane material doesn't stretch, which, depending on the design and 'tailor cut' of the suit, can limit movement in some directions, for example, if you try to reach out for a tank valve behind your head (a maneuver you should be able to execute in technical diving).

Finally, there are some high-end hybrid models aimed at combining the best of both worlds. Foremost and best known of these models are suits made out of compressed neoprene, a special neoprene in which the characteristic air bubbles have been compressed or 'collapsed'. This produces a much thinner, yet flexible material, but obviously also far less insulating, for which reason an undergarment is necessary for thermal protection. These suits are generally more expensive. We have also seen suits lately where a thin metal-foil that reflects body heat are incorporated into the fabric.

Choice of material is ultimately down to personal preference and the type of diving you want to do - and perhaps also the size of your wallet

Poseidon's Vesta is made from 5mm semi-compressed neoprene

Whites Catalyst is a membrane suit made from QuadFlex incorporating the Captive Suspension System

Aquata Crush - Crushed Neoprene Dry - Overall 5 mm crushed HD-neoprene

TUSA's H.R.S. uses a 5-layered structure with a 3.5mm hyper-compressed neoprene and a double titanium alpha lining

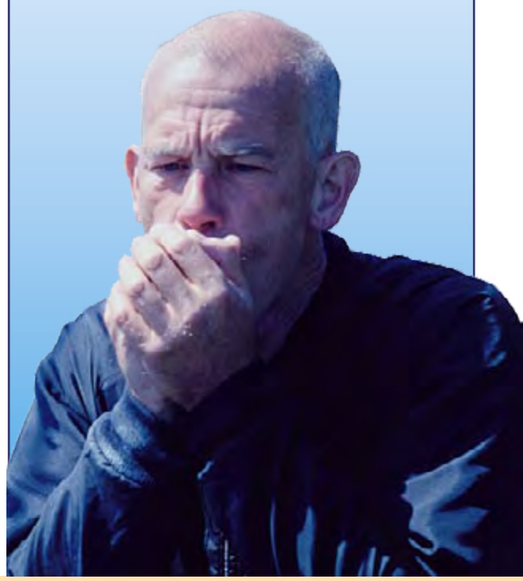
Why you should stay warm

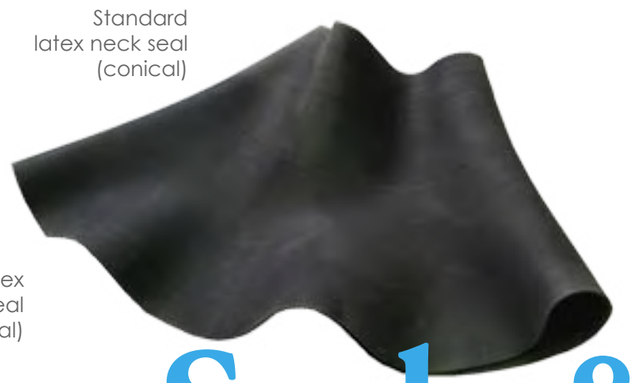
The recent rise in popularity of technical diving with mixed gasses, rebreathers and advances in computer technologies have enabled us to vastly increase the time we can remain underwater.

Consequently, the requirements for thermal protection are higher than ever. If the protection is insufficient, our bodies will react by increasing metabolism to compensate for the loss of body heat. This in turn increases our breathing rate and gas consumption, sometimes depleting our supplies prematurely and forcing us to finish a dive early. Being cold also increases the risk of decompression illness. In the beginning of dive, when the body is still warm, the tissues saturate with nitrogen relatively fast. But once the tissues have cooled, the off-gassing occurs much more slowly.

Most people can do one dive and stay comfortable, but, the second or third dive of a day is when heat loss becomes very noticeable. Even in the tropics, after a week of heavy vacation diving, many people start getting chilled during the last few days.

Also, water temperature in many dive areas can change up to ten degrees or more between winter and summer, so this factor must also be considered when choosing a dive suit. ■





Standard latex neck seal (conical)

Standard latex wrist seal (conical)

Seals & Hoods

Shit Happens

This option from DUI, the ZipSeal, comprises of a flexible urethane ring installed on the neck and/or wrist, which permits the user to replace a torn seal in minutes

Tucking down the seal, like an inverse turtle neck collar, will trap air in a way that will strengthen the sealing effect

Bellow neck seals allow for more head movement without ingress of water

Air is kept inside the suit by seals or cuffs at the wrists and either a neck seal or a hood with face seal. It is inflated through the inlet valve and deflated through an exhaust valve or by air escaping out under the cuffs. The amount of air in the suit is thus variable. How much will always be a compromise. Put more air in and the insulation improves but this also makes the suit more buoyant, calling for the addition of more weights to maintain overall neutral buoyancy. Conversely, if you can do away with less air in the suit—i.e. by using high quality undergarments—you can save on weights. As compared to diving with wetsuits, most will need at least 5kg extra weight for starters.

However, the extra air and the added weight also calls for better buoyancy skills. A drysuit is less forgiving and requires more compensation than a BCD once you start to sink or ascend... more on that on page 74.

Here, I use a neoprene neck seal with a seperate hood. I fancy that neoprene provides me with more warmth around the neck (I am such a wimp) than latex. And it is softer, feeling less tight. A separate hood also makes it more comfortable wearing the suit out of the water—ie during transport to dive site.

Neoprene suits require more weights than membrane suits to compensate for their relatively higher buoyancy at the surface. But as they compress with depth and lose buoyancy this has to be offset by adding extra air. Therefore the air pressure inside a neoprene suit will often be slightly higher. This puts a stronger pressure upon neck and wrist seals. These seals can be made of either latex or neoprene. Neoprene seals have to have the outermost 1-2 cm folded inwards like an inverted turtle neck collar and tucked down along the skin to provide a tighter seal.

When air tries to get out of the sleeve, it gets trapped under this fold and presses the folded-down flap against the skin. It is not always necessary to fold down latex seals as this material is more elastic than neoprene but many do anyway. A word of caution however, a neck seal should hold tight but not be so tight that it restricts the blood flow in the veins leading to the head nor should it be pressing on the vagus nerve. This can lead to increased blood pressure in the head, causing headaches and perhaps even unconsciousness. This can be avoided by using an isolating latex hood, which seals around the face. This latter option is more often seen with commercial divers who have to work for many hours under water, while recreational divers seem to favour the neck seal with either a fixed or separate hood.

Separate hood. You'll get your hair moist like in a wetsuit

Face seal as seen on a Viking suit. This option is mostly favoured by the commercial divers

The 'Winter Shrink'

After a long break or during cold periods, you *may* find that your seals have shrunken and become too tight to pull over your head. You can try to expand and soften them by inserting plastic bottles or balls into the sleeves and neck and leaving them overnight to stretch.

Trimming Seals To Size

Both neck and wrist latex seals are conical. Trimming off the ends willl thus make the fit less tight. Make sure you use a proper pair of scissors and a stable support. One nick and you might tear the seal, which then needs to be replaced. So be careful!

Lubricating seals

Most use talcum powder, but soapy water is also an excellent lubricant for putting the wrist seals on and off. A word of caution however: Avoid anything that contains perfume as it may degrade the seals. Spray a small amount of the soapy water on the inside. Avoid silicone lubricants, which can build up on the suit resulting in problems when repairs are needed. Talcum is the best option.

COUNTERCLOCKWISE FROM TOP RIGHT: Zipper configurations 1. Poseidons first Unisuit had a crotch zip (1963) that went between the legs. This design is no longer used. 2. Round the head permits for easy entry. 3. Across the shoulders are the most common, but this typre requires assistance to get in and out of. 4. Across the chest. 5. The flipover.

Configurations & Care

Zippers

The zipper is the most expensive feature on a dry suit. It requires both protection, careful handling and maintenance. But with proper care the zipper could outlast the suit.

How exposed the zipper is to wear and tear, grit and dirt depends on the design of the suit and whether it is protected under some flap or cover. The zipper needs to be kept clean and lubricated to ensure that it doesn't jam and damage itself and remains watertight. It should open and close smoothly.

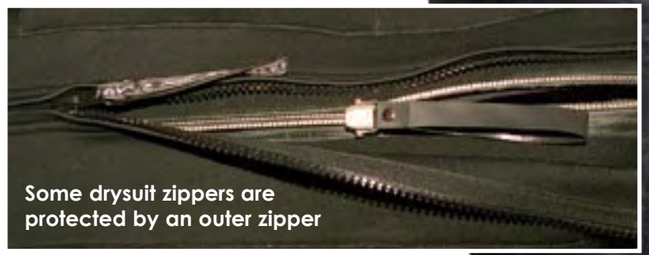
Keeping the zipper clean may include rinsing the zipper off after the dive before unzipping. Divers who dive off beaches may get sand grains deposited as they scramble ashore, which must be rinsed off or swept off before the buddy opens the zipper. An old toothbrush may also come in hand to clean out dirt and salt crystals from between the zipper teeth.

Make sure that care is taken when opening and closing the zipper. Drag evenly and carefully.

Lubrication

It is also important to keep the zipper well lubricated. Wax or liquid are the main choices. Silicone should never be used as it causes problems with glue used in repairs. Some manufacturers recommend sticking with the wax only. In any case, follow their recommendations – otherwise you might void the warranty. Liquid does seem to seep better into the corners, but it may also attract and trap dirt particles.

Some manuals also state that only the outside teeth should be lubricated. Lubricating the zipper, once for each diving day, should suffice. But once it feels tight to open and close, it's time for another lubrication or cleaning. Apply the correct lubricant, open and close the zipper twice, then store the suit with the zipper open ready for the next use.



Some drysuit zippers are protected by an outer zipper

WWW.KALLWEIT.DE

Nice, dry and cozy, also between dives

Dry Gloves

The head, neck, hands and legs can be responsible for up to 70 % of the loss of total body heat. Dry glove systems should be considered when diving in water temperatures below 12°C to minimize the risk of non-freezing cold injures. Inside the membrane, you wear gloves of wool or Thinsulate. There are two main types—with or without a coupling.

PHOTO COURTESY OF NEREIS DIVE CENTER, WHITE SEA, RUSSIA

Some assorted & excessive

Accessories

Ankleweights?

Some scoff at ankleweights denoting them "training wheels for novice divers" and that they just add to the strain of finning. I beg to differ on both accounts. It is about finding your personal trim and what works for you. In my case, as my legs are rather buoyant, in part also thanks to the fact that I, as photographer, favour swimming in a slightly head down position, I need those weights to keep my legs down and balanced. It also spares strain on my back that I can re-distribute the weight more evenly. Swimming? Can't feel the difference? Who got the idea that diving was an underwater marathon anyway?

OMS® ankle weights are fabricated from abrasion and puncture resistant 1600 Denier Nylon with individually sewn pouches to prevent shifting of the coated metal shot.
www.omsdive.com

The Bio-Seal from Apollo not only helps with the sealing. As it does not contain latex, it also helps those who are allergic or prone to neck rash. It is extremely pliable and molds itself to seals and skin equally well. This product can reduce, and in most cases, eliminate water leakage in the neck area while allowing for a more comfortable fit.

Guilty as charged

Cold Feet?

How about an electrical sole wamer from German Kallweit?
www.kallweit.de

Any Colour you like

Regular (3.3 lbs per pair) and Long (3.9 lbs per pair) Ankle Weights are available in Black, Blue, Neon Green and Yellow. **www.mcnett.com**

Argon for suit inflation

Argon is an inert gas which also happens to be a bad conductor of heat. Using Argon as a drysuit inflation gas therefore yields a far better thermal insulation than using air. Argon is carried in a little separate cylinder mounted with its own regulator. **www.omsdive.com**

P-Valve

If you gotta go, you gotta go. The overboard discharge or "pee valve" is a must for any male drysuit diver doing moderate to long exposures. (Sorry, gals. We are out of luck on this option. See 'Drysuits for Divas' on page 71 for advice on this subject). Without a way to relieve himself, the diver will often intentionally keep himself in a state of dehydration. The Pee-valve from OMS is usually installed on the inner thigh. The valve has a hose that attaches to a condom (supplied). When the plumbing is all set up, the diver can urinate at will and the effluent automatically passes from the condom, down the tube and through the valve for an "outboard" dump into the water.
www.halcyon.net

Neoprene Warm Collar - to be fitted over a Latex Seal
www.drysuits.co.uk

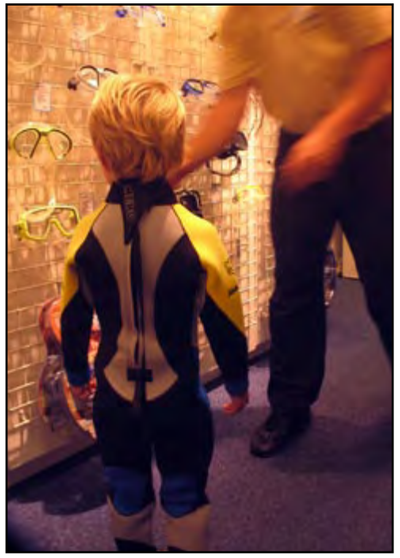
Shopping for a Drysuit

Contributed by Peter Fitschen
Sales Manager at Aquata

A prospective drysuit diver should begin with considering the following questions before buying a drysuit:

Where and how will I dive the suit and what are the temperatures from which the suit has to protect me? Do I only dive occassionally or do I frequently make more than one dive in one day in cold water? What will the suit have to sustain? Am I a sport diver or will I need the suit for professional uses? How do I dive—wreck diving, underwater photography or videography, underwater work or training?

Drysuits are classified as personal protective equipment, and as such, they are subject to commercial standards. Make sure that the drysuit, regardless



Ask for professional advice

of which materials it is produced from, have met these standards. In Europe, for example, this means a valid EU Conformity Declaration and test certificate. This provides the customer with some assurance that he or she is going to purchase a drysuit of good quality where the properties have been tested and recorded.

In particular, this matters when it comes to the degree of thermal protection offered by different materials. Here, it is important to pay close attention to the level of personal activity and anticipated use of the dry suit and match this to what classification of thermal protection the suit has. These data and physical characteristics should be shown in the dry suit and is the only reliable and standardised information available to the customer. Whether the suit is actually made from crushed neoprene, a 7mm neoprene with a Titan coating or other material should be a secondary consideration.

The standards also stipulate how sizes should be presented. Also, any manufacturer is obligated to produce at least two different sizes. In order to offer a perfect fit, however, two sizes will not be enough, so this part of the standards can only be seen as a rough orientation.

A very important issue when it comes to the purchase of drysuits—and wetsuits for that matter—remains finding the best cut and a perfect fit. Even a drysuit made in the finest materials with the best thermal protection characteristics available will not be of much use if it doesn't fit.

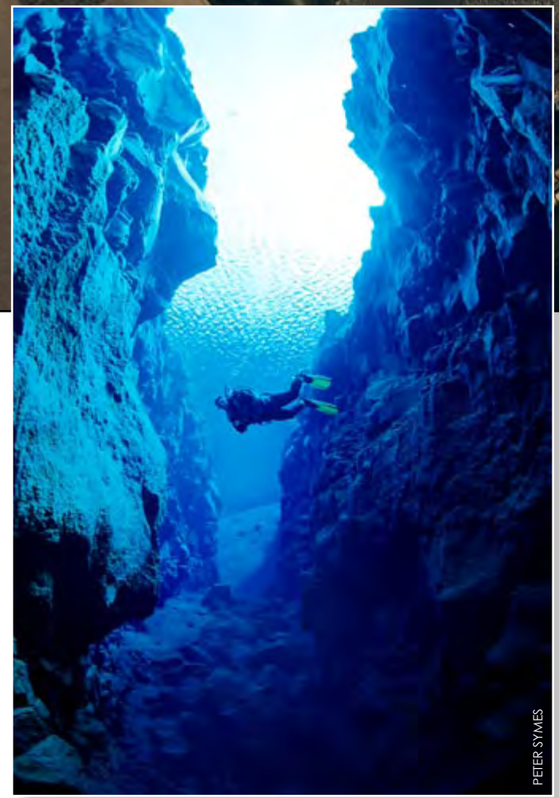
The last consideration is the quality of the workmanship of the suit. Take a look at the flexibility and stability of the material and the arm seals, compensation of cold bridges (see note), sensible use of materials at neuralgic body points, like the joints, and for women, the breast area. Also look at the overall functionality of the drysuit. Are the boots interchangable? Are the hood and seals interchangable too? Can you get additional pockets for additional equipment? It is the sum of the parts that makes a good drysuit.

But it is the combination of the suit's properties and your individual needs and charactistics that will ultimate define what's right for you. We recommend that you seek out a qualifed dealer who can offer you professional advice and guidance in finding a suit that fits correctly. Beginners should also consider special courses in drysuit diving and take the opportunity to make a try dive in a drysuit where offered.

For further advice and details, please visit our website **www.aquata.com.** Look under the category "Guide".

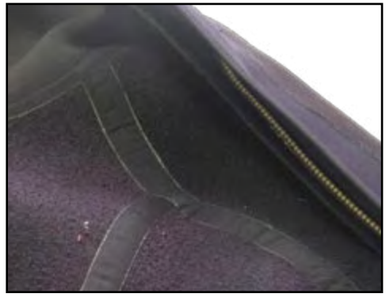
Direct **Link** (click here)

Shopping for thermal underwear, see next page.



What are you going to use your suit for?

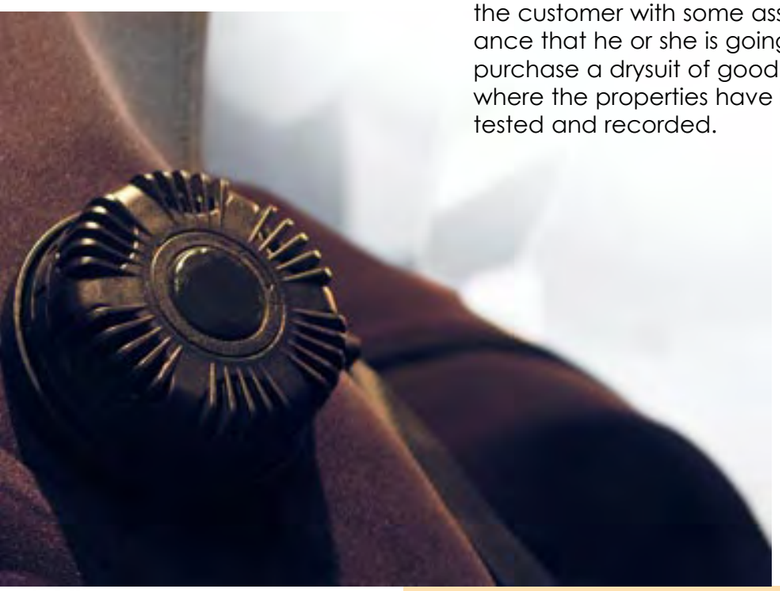
A glued and taped seal of high qualty. There is a tight bond between the materials



Heat-sealed seams. It might be difficult to see the difference, but there is not the same degree of bonding

Checking the quality

Drysuits are not unlike other clothes, shoes or backpacks. Taking a closer look at the finish will tell you a lot about the build quality. Are there any loose threads or uneven seams? Is the material even? The seams are of particular importance because any leaks will arise here. Are they glued (and how) or heat-sealed? Glued and taped seals may look messier on the inside, but heat-sealing is a process whereby the material is welded together under high pressure and temperature, which might affect the materials characteristics locally and create cold bridges that are bands of low thermal insulation.



What to keep in mind when

Shopping for Undergarments

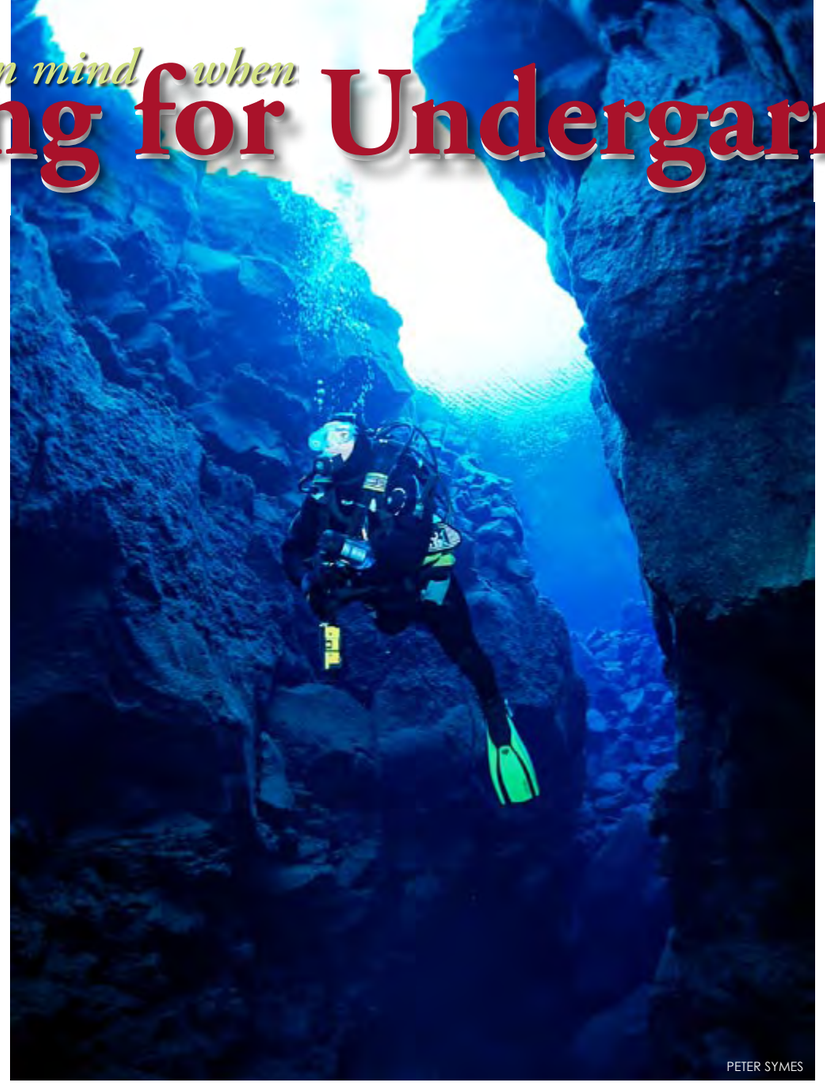
Hilary Child of Weezle Diving Systems has the following advice:

Any thermal underwear should be appropriate and 'fit for the purpose' for the diving being undertaken and flexible enough to be suitable for any diving being considered in the near future. It should also take into consideration the existing equipment such as which drysuit is being worn. When the desirable qualities of diving underwear comes into consideration, there are 3 W's: Warmth, Wicking and Washable

Warmth either through layering, trapped air, reflective heat (a combination of these) or even a mechanical process such as an electrical device, if the others aren't present.

Wicking The body releases water in the form of sweat even on cold dives, up to 12 litres in 24 hours in extreme circumstances but usually nearer to half a litre per day. In good undergarments, small suit leaks should be kept to the exterior of underwear often making the wearer unaware of a wet undersuit.

Washable & Fast Drying
if it is going to wick the sweat to the outer layer, it needs to be washable not only to make it less offensive after a couple of dives, but also to keep the efficiency of the wicking fibres. Fast drying removes the need for a tumble dry and means suit leaks can be dried between dives.



Diving the crystal clear glacial waters near Thingvellir, Iceland

Other good questions

1. Is the cost appropriate to the style and amount of diving being done?
2. How long will the suit last, giving good 'cost per dive' value?
3. Is it compatible with my existing equipment?
4. Reputation; What is the likely customer care back up from manufacturer?
5. Does the fit allow room for the dry suit and ease of movement for all diving drills and actions? Can you fit fins, climb a ladder and do valve isolation drills?
6. Is it well made and hard wearing?
7. Can I add to or reduce the thermal properties of the suit should my needs change?
8. If any diver is going to be wearing this for a full day's diving, is it comfortable?
9. Can it be packed away simply and small enough to travel with?
10. Does it match my eyes? :o) ■

Jim Standing of Fourth Element writes:

Thermal performance

Loft is not necessarily the answer to greater thermal performance. Whilst a thicker layer of air will be a better insulator, reducing conductive heat loss, the management of the air is a far greater challenge and often an irritation to a diver. The greater the amount of air needed to keep the undersuit "fluffed up", the more a diver will need to monitor the air and adjust the air in his or her suit with changing depth. Also, there is a greater risk of "floaty feet" with a larger quantity of air within the suit, and the wearer will be likely to need more lead to achieve neutral buoyancy—a problem particularly before and after the dive, above the surface. If your drysuit undersuit requires a lot of air in order to perform its function, it will require more management underwater.

Density

If something packs down to a small size relative to its size when in use, it is advantageous from the point of view of packing it to transport it, but it is also indicative of how easily it can be compressed during the dive. Generally speaking a dense material will not compact as much and therefore will not compress as much during a dive.

If your drysuit undersuit requires a lot of air in order to perform its function, it will require more management underwater.

Wicking

Ensure that you have a good base layer next to your skin. Ideally, this should wick away moisture from perspiration or suit leaks. Keeping the skin dry is crucial to the overall performance of the drysuit and undersuit. Some products wick via a chemical treatment, but this will wash out after a time. Others have a mechanical wicking process due to the precise knit pattern of the fabric. They tend to be more expensive, but their performance will last the lifetime of the garments. All "natural fiber" base layers have mechanical wicking properties, but the best wicking fabrics are the top end synthetics. These do tend to get quite smelly after prolonged use, so machine washability is also a key factor. Look out for branded fabrics such as Polartec and Goretex. They have a large R&D budget, which is well spent on producing high performance fibers that are effective in insulating the wearer more effectively with less bulk.

The best wicking fabrics are the top end synthetics

Layering

Layering is a solution to attaining greater protection without bulk. It's a tried and tested approach in other outdoor sports, and is just as effective under a drysuit. Think of the drysuit as the water proof outer layer. What you need is an appropriate combination of base layer and mid layer. Use a thermal baselayer with lighter weight undersuits, and a wicking base layer with the heavier weight suits to maximise moisture management. Better still, use a thermal wicking base layer —the best of both worlds.

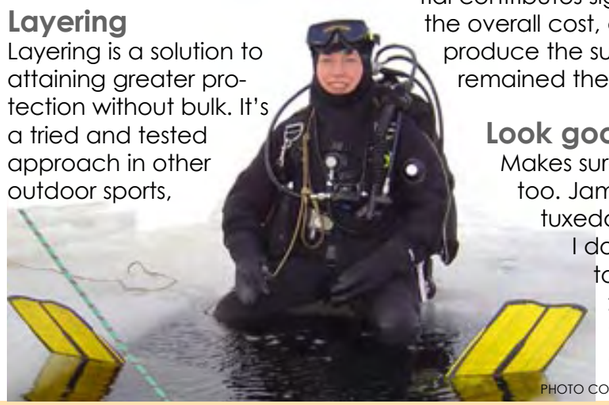


PHOTO COURTESY OF NEREIS DIVE CENTER, RUSSIA

Price vs. Quality

Beware of undersuits in a range where the price increment is not that great between the different levels of protection. It means that the cost is in the garment rather than the insulating material used. If you see a suit that uses a good quality material, the increase in price between a 200g and 300g suit will be significant showing that using more of the insulating material contributes significantly to the overall cost, as the work to produce the suit itself will have remained the same.

Look good

Makes sure you look good too. James Bond wore a tuxedo under his drysuit. I don't think we have to aspire to looking *that* good, but we can come close! ■

mermaid matters

Edited by Gunild Symes

Drysuits for Divas

Text by Cindy Ross
Photos courtesy of the manufacturers

THE NIGHTMARE: Emerging from a dive wrapped in a cold neoprene sponge, which needs to be peeled off of your pasty body, while onlookers gasp, as your swimsuit shows more of your bottom than it covers.

Enter the Drysuit...Diva Style

Drysuits come in all flavours. From vulcanized rubber (for the commercial dive diva) to compressed/crushed neoprene and heavy nylon shell suits. No matter how you choose to dry up your diving, there are some considerations GirlDivers must ponder, that the boys know nothing about.

These are not bikini's. Not sexy. Not sensual. But they are HOT! Hot in the best sense of the word underwater. So, we'll save the sexy black dress for post-dive activities, and realize that staying warm sometimes means sacrificing fashion. Be sure that your drysuit has ample room to add some layers, after all, no matter how tight fitting your suit, no one will see the 10 pounds you struggled to lose.

When will they ever learn?

Now, why would any self-respecting woman invest up to $2800 in a drysuit that makes her look like a sack of potatoes, or a badly stuffed sausage, or a boy? Some manufacturers simply place men's designs on women's bodies, or create dowdy flat-chested designs that don't acknowledge women's curves and cut the line of the leg across the widest part of the hips or thighs—a BIG No-No. Four words: *Hire a fashion designer!* Perhaps then we women will buy your drysuit rather than a Gucci bag.

LEFT TO RIGHT: Waterproof Sedna, Aqualung Blizzard, DUI FLX50/50 drysuit

Layering In order to achieve warmth with most drysuits, you'll need to layer a bit underneath the suit. The type of suit you dive will determine the extent of layering that is needed.

You will always need a base layer. This layer should be made of a wicking fabric to move moisture away from the skin through to the outer layer of fabric in your suit. One yummy solution for a base layer is long underwear made of silk. Silk is the warmest natural fibre and feels soft against your skin. It's the weave of the fabric which achieves the wicking properties, and most outdoor sports retailers will carry silk long underwear.

Why is the insulation layer always black? Whether fleece or a synthetic "down-like" fill, we should be able to add a bit of color with this layer. Go for pink. Or tangerine or lime-green. We aren't limited to black here. For ease in the head, you may want to try a two piece heavy weight fleece outfit. The synthetic filled undergarments are usually a one piece that make that visit difficult.

Digits & Crowns Most GirlDivers suffer from "my fingers and toes are cold" syndrome. It's just the way we're wired. To help with this malady, be sure to wear two pairs of heavy wool socks in your boots. For your fingers, go dry. Investing in dry gloves may be the best dive money spent. Even if, in the coldest of seas, your fingers get chilled in the gloves, by keeping dry they will rewarm almost instantly during your surface interval.

Don't forget your hood. Most of the heat lost in your body is through your head. Blood flows continuously through your body, and when it reaches your scalp, with no fat for insulation, it cools as it moves through those veins. Find the warmest hood you can. Going from a mediocre hood to a thick warm hood will provide a noticeable difference in the heat retention in the rest of your body.

LEFT TO RIGHT: TUSA X-PERT, Northern Diver (above center & inset) and Aqualung drysuits

Pee Valves and Relief Zippers Not really available to us. To consider a pee valve for a GirlDiver would be to consider "catheterization"...let's not. And while I've seen a female version of a relief zipper, I'm really not sure how that works with the layering of clothing underneath. A "male" relief zipper could work, if you use a FUD (female urinary device). This plastic device, recognized by the outdoor industry, is designed to allow females to pee in the woods. And while you can perfect the aim enough to pee on a tree, I'm not sure your boat mates would be impressed with your aim in the loo.

So, GirlDivers remain in the state of hydrated enough to have healthy dives, but not to the point of a full bladder. Note: this is a skill that takes time and patience to master.

Whether diving under ice caps or simply taking a plunge in your local quarry, drysuit diving insures that there is no season that GirlDivers need miss their time with the fish. And with these few considerations, this may be your most comfortable and colorful drysuit season ever.

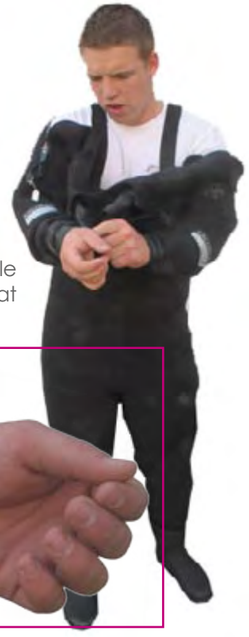
Scuba Lifestyle writer, soft goods stylist, and PADI Instructor, Cindy Ross is passionate about promoting the sport of scuba to females of all ages, all over the globe.
girldiver.com ■

Some manufacturers are more successful with designing for the female figure by acknowleging women's curves and creating a flattering line of the leg and bodice like this BARE Pro neoprene (but why the bull's eye circles around the knees?) and the TUSA X-PERT drysuit with flattering bodice cut (4th from right).

Donning a Suit

Pull up your boots and make sure that there are no folds in legs of the undergarments either

Put your fingertips together. Hold onto the sleeve of your undergarment until you gently push your hand out through the wrist seal. Use the other hand to ease it through and protect the seal. A little talcum usually helps. Make sure that there are no folds in the seal



Grab hold of neck seal with both hands. Take care that your nails don't tear seal

Pull outwards while you press your head gently through. Talcum will lessen the friction

And presto! You're reborn like a newborn babe. Make sure that seal lies even against the skin, with no folds or kinks

You might want to fold it down. In case of a neoprene seal, this is must to avoid water ingress

If you have a shoulder zipper, have your buddy help. Pull even and gently. Make sure that the undergarment doesn't get caught in the zipper

Cleaning & Storage

Rinse the suit off in freshwater after each dive, paying particular attention to the zipper. Never use washing powder, detergent or other household cleaning agent but use the specially formulated shampoos to get rid of salt, grime and dirt as well as bacterial build up. Keep the zipper lubricated with wax or liquid. Avoid using silicone or other greases. Cut of any loose threads and carefully seal the ends with the flame from a lighter. Neoprene suits are best stored hanging on a hanger, whereas membrane suits are best kept in their bag. Keep suits away from heat and out of direct sunlight.

Tip: Let the suit dry with the inside out first. If there is any bad odours, rinse it with one of the specially formulated agents. Never put a drysuit in a washing machine nor in spinner. Read the manual.

FROM DYKKERCENTERET (DK) WWW DYKCEN.DK

Seal Saver protects and conditions dry suit seals, gaskets, O-rings and rubber products

Fold your drysuit with your zipper pointing out. Avoid strains og kinks as this may damage the zipper

Stig Insuláns guide to perfect buoyancy control

Mastering Bouyancy in Drysuits

The following procedure will help you obtain perfect buoyancy control in a drysuit. It should be performed several times and in a comfortable environment. The goal is to master a controlled ascent without effort, similar to taking an escalator to the surface.

The starting point for these exercises is wearing enough weight to compensate for the gas pressure needed to force the exhaust valves open to vent expanding gas. The exhaust valve must also be properly set and located on the highest point on the suit or close to it, i.e. on the shoulder.

Basic buoyancy adjustments

Kit up in full equipment wearing undergarments suited for the water temperature. Adjust your weight belt accordingly. Enter shallow water with all your gear. Open the exhaust valve fully by turning it counter clockwise as far as it goes. This reduces the gas volume in the suit to the minimum by venting excess gas. While breathing normally, deflate your BC completely if you have any gas therein. Now, add or remove weights until you can hang feet down just below the surface touching it with the top of your head only. In this position, when you stretch your arms out horizontally in front of your chest the exhaust valve should be at the highest point of the suit (excl. the hood). The reason for this is when the exhaust valve is elevated, the water pressure will decrease and a spring loaded piston will automatically open and let out expanding gas.

Compensating for gas consumption

During a dive you will loose additional weight as you consume your gas supplies. To compensate for the extra buoyancy at the end of a dive more weights need to be carried. But how much? This requires a little calculation as detailed in the side bar "Calculating increase in Buoyancy", but even just a standard 12l cylinder (~80 cu feet) pumped to 200 bars will contain over 3 kg of air.

Adding some additional weight, say 1-1.5 kg, will allow you the option to do a safety stop with enough margin for comfort. Next, having added all the extra weights necessary, inflate your drysuit. Then slowly close the exhaust valve by turning it clockwise until you once more reach neutral buoyancy. Because you have more weight, you need more gas in the suit. In turn, this results in a slightly higher gas pressure that would otherwise just exit the exhaust valve if it hadn't been turned down.

Initiate the descent by exhaling and by elevating your elbow to cause some gas to exit the exhaust valve. (It can be aided by pressing the cover

Two happy campers in Lake Baikal, Russia. Make your first bouyancy adjustments by adding or removing weights at the beginning of the dive

PETER SYMES

Diving Membrane suits? Don't Use the BCD

The BCD should remain empty during the bottom time of the dive and be used as a back-up buoyancy device only. The only, or primary, buoyancy device should be the suit. This also serves to reduce the task load—which is specially important during stressful sitations—and to focus on the proper buoyancy control through the suit only. The BCD should be kept empty at all times except while floating in the surface. However, some divers with neoprene suits favour also adding a little gas to the BCD during the shallow parts to avoid having excessive amounts of gas in the suits themselves. But that is beyond the main point, which is that you should be capable of controling your buoyancy through the suit alone.

Your buoyancy will increase while diving as you consume the gas through breathing. If you feel that the deflation capacity of the exhaust valve is insufficient, the reason may well be that you started the dive with not enough weight.

Setting the Exhaust Valve for Automatic Buoyancy Control

You can remain neutrally buoyant during a dive without resorting to manual inflation or deflation provided that the exhaust valve is correctly located at the highest point of the suit, that it is properly set and that you are wearing the correct amount of weight.

When you adjust the setting by turning the valve cover, a clicking sound or sensation will help you determine the fine tuning. When the valve is properly set, you will be able to fine tune the gas volume in the suit just by rolling the body on one side or by raising or lowering your elbow. The valve may need further fine-tuning during the dive depending on the duration of the dive and the suit material:

For reduced buoyancy:
Adjust counter clockwise (towards -) = lower pressure = less gas retained in the suit

For increased buoyancy:
Adjust clockwise (towards +) = higher pressure in the suit compared to ambient pressure = more gas retained in the suit

Once back in the surface, close all valves and inflate suit and BCD

of the valve forcing it open). Once you start descending, take your elbow down and start reinjecting gas into the suit in gentle squirts on the inlet valve to control the descent rate and avoid getting a suit squeeze.

During the dive

The suit should be used for buoyancy control at all times—not your BCD, which contains no gas at any stage of the dive. When diving drysuits the BCD is relegated to being a backup device i.e. in case your suits gets flooded and loses buoyancy. Do the fine tuning by adjusting the exhaust valve little by little in either direction by turning the valve's cover.

The ascent

During ascent or while changing depths during the dive, you can adjust the gas volume within the suit by rolling the body or by raising or lowering the elbow—provided the valve is properly set and you are correctly weighted. (Also see " Setting the Exhaust valve for Automatic Bouyancy control"). For slower ascent, raise the arm with the exhaust valve. The internal suit pressure will increase compared to the ambient water pressure on the valve. Gas will be vented faster and ascent rate will slow.

Post-dive buoyancy check

At the end of the dive, see if you are able to maintain neutral buoyancy at 3m with less than 50 bar in your tanks.

At the surface

To obtain maximum flotation and to preserve the insulating effects of the gas, close the exhaust valve fully by turning it clockwise all the way to a full stop. You can then add additional air for further inflation and insulation. Also you can now use your BC to help you float.

Stig Insulan is CEO of SI TECH, the renowned manufacturer of drysuit valves, gloves and other accessories. See ***www.sitech.com***

How to Calculate Expected Increase in Buoyancy

Compressed air (or breathing gas mix) has density. Two to three kilograms of gas is spent just on a typical recreational dive from breathing and inflating a suit or BCD. During technical dives gas consumption is often significantly more—and more than can be compensated for by wearing more weights. Therefore, on deep dives a technical diver will take on additional weights—which may be placed on the down line or handed over by a support diver—to counter for lost weight in gas. Ideally, one should always calculate the weight loss during a dive. For most recreational dives, most of us can do with a general setting, but once we move beyond that, it's time to do some calculations. Each dive is unique, but the diver should always have complete buoyancy control and make contingencies for deco-stops and unforeseen events,

In the following examples, metric units are used and the breathing gas is assumed to be air. Air weighs 1.29gr pr liter.

Example A:

A typical volume for a rental tank on a tropical resort is 10 liters. At a service pressure of 200 bar this tank can contain 10 liter x 200 bar x 1.29 gr/l = 2.6 kg air. This can be felt but most will manage with out any further ado.

Example B:

A technical diver elsewhere might carry a 2 x 12 l twin set charged to 230 bar. In this case, it carries (230 x 2 x 12) liters x 1.26 gr/l = 7.1 kg of potential weight loss.

In either case, add a maximum of 1500 g for the option of a decompression stop. ■

aquatours
ADVENTURES FOR THINKING DIVERS

A good suit is when you have you had it for two years and you ask yourself if you would buy it again if you had to and the answer is yes
—John Womack,
Otter WaterSports

...summing it all up

- Use a drysuit that fits and is suited for the dives you're planning
- Practice your drysuit diving skills under controlled conditions until they become second nature.
- Know your equipment and emergency procedures.
- Make sure your dive partner understands your drysuit system too.
- Check your valves, zipper and seals before each dive.
- Also wear a BCD and use it for surface flotation and back up.
- Use the correct amount of insulation for the water temperature you're diving in and your exercise rate.
- Water or air temperatures below 21°C (70°F) constitute cold water diving.
- Water or air temperatures below 4°C (40 °F) should be considered as ice diving. This comes with added hazards and requires special equipment, training, preparation and procedures.
- Know your limitations and do not exceed them.
- Complete a drysuit diving course from an instructor and stay current by practicing your skills ■

Go on a course - a drysuit specialty course

Diving drysuits is not difficult and a lot of dive suit divers have just started using them without any further ado or problems.

But they do require a bit more technique and skills so why not master these under the watchfull eye of a qualified instructor, who can help you settling into the correct habits. All the major training agencies offer some sort of drysuit specialty course.

Check with your usual diveshop or instructor.