

VIKING

THE WORLDWIDE
DIVING STANDARD



VIKING™
OWNER'S
MANUAL

Ansell

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VIKING™ OWNER'S MANUAL - INTRODUCTION

Thank you for purchasing this VIKING™ suit. Ansell Protective Solutions AB (Ansell) has a long history of manufacturing high quality drysuits going back as far as 1910, and is well known for supplying vulcanized rubber drysuits for professionals in hazardous working conditions all around the world.

Ansell has also created a range of lighter weight trilaminate suits, including stretch materials which are unique. In addition to this, Ansell has developed a method of vulcanizing the inside seams on the VIKING™ suits, which eliminates the potential problem of adhesives and tape deteriorating, and becoming a potential leak issue.

A Hot Water Suit and a range of Surface Rescue Suits complete the VIKING™ range.

This manual relates to every style of VIKING™ diving and rescue suit manufactured by Ansell, although not all parts relate to every suit type.

This manual is delivered with each and every VIKING™ suit, but if your copy is lost or mislaid, a new copy can be obtained by downloading from the website at protective.ansell.com, or contacting customer service at:

Ansell Protective Solutions AB
Tel: +46 (0)10 205 1800
order.protective@ansell.com

Online versions of this manual in languages other than English can be found at <http://protective.ansell.com/en/Media/Manuals/Viking/>.

VIKING™ suits are manufactured under BS EN ISO 9001 quality management systems.

INTRODUCTION



EC TYPE APPROVAL

The VIKING™ suits are CE marked according to the EU directive on personal protective equipment 89/686/EEC as amended. The suits fulfil the applicable harmonized standards as listed below.

Vulcanized rubber drysuits

Suit	Standard	Certificate
VIKING PRO	EN 14225-2:2005, including additional BIO protection requirements	12105AZS01
VIKING PROTECH	EN 14225-2:2005	12106GJS01
VIKING PROTECH BE Navy	EN 14225-2:2005, including additional HZ and BIO protection requirements	12106GJS02
VIKING HD	EN 14225-2:2005, including additional HZ and BIO protection requirements	12104HVS01
VIKING DD	EN 14225-2:2005, including additional HZ and BIO protection requirements	12090COS03
VIKING HDS	EN 14225-2:2005, including additional HZ and BIO protection requirements	12090COS01
VIKING HDS DD	EN 14225-2:2005, including additional HZ and BIO protection requirements	12090COS02

PU suits

Suit	Standard	Certificate
VIKING HAZTECH	EN 14225-2:2005, including additional HZ and BIO protection requirements	12021HAS01

Trilaminare suits

Suit	Standard	Certificate
VIKING VTS	EN 14225-2:2005	11093VTS01
VIKING VSN	EN 14225-2:2005	29326TRS01
VIKING WRS-D	EN 14225-2:2005	17142LJS01

Hot water suit

Suit	Standard	Certificate
VIKING HWS MK 2	EN 14225-3:2005	14135HJS01



Surface rescue suits

Suit	Standard	Certificate
VIKING SRS	PPE Directive 89/686/EEC, using applicable parts of EN 15027-1	11092SRS01
VIKING WRS	PPE Directive 89/686/EEC, using applicable parts of EN 15027-1	11092SRS02
VIKING WRS-D	EN 14225-2:2005	17142LJS01

All suits are tested and approved by the following organization:

Finnish Institute of Occupational Health, Topeliuksenkatu 41b,
 FIN-00250 Helsinki, Finland, Notified body No. 0403.

DESCRIPTION OF MARKING IN THE SUIT

1		13
2		
3		
4	5 	
6 	7	
8		
9	10	
11		
12		

Field 1: Brand name and country of origin

Field 2: Suit model

Field 3: CE-mark, see chapter *EC type approval*. 0402 is the number of the notified body that is responsible for production control. 0402 is SP, Sweden.

Field 4: Size

Field 5: Pictogram with measurements in centimeters, see chapter *Selecting and fitting a drysuit*

Field 6: Request to read instructions in this Owner's manual before using the suit

Field 7: Cleaning instructions, see *Cleaning* in this manual

Field 8: Article number of suit

Field 9: The suit's individual batch number

Field 10: Date of manufacture

Field 11: Suit manufacturer

Field 12: Address of suit manufacturer

Field 13: Warning text



VIKING™ DRY SUIT LIMITED WARRANTY

VIKING™ DRY SUIT LIMITED WARRANTY

Ansell Protective Solutions AB (Ansell) warrants that your VIKING™ Dry Suit will be free of defects in material and workmanship for a period of one (1) year.

Ansell warrants that latex parts of the VIKING™ Dry Suit, such as hoods, neck seals and cuffs, will be free of defects in material and workmanship for thirty (30) days from date of purchase.

If any VIKING™ Dry Suit (or component) is found to be defective under normal use and care during an applicable warranty period, Ansell will repair, replace or refund the purchase price of the VIKING™ Dry Suit, free of charge, at the sole discretion of Ansell. This is the exclusive remedy provided by Ansell under this warranty. To obtain warranty service, either contact your local authorized dealer, visit <http://protective.ansell.com> or contact Ansell Customer Service on telephone number +46 (0)10 205 1800. If a repair is performed at no charge under this warranty, the date of purchase by the ultimate purchaser remains as the date for the start of the warranty. A new warranty period does not begin when service is performed.

The decision to repair, replace or refund the purchase price of the VIKING™ Dry Suit will be made after receipt of the Suit, satisfactory proof of purchase, documentation specifying the claimed defect, requested action and all relevant information. Suits without a copy of the purchase receipt will **not be covered under this warranty**.

VIKING™ Dry Suits must always be worn and cared for in accordance with the Ansell Use and Care instructions contained in the applicable Owner's Manual included with each VIKING™ Dry Suit. The above warranties are VOID if any VIKING™ Dry Suit has been subjected to misuse, abuse, unauthorized alterations, improper or incorrectly performed maintenance, fading from sunlight or unauthorized repair or service.

This is a limited warranty. The above warranties are the sole and exclusive warranties made by Ansell with respect to its VIKING™ Dry Suits. The warranty or product guarantee cannot be prolonged by anything stated in the Owner's

VIKING™ DRY SUIT LIMITED WARRANTY



Manual. Ansell makes no other warranties express, implied, or statutory; including without limitation any implied warranty of fitness for a particular purpose or merchantability.

In no event shall Ansell be liable for any punitive, exemplary, or consequential damages, anticipated or lost profits, incidental damages, loss of time, or other indirect losses or expenses that arise from any cause relating to its Dry Suits, regardless of the form of the action, whether in tort (including negligence), contract, strict liability or otherwise, and regardless of whether the company has been advised of the possibility of such consequential damages. Notwithstanding any contrary provision, in no event shall the total liability of Ansell (together with the liability of its officers, directors, employees, and agents) exceed the purchase price actually paid for the suit that gives rise to such liability. The foregoing disclaimers are subject to any applicable law that regulates product warranties.

To obtain warranty service, contact your local authorized dealer, or call Ansell Protective Solutions AB's Customer Service at +46 (0)10 205 1800.

DEFINITIONS OF IMPORTANT SIGNAL WORDS USED IN THIS MANUAL

Throughout this manual, the following signal words will be used to call your attention to conditions, practices or techniques that may directly affect your safety:

!!! DANGER !!!

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

!! WARNING !!

Indicates a potentially hazardous situation which, if not avoided, may result in death or serious injury.

! CAUTION !

Indicates a potentially hazardous situation which, if not avoided, may cause damage to material or equipment.

SAFETY INSTRUCTIONS

All procedures described in this manual require adequate skill and knowledge in the use of drysuits through training by a qualified and certified instructor.

These guidelines are recommended by Ansell. Follow them for your safety and incorporate them in your routine as a mandatory pre-dive check list.

If your equipment fails to work as intended: **Do not use it; have the problems corrected by a qualified dive shop or distributor.**

1. Complete a drysuit diving course led by a certified instructor and maintain proficiency by regular dives.
2. Use a buoyancy compensator device for surface flotation and for your safety. This is optional when diving with surface supplied air.
3. Know your equipment and emergency procedures. Read the user manuals for all your equipment.
4. Practice your drysuit diving skills under controlled conditions until they become second nature.
5. Never dive alone. Dive with a buddy who has a thorough understanding of your drysuit system. Do always have people on land or in a boat that are able to help you in case of emergency.
6. Use the correct amount of insulation for the water conditions you are diving in and your exercise rate.
7. Your weighting should allow you to make a decompression at 10 feet (3 meters) at the completion of your dive with a tank containing 500 psi (30 bar) of air or less. Determine the appropriate weight needed to attain neutral buoyancy by for example a pool dive. Weight yourself at neutral buoyancy with an empty tank. An increased salinity in the water requires more weight.
8. Check your valves, hose, zipper and seals before each dive.
9. Perform preventive maintenance and repairs on the suit regularly. At least once a year, have the suit, valves and hose serviced by a qualified dealer service, but more frequently if the suit is in heavy or extraordinary use.
10. Know your limitations and do not exceed them.

!!! DANGER !!!

Risk of injury due to reduced body functions when diving in cold water. Water or air temperatures below 70 °F (21 °C) constitute cold water diving. Water or air temperatures below 40 °F (5 °C) constitute ice diving. Ice diving is dangerous and requires special equipment, training, preparations and procedures.

!! WARNING !!

Diving with a drysuit can be extremely dangerous. Do not attempt to use this drysuit without prior training and certification by a qualified and certified instructor, and use of all necessary and appropriate equipment.

!! WARNING !!

Risk of skin irritation and allergic reactions. The suit materials can cause skin irritation and allergic reactions to individuals sensitive to these materials. Consult a medical professional if in doubt.

!! WARNING !!

Improper maintenance, use or misuse of this suit may result in death or serious injury.

Follow established diving safety practice. Do not dive over the limits of your ability and training. Do not use this suit without being familiar with diving equipment and having had prior qualified training.

Do not use this suit until you have practised and mastered practical drysuit skills, including emergency skills in a controlled environment under supervision of a dive instructor certified by a nationally recognized instructional organization and knowledgeable in the use of drysuits.

Do not use this suit without evaluating the conditions before every dive and making sure they fit your personal capabilities. Regularly service and maintain the suit and its parts! Check equipment before and during every dive.

Improper maintenance, use or misuse of this drysuit could cause loss of buoyancy control and exposure to thermal hazards, including uncontrolled rapid ascents, body overheating or overcooling, resulting in drowning, decompression sickness, air embolism, stroke or seizure.

Do not use this drysuit until you have read, understood and followed all instructions and safety precautions in the Owner's Manual.

Never dive without accepting your own responsibility for safety on every dive.

If the Owner's Manual is unavailable or lost, another copy can be obtained by writing the manufacturer, or downloaded at <http://protective.ansell.com>

DESCRIPTION OF A DRYSUIT

A drysuit is a suit which protects its wearer by the exclusion of water and contaminants when underwater. Latex seals are attached to the body of the suit at the neck and cuffs to prevent water from entering whilst submerged.

Various types of underwear can be worn under the suit depending on water temperature, depth and diver activity. The conservation of body heat using thermal protection in cold, deep water is vitally important to the safety and efficiency of divers, professional and amateur alike.

The following chapters describe in detail how to use, maintain and carry out certain repairs to your drysuit.

!!! DANGER !!!

Risk of injury due to reduced body functions when diving in cold water. Water or air temperatures below 70 °F (21 °C) constitute cold water diving. Water or air temperatures below 40 °F (5 °C) constitute ice diving. Ice diving is dangerous and requires special equipment, training, preparations and procedures.

!! WARNING !!

Do not use other gas than air for inflation of the suit. Using oxygen-enriched gas for inflation one is in risk of fire and explosion. Using argon there is a risk of this gas getting into a full face mask and the breathing system through the hood. This has to be avoided because the effect of breathing argon is more narcotic than nitrogen when under increased partial pressure.

!! WARNING !!

The suit itself does not have a depth limit, but all diving at large depths is potentially dangerous and requires special training, skills and know-how.

SELECTING AND FITTING DRYSUIT AND UNDERWEAR



SELECTING AND FITTING A DRYSUIT

VIKING™ drysuits come in several different sizes that fit a large percentage of divers. Since a drysuit does not need to fit snugly, each different size suit will fit a range of body shapes and sizes.

Even though the fit of a drysuit is more forgiving than a wetsuit, the suit must fit you properly. If you are unable to squat or kneel easily in the drysuit while wearing an insulating undergarment, the suit is too short.

A drysuit that is too long for your body can also be a problem. If the crotch of the suit hangs more than 4 inches (10 cm) below your crotch when you are wearing it, the suit is probably too long. Suits that are too long may allow air into the feet of the suit, causing your boots and fins to pop off while diving. This is a dangerous situation.

When you try on a drysuit to determine your size, be sure to put on the bulkiest thermal insulation you plan to use with the suit first. After you have the suit on, check to see that you can comfortably reach both the inflator and exhaust valve when you have all your equipment on.

VIKING™ drysuit size charts

Size charts for each style of VIKING™ suit are available on the website at <http://protective.ansell.com>. VIKING™ sizes are unisex.

SELECTING AND FITTING DRYSUIT UNDERWEAR

Drysuit underwear is designed specifically for diving. Ordinary long underwear, or sweatsuits, are not designed for diving, but may provide acceptable insulation for less demanding diving conditions.

Each individual differs in the amount of insulation they need to wear. The amount of insulation you need is determined by the following factors:

- Your body size and weight
- Your sex
- The water temperature when you dive
- Your exercise rate when diving

Always remember that each person has a different range of temperatures at which they feel comfortable. What is comfortable to your instructor may not be comfortable for you or your diving partner.

Just as too little insulation in cold water can make you quite uncomfortable, too much insulation in warmer water can also make you uncomfortable. When top-side conditions are warm, it is essential to remove your drysuit between dives to allow your body to cool down.

Proper drysuit underwear must cover your arms, legs and torso. Separate socks or booties must be worn to keep your feet warm and comfortable.

!! WARNING !!

It is essential to adjust your insulation according to the environmental conditions where you dive. Overheating is extremely dangerous. It can lead to exhaustion, blackout and in rare instances, death.

!! WARNING !!

The type and amount of underwear used under your drysuit will affect your weight. In most situations, the more insulation you wear, the more weight you will need to dive.

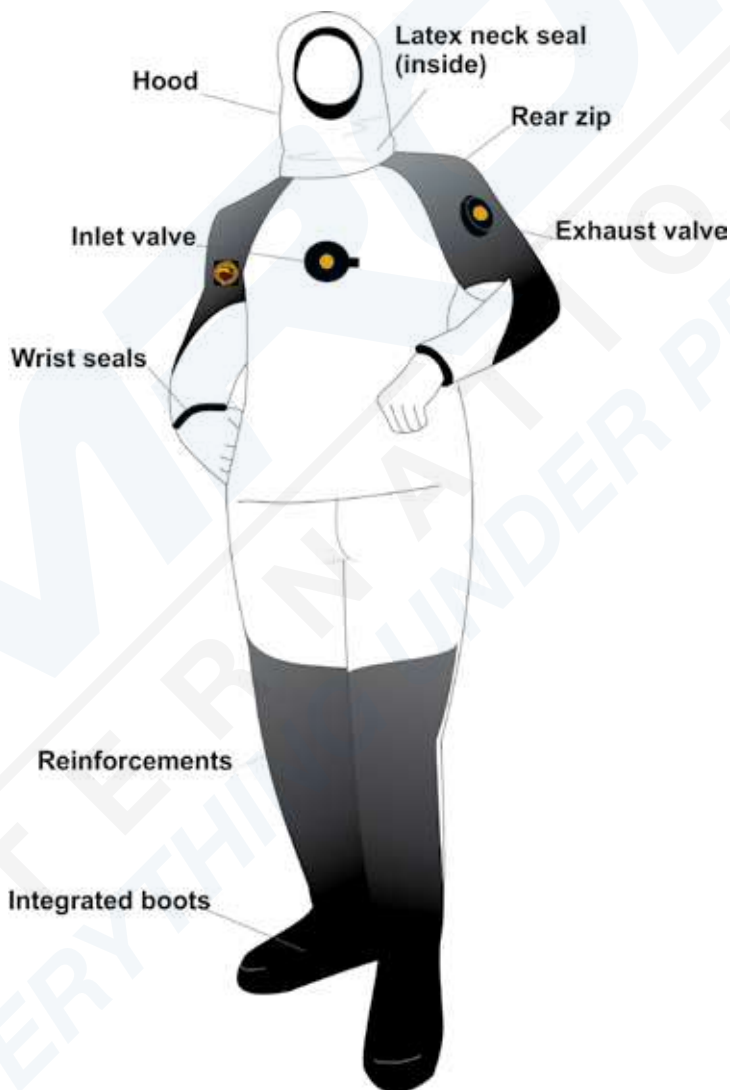
DRYSUIT COMPONENTS

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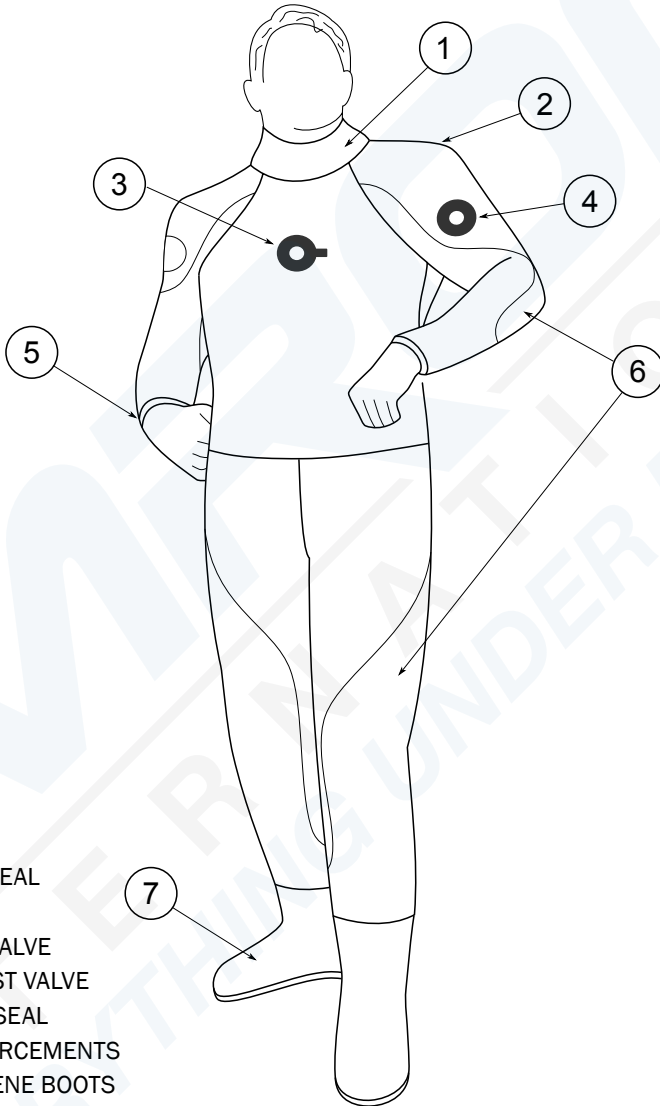
COMPONENTS OF A DRYSUIT

Below you will see typical basic components for each style of VIKING™ drysuit.

VIKING™ PRO



VIKING™ PROTECH

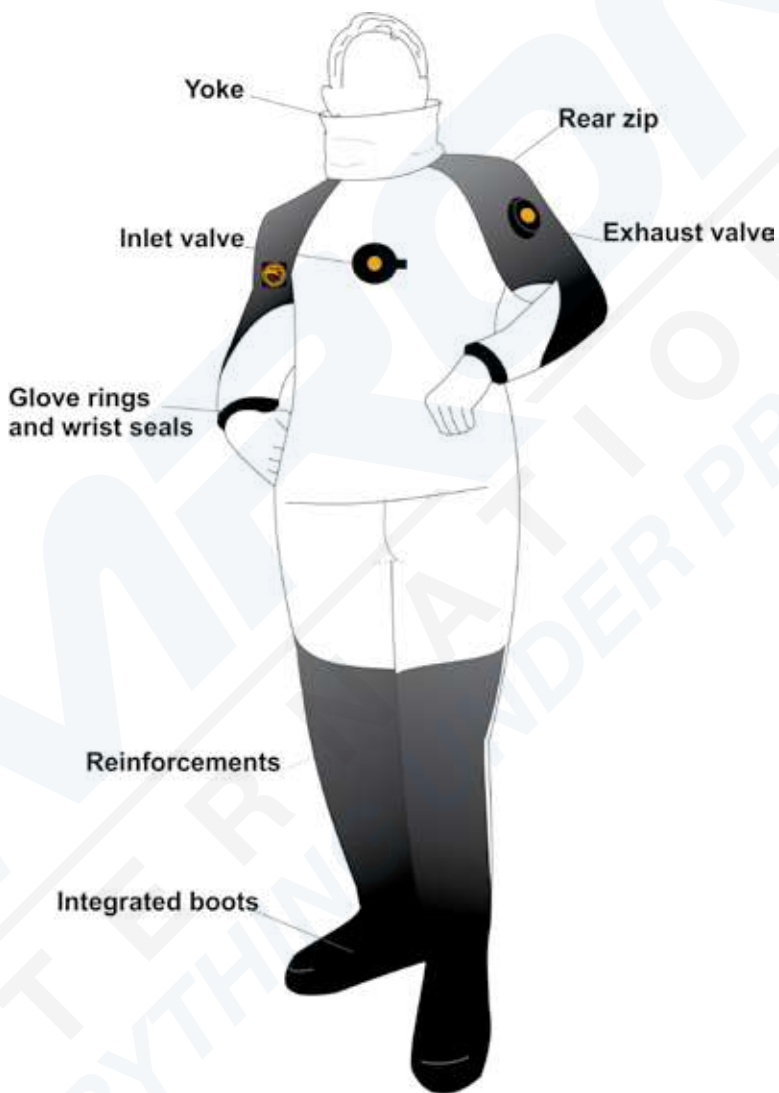


- 1. NECK SEAL
- 2. ZIP
- 3. INLET VALVE
- 4. EXHAUST VALVE
- 5. WRIST SEAL
- 6. REINFORCEMENTS
- 7. NEOPRENE BOOTS

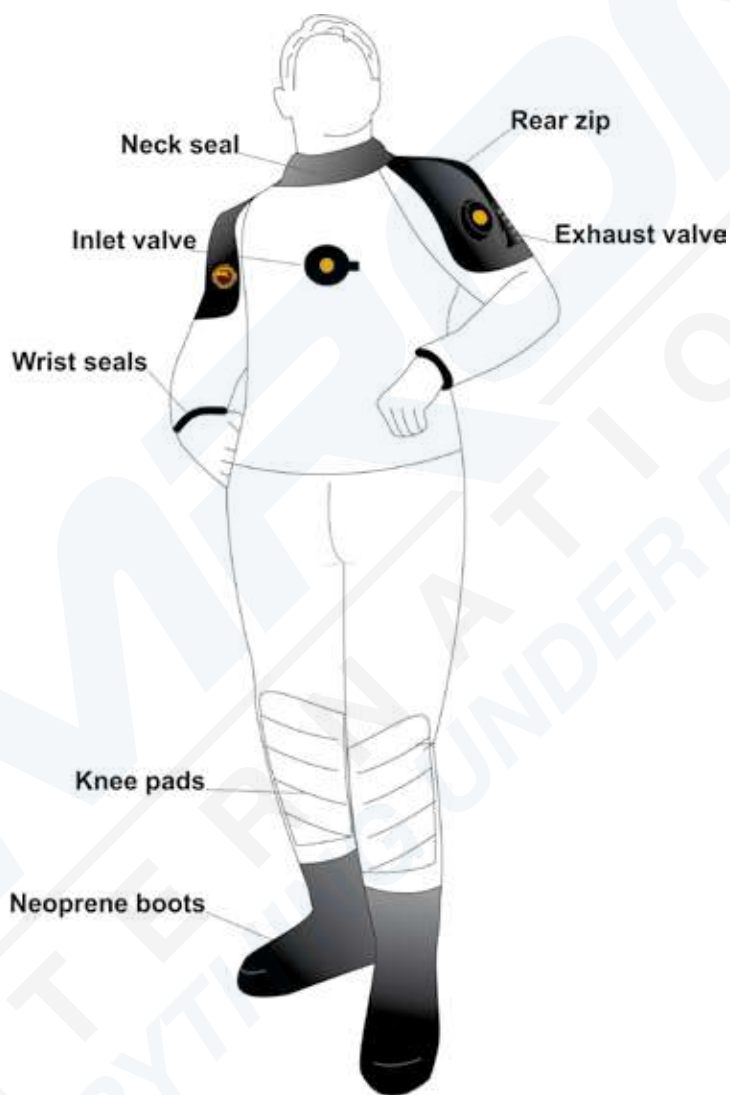
DRYSUIT COMPONENTS

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VIKING™ HD



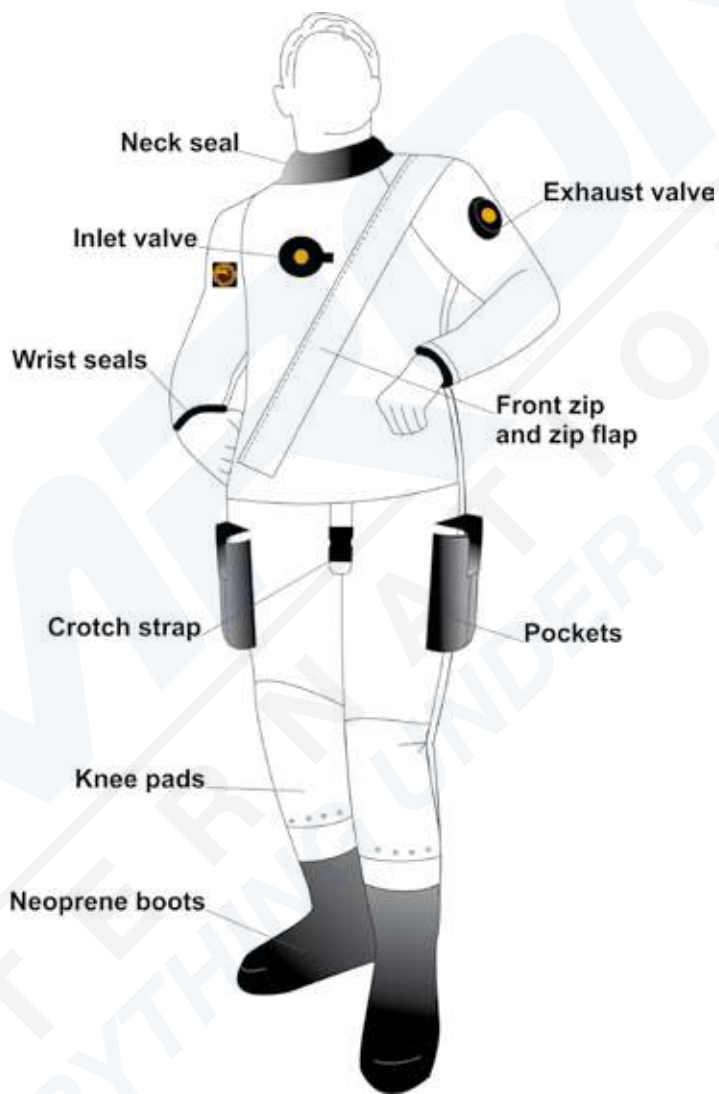
VIKING™ HAZTECH



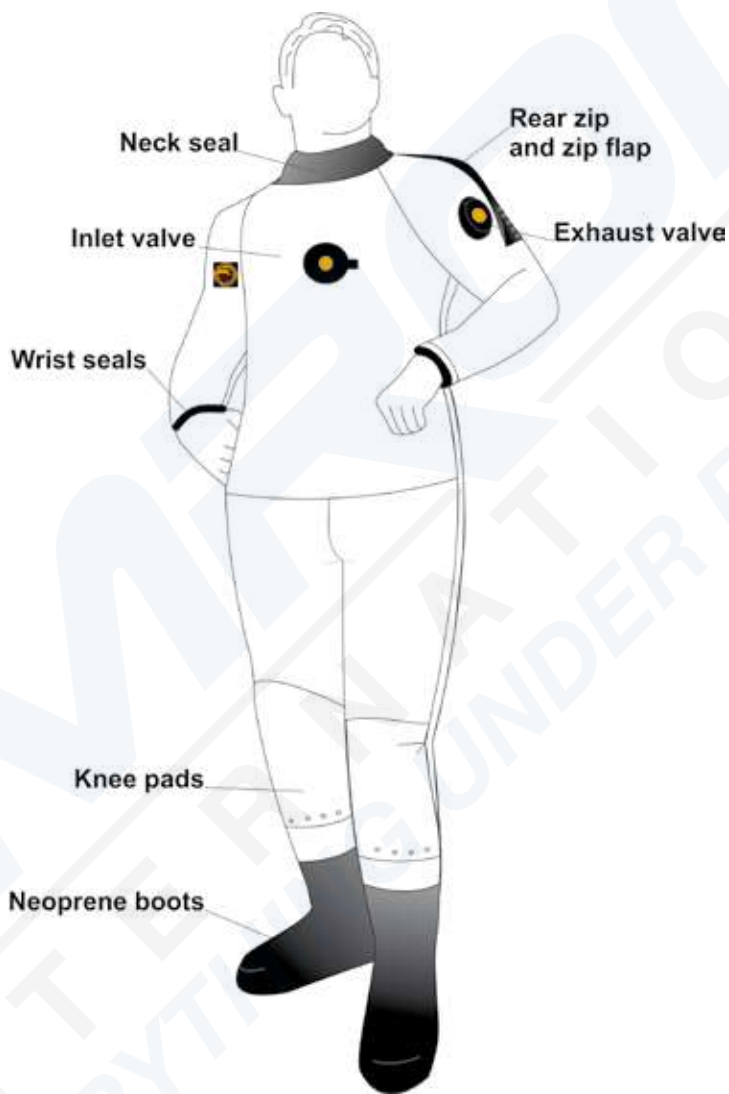
DRYSUIT COMPONENTS

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VIKING™ VTS/VSN Front Entry



VIKING™ VTS/VSN Rear Entry



DRYSUIT COMPONENTS



DRYSUIT COMPONENTS EXPLAINED

Neck and wrist seals

The neck and wrist seals are fitted to the suit to provide a watertight seal. Latex seals are most commonly used, but neoprene seals may be fitted on request. Latex seals are adjustable for fit and comfort, whilst neoprene wrist and neck seals generally come in a range of sizes.

Waterproof zipper

Zips are fitted to provide a waterproof and gastight seal. These may be heavy duty or medium duty depending on the style of suit. The zip is an expensive component, and must be regularly inspected and maintained. Care instructions are provided, and should be followed.

Boots

Vulcanized rubber suits feature boots which are an extension of the legs, and not a separate item. Safety or neoprene boots can be fitted on request.

Trilaminar suits are fitted with neoprene boots as standard to form a watertight closure for the feet. Safety boot and latex sock options are available on request.

Drysuit valves

Drysuits are generally fitted with a low profile swivel inflation valve which is fitted to the chest of the suit, and a low profile adjustable exhaust usually fitted to the upper arm.

The inlet valve is attached to your air supply by way of an LP hose with UNF 3/8" coupling, and allows you to put air into the suit to avoid getting squeezed as depth increases, or to add air on the surface to aid flotation.

The exhaust valve is used to remove unnecessary air from the suit either automatically or manually. **See separate section on *Diving with your drysuit and Buoyancy control.***

Suspenders

Elastic, adjustable suspenders are fitted to most suits, and allow for the suit to be worn when on standby, with the top of the suit around the waist. They also ensure comfort for a range of sizes by adjusting the legs up or down. On front entry adjustable torso suits, the suspenders form part of the telescoping system.

COMPONENTS SUPPLIED WITH THE SUIT

Every VIKING™ drysuit comes supplied with:

- Carry bag
- Suspenders
- Inflation hose
- Owner's manual
- Basic repair kit

DRYSUIT ACCESSORIES



DRYSUIT ACCESSORIES

A full range of accessories is available to add to the comfort or practicality of using your VIKING™ drysuit. Below is a selection. For details, please refer to the VIKING™ price list and/or website <http://protective.ansell.com>.

VIKING™ Quick Neck System

A kit for connecting a latex neck seal to the drysuit. It makes the neck seal easily removed and replaced without the need for adhesives.

A plastic collar is glued onto the suit, and a latex neck seal is then attached to the collar with a plastic ring. A combined latex hood and neck seal may be added in the same way.

Hoods

Latex or neoprene hoods may be attached to the suit to help attain warmth and comfort.

Rubber hoods are available for attachment to vulcanized rubber suits, and are ideally suited for contaminated water diving being easy to clean.

Latex hoods and Turbo and Magnum rubber hoods must always be used with a hood liner for warmth, and to avoid burst ear drums.

Separate neoprene semi dry hoods are also available.

A warm neck collar can be fitted to provide additional thermal protection.

Gloves and glove systems

For a dry dive, you can choose the VIKING™ rubber ring system which can be permanently attached to the suit, and allows for easy removal and replacement of cuff seals without the need for adhesives. The second reason is to provide a rigid platform for mounting latex gloves, which are also easily replaceable. This system is particularly useful for contaminated water diving.

A bayonet quick connect glove ring system is also available for easy donning of dry gloves. Main ring is either glued onto the suit sleeve, or attached directly to the latex cuff.

Relief zip

A convenience or relief zip can be fitted to allow for a comfort break while on standby for a dive.

Pockets

Pockets made from the same material as the suit can be added to carry small items.

PREPARING FOR YOUR FIRST DRYSUIT DIVE



PREPARING FOR YOUR FIRST DRYSUIT DIVE

Before you use your drysuit for the first time, the neck and wrist seals must be adjusted for your individual use. The seals on all VIKING™ drysuits are made from latex or neoprene.

Adjusting latex neck seals

Latex is a flexible rubber material, similar to that used in the manufacture of dishwashing gloves. To make a watertight seal on your drysuit, latex seals are used at the wrists and neck. The seals are manufactured in a cone shape and are trimmed to the size needed by each drysuit owner.

If you are unfamiliar with trimming latex seals, Ansell recommends that you allow your dealer to trim the seals on your suit for you. If you are an experienced drysuit user you may want to trim the seals on your suit yourself.

Before you begin to trim your neck seal, measure the circumference of your neck at collar level. This is the area where the seal will sit against your neck. Next, measure the opening of the neck seal on your suit. When the neck seal is trimmed correctly, the opening will usually be approximately 15-25 % smaller than the circumference of your neck. The neck seal must stretch a bit when you wear it for it to work properly. If too much material is removed the neck seal will leak.

1. To trim a latex neck seal, turn it inside out so that you can see the cutting guides moulded into the seal. These guides are thin ridges that help you to trim the seal with an even cut, helping to ensure a good seal.



2. Have your dive partner hold the seal so that it is flattened. The fingers should grip the seal approximately 1/4-1/2 inch (6-13 mm) back from the opening on either side. The seal should be under slight tension. The two "edges" of the opening should be parallel to each other.

3. Trim the seal with the largest, sharpest scissors available, making as few cuts as possible. Trim no more than 1/4 inch (6 mm) of material during a single cut. Try to avoid leaving the edge of the seal with a jagged surface that could tear.

4. Try the neck seal on when you think you are cutting close to the right adjustment. To do this, you don't need to put the whole suit on; just spread the neck seal as explained in the section *Putting on your drysuit* and pull it over your head. Adjust the seal so that it lies flat against your neck, as low as possible. It should be snug, but not uncomfortable.

New drysuit divers usually will feel that a snug neck seal is uncomfortable and doesn't fit out of the water. However, after you have entered the water, you will find that a snug neck seal provides a good fit and a proper seal.

!! WARNING !!

If your neck seal is too tight it can restrict the flow of blood to your brain, resulting in serious injury or death.

PREPARING FOR YOUR FIRST DRYSUIT DIVE



Adjusting latex wrist seals

If you have large wrists you may find that you need to trim the wrist seals on your drysuit, too. The technique for trimming your wrist seals is similar to that used to trim your neck seal.

Measure the circumference of your wrist above the wrist bone. The wrist seal will seal from the wrist bone up your forearm another 1-1.5 inch (25-38 mm). Next, measure the opening of the wrist seal on your suit. When the wrist seal is trimmed correctly, the opening will usually be approximately 15-25 % smaller than the circumference of your wrist. The wrist seal must stretch a bit when you wear it for it to work properly. If too much material is removed the wrist seal will leak.

To trim a latex seal, have your dive partner hold the seal so that it is flattened. The fingers should grip the seal approximately 1/4-1/2 inch (6-13 mm) back from the opening on either side. The seal should be under slight tension. The two “edges” of the opening should be parallel to each other.

Trim the seal with the largest, sharpest scissors available, making as few cuts as possible. Trim no more than one quarter inch of material during a single cut. Try to avoid leaving the edge of the seal with a jagged surface that could tear.

! CAUTION !

If you damage the neck or wrist seals by trimming them excessively, replacement is NOT covered by the VIKING™ Warranty.

Try the wrist seal on when you think you are cutting close to the right adjustment. To do this, you don't need to put the whole suit on; just insert your hand in the sleeve and slide it through the wrist seal as explained in the section *Putting on your drysuit*. Adjust the seal so that it lies flat against your wrist. It should be snug, but not uncomfortable.

!! WARNING !!

If the seal is too tight blood circulation to the hands will be restricted and could cause your hands to become cold or numb. This can make it difficult or impossible to operate equipment.

Connecting the low pressure inflator hose to your regulator

You must connect the low pressure hose that is supplied with your drysuit to a low pressure port on the first stage of your regulator before you use your suit. Low pressure ports are 3/8" UNF (9.5 mm). The maximum output pressure of an LP port should be 225 psi (15 bar). The hose must be routed so that it comes under your left arm. Accordingly, the hose must connect to a port on the "left" side of your regulator as it sits when it is connected to your tank.

To connect the hose to the first stage, you must remove one of the low pressure plugs from the first stage of your regulator. The post must either be marked "LP" or it may have no marking. Under no condition should you use a port that is marked "HP" or "high pressure".

Use an Allen wrench or open end wrench as appropriate to remove the low pressure plug. Keep the plug in a safe place in case you change regulators. Once the plug is removed, screw the low pressure inflator hose into the opening and tighten with a wrench until snug. If you are uncertain of how to perform this procedure, have it done by your drysuit or regulator dealer.

!! WARNING !!

Do not connect the VIKING™ low pressure inflator hose to a high pressure (H.P.) port. The hose may erupt causing serious injury.

!! WARNING !!

Do not substitute any hose for the hose that was provided with your drysuit. Even though you may be able to couple another hose to the low pressure inflator, the flow capacity through the quick disconnect may not be adequate to supply the inflator valve. In addition, if the hose is too short and bent, kinked or otherwise restricted, the inflator valve on your suit may fail to operate properly.

GETTING READY TO DIVE WITH YOUR VIKING DRYSUIT



PRE-DIVE INSPECTION

At the dive site, you will need to spend a few minutes getting your suit ready to go diving. There are certain items that should always be part of your pre-dive check for drysuit diving.

If your drysuit has been in storage for more than a month, be sure to inspect your suit several days before you leave home to go diving. Give yourself enough time to make any necessary repairs or to have them done.

Zipper

Always check the zipper on your drysuit before diving. You should be able to close the zipper with a single finger pulling on the loop. If the zipper is hard to pull, lubricate it with either zip lube, beeswax or paraffin wax. In an emergency, you can use a bar of soap for lubrication.

To lubricate the zipper, close it all the way and lubricate the outside of the zipper only. Inspect the teeth for damage, or teeth that are not in alignment. Either of these signs indicate a damaged zipper. If these signs are present take your drysuit to the closest VIKING™ dealer for inspection and repair.

! CAUTION !

Do not use silicone spray to lubricate your drysuit zipper. Silicone spray can damage the fabric of the suit and the tape that forms the base for the zipper.

Latex seals

Check latex seals. In cold and low temperatures latex parts become stiff and brittle. Warm them gently to around 99-104 °F (37-40 °C) to soften them and improve ease of donning. You may use a hair dryer or a similar source of gentle heat for this purpose.

Inflator and exhaust valves

Prior to each dive, check the operation of both your inflator and exhaust valve. Test the inflator valve by hooking up your regulator to a scuba tank and pressing the inflator button.

To check the exhaust valve, seal the wrist and neck seals with rubber bands and inflate the suit until air escapes from the exhaust valve. Push down on the top of the exhaust valve to check the manual override function.

PUTTING ON YOUR DRYSUIT UNDERWEAR

When the weather is warm topside, you'll want to set up all your other diving equipment before putting on your drysuit underwear and suit.

To put on your drysuit underwear, start by sitting down. Pull on the lower portion of your underwear and boots (or socks) while you are still seated. Tuck the legs of the underwear inside the boots.

Hold the upper part of the underwear as you stand up. Slip one arm into the underwear and then the other. You may need your dive partner to assist you with this, especially to get the underwear up over your shoulders. Do not force the underwear over your shoulders. Close the zipper on your underwear when it is in position on your upper body.

GETTING READY TO DIVE WITH YOUR VIKING DRYSUIT



PUTTING ON YOUR DRYSUIT - REAR ENTRY STYLE

1. Be sure to remove all jewellery and your watch before attempting to put on your drysuit. The sharp edges on jewellery and watches can easily tear latex wrist and neck seals.
2. Drysuit wrist and neck seals should always be lubricated with pure talcum before putting on your suit. Never use scented talcum powder because the oils in the perfume may damage the seals. If talcum powder is unavailable, you can use a dilute solution of mild soap, shampoo or hair conditioner (five parts water to one part soap, shampoo or conditioner).
3. Open the drysuit zipper completely. Fold the top of the suit inside out down over the outside of the suit to the waist. Sit down and insert your feet into the legs of the suit. Make sure the suspenders are on the outside of your legs as you insert your feet into the suit.

Stand up and pull the suit up to your waist. Slide the suspenders over your shoulders. Make sure they are not twisted and adjust them so they are comfortably snug, but not tight, across your shoulders.

Insert your right arm in the right sleeve of the suit. Insert two fingers from your left hand into the right wrist seal. Push the seal over your right hand. Cup your fingers tightly together as you push them through the seal.

! CAUTION !

Do not dig your fingernails into the wrist seals. Do not put any pressure on the wrist seals with your fingernails.

4. Adjust the wrist seal so that it lies flat against your wrist. There must be no drysuit underwear trapped underneath the wrist seal that could create a channel for water to enter your suit. The seal must be neat and even all the way around your wrist.

If you have prominent tendons on the inside of your wrist that form a groove when you use your hand, this can create a channel for water to enter your drysuit. In this case be sure to pull your drysuit wrist seals as far up your forearm as possible to help prevent water leakage at your wrists.

Repeat the procedure for putting on your left wrist seal.

Putting on the neck seal

5. If you have long hair you will find it easier to put on your neck seal by covering the head first with a nylon stocking. This makes it easy for the latex to slide over your head.

Grab the neck seal by putting both hands through the top opening and spread the neck seal by pulling against the palms of your hands. Do not dig your fingernails into the neck seal. Keep your thumbs on the outside of the seal.

Spread the neck seal and turn your head slightly to the side. Pull the neck seal over your head as you hold it spread open. Pull down on the seal and push up with your head.

Once the neck seal is over your head, adjust it so it lies flat against your neck. The edge of the seal should be turned up and should sit between one and two inches above your collar bone. The seal should be neat and even all the way around your neck with no hair or underwear trapped under it that might cause a channel for water to leak in.

GETTING READY TO DIVE WITH YOUR VIKING DRYSUIT



! CAUTION !

There must be nothing trapped under the edge of the wrist seals or neck seal or your drysuit will leak.

Closing the zipper

Your buddy should close the zipper on your drysuit for you. Do not attempt to close the zipper by yourself.

6. Hold your arms up at shoulder level and out in front of you in an arc. Have your buddy place one finger in the zipper tab and pull the zipper with a steady, even pull. Make sure your buddy understands that there must be no hair or underwear caught in the zipper.

! CAUTION !

There must be no foreign matter caught in the zipper. Anything caught in the zipper, such as hair or drysuit underwear, will cause it to leak and could cause it to break.

You can visually check the end of the zipper yourself by looking back over your shoulder. The zipper slide must be hard up against the stop. If it is open the slightest bit, the zipper will leak and you will get wet.

GETTING READY TO DIVE WITH YOUR VIKING DRYSUIT



1) Insert your feet into the legs of the suit.



2) Pull the suspenders over your shoulders.



3) Insert right arm in the right sleeve of the suit.



4) Insert left arm in the left sleeve of the suit.

GETTING READY TO DIVE WITH YOUR VIKING DRYSUIT

VIKING
THE WORLDWIDE
DIVING STANDARD



5) Insert your head through the neck seal.



6) Close the zipper fully.



7) Close the zip flap (if fitted).

PUTTING ON YOUR DRYSUIT - FRONT ENTRY, SELF DON STYLE

1. Follow instructions 1-5 in section *Putting on your drysuit - shoulder entry style*.

Closing the zipper and adjusting the crotch strap

2. Grasp the puller on the zipper at the left shoulder with the right hand, and pull the zipper downwards to the fully closed position, hard up against the rubber end stop. It may be necessary to use the left hand to support the zip to provide resistance against the right hand pulling the suit down with the zip.
3. Once the zip is fully closed, lay the zip flap down flat and line up the Velcro® hook and loop closures.
4. Connect the crotch strap together at the front of the suit.
5. Tuck the excess body material as flat as possible underneath the waistband.

GETTING READY TO DIVE WITH YOUR VIKING DRYSUIT

VIKING
THE WORLDWIDE
DIVING STANDARD



1) Insert your feet into the legs of the suit.



2) Pull the suspenders over your shoulders.



3) Insert right arm in the right sleeve of the suit.



4) Insert left arm in the left sleeve of the suit.

GETTING READY TO DIVE WITH YOUR VIKING DRYSUIT



5) *Pull the suit up and over your head.*



6) *Close the zip fully while supporting the upper material.*



7) *Close the zip flap.*



8) *Connect the crotch strap and tuck excess body material under the waist band.*

GETTING READY TO DIVE WITH YOUR VIKING DRYSUIT



PUTTING ON YOUR DRYSUIT - FINAL PREPARATIONS

Venting the drysuit before diving

When the zipper is closed there will normally be excess air trapped inside the drysuit. This excess air can make it awkward to walk while topside. To vent this air out of your suit, squat down and fold your arms across your chest. Push down on the top of the exhaust valve to manually vent the suit. You should hear and feel the air escaping from the valve. This action also provides a test of the exhaust valve.

!! WARNING !!

A buoyancy compensator is considered essential for drysuit diving. The buoyancy compensator is used for surface flotation and as a back-up buoyancy system. Do not use your drysuit unless you are wearing a buoyancy compensator. You must be certain that your BC does not interfere with the operation of your drysuit valves before you perform any open water dive.

Connecting and disconnecting the drysuit inflator hose

The low pressure inflator hose for your drysuit should be routed under your left arm to the inflator valve for your drysuit.

To connect the low pressure inflator hose, grip the hose just behind the fitting and pull back on the collar. The quick-disconnect fitting is spring loaded and should slide back easily. Hold the sleeve on the fitting back and slide the female end of the hose over the male end of the inflator valve. Push the sleeve toward the valve until it locks in position.

Test the inflator valve for proper function by pushing in on the inflator button. Air should flow through it easily.

To disconnect the hose, grab the end of the hose behind the fitting and push it toward the inflator valve.

As you hold the hose in this position, pull back on the locking outer sleeve. The hose should disconnect from the drysuit easily.

You can connect or disconnect the inflator hose whether the air in your tank is on or off. A small check valve inside the inflator hose will prevent air from leaking out of it when the hose is not connected to your suit.

!! WARNING !!

Make sure that your drysuit inflator hose easily reaches the inflator valve on your suit. There must be no bends or sharp kinks in the hose.

DIVING WITH YOUR DRYSUIT

!! WARNING !!

This drysuit owner's manual is not a substitute for drysuit instruction from a qualified instructor. Do not use your drysuit until you have practised and mastered practical drysuit diving skills in a controlled situation. Your practice must take place under the supervision of a certified diving instructor who is skilled in the use of drysuits.

Diving with a drysuit is a skill that you can only learn through proper practice under controlled conditions. It takes time to adapt to using a drysuit in open water.

Entering the water while wearing a drysuit

!! WARNING !!

Never jump in the water while wearing your drysuit unless you have vented all the excess air from the suit first.

Be sure to exhaust all the excess air in your drysuit before you enter the water. Be sure to partially inflate your buoyancy compensator before entering the water.

Conducting a buoyancy check

Your weighting should be checked by a qualified drysuit diving instructor. You should not dive with your drysuit until you have adjusted your weights to ensure that you will be able to complete a precautionary decompression stop at a depth of 15 feet (4.5 metres) with 500 psi (30 bar) or less of air in your tank. When properly weighted, you should be able to complete this stop while wearing no additional weight and with no air in your buoyancy compensator or drysuit.

! CAUTION !

Your weight requirements will change from diving in fresh water to salt water and with changes in your diving equipment.

! CAUTION !

Your weight requirements will change with changes in the amount of drysuit underwear worn under your drysuit.

In order to check your weighting, you will need to enter the water in a controlled environment, such as a swimming pool, fully equipped with the gear that you will use for open water diving. The tank must be full.

To start your check, begin by venting all the air from your buoyancy compensator. Next, vent all the air from your drysuit. To do this, hang vertically in the water in a head up position and open the exhaust valve on your suit completely by turning the head of the valve counterclockwise until it stops. Lift your left elbow until it is at shoulder height, keeping your hand below the level of your elbow. The air in the lower part of your suit will be forced out through the exhaust valve by the water pressure.

If you are neutrally buoyant, with your lungs full of air, you should float at eye level. After exhaling as much air as possible, you should begin to sink, but very slowly. Both conditions must be met for you to be considered neutrally buoyant.

As you dive and use up the air in your tank, you will become more buoyant. This is due to a decrease in the amount and weight of the air in your tank. To complete a precautionary decompression stop you must add enough weight to your belt at the beginning of the dive to compensate for the weight of the air used during your dive. After you have achieved neutral buoyancy during test, add whatever additional weight is required to compensate for the weight of air to be consumed.

DIVING WITH YOUR DRYSUIT



NOTE: Air weighs approximately 1.5 pounds (0.7 kg) per 20 cubic feet (566 litres). Therefore the amount of weight you should add after achieving neutral buoyancy will depend on how much air you will consume and can be estimated from the table below.

Tank capacity	50	70	80	90	100	cu. ft.
	1416	1982	2265	2549	2832	litres
Estimated additional weight needed	4	5	6	7	8	lbs
	1.8	2.2	2.7	3.1	3.6	kg

Prior to adding this additional weight, be sure to put enough air in your buoyancy compensator to make you positively buoyant on the surface.

! CAUTION !

Different tank volumes will require you to use different amounts of weight to compensate for the change in buoyancy from a full to empty tank.

When you are in the water in a vertical position with your head up, you will notice there is more pressure on your legs than your chest. This is a normal experience any time you are in the water with your head above your feet. This is known as underpressure.

When you are properly weighted and neutrally buoyant underwater, you should feel as though your drysuit is hugging your body gently but firmly all over. This sensation is markedly different than what it feels like when you are wearing a wetsuit. You won't notice this after a few dives and it is always less noticeable when your body is completely horizontal.

At the start of your dive

To start your dive, first vent all the air from your buoyancy compensator. Make sure the exhaust valve on your suit is completely open. To open the valve, turn the top portion counterclockwise until it stops rotating.

Lift your elbow until it is at your shoulder level but drop your hand below the height of your elbow. When you are underwater you will usually not be able to see the exhaust valve on your suit, but you should be able to hear the air escaping from it and feel the vibration caused by the air as it vents through the valve. Be sure that your buoyancy compensator is also completely empty of all air.

Making your descent

As you drop past 10 feet (3 metres), you will find that you start to descend faster. Leave the exhaust valve on your suit completely open; do not close it. Add air to your drysuit in short bursts to control your descent, push the inflator button for not more than a second or two at a time.

By introducing air into your suit with short bursts, you will control your buoyancy better and help prevent your inflator valve from freezing in cold water when water temperatures are below 45 °F (7 °C).

Add only enough air to your suit to prevent any uncomfortable squeeze. Adding too much air will cause your descent to stop.

To equalize the pressure in the boots of your drysuit, you must get air into the boots. This can only happen when you are lying parallel to the surface or in a slight feet-up posture.

!! WARNING !!

Never close your drysuit exhaust valve all the way while you are underwater. The valve has been designed to vent automatically whenever the valve is above the rest of your body. By closing the valve, you will trap more air in your suit, possibly leading to a loss of buoyancy control and a rapid ascent. Rapid ascents are extremely dangerous and can cause air embolism and/or decompression sickness, either of which can result in serious injury or death.

Surface swimming with your drysuit

!! WARNING !!

Do not use your drysuit for surface flotation. If you inflate your drysuit enough to give you positive buoyancy on the surface, this may put unwanted pressure on your neck. Increased neck pressure causes discomfort and can lead to blackout due to decreased blood flow to the brain. This can cause drowning.

Inflating your buoyancy compensator will allow you to swim comfortably on the surface without the need to inflate your drysuit.

Some divers prefer to close the exhaust valve on their drysuits while surface swimming to ensure buoyancy and prevent water leakage through the valve. Although you may close the valve completely while on the surface, be sure to open it completely before you dive again.

Buoyancy control

Proper buoyancy control is always essential in diving. Most divers find that with a bit of training, buoyancy control with a drysuit can be more precise than when using a wetsuit and buoyancy compensator.

ATTAINING NEUTRAL BUOYANCY AT DEPTH

When you reach your desired depth, add just enough air to your drysuit to make yourself neutrally buoyant. Skilled drysuit divers dive with the minimum volume of air in their drysuit. Proper weighting is a key element in the ability to dive with the minimum volume of air in your suit.

Underwater, use your drysuit to control your buoyancy. If you pick up items that have any significant weight during your dive, such as game or salvage items, use a lift bag to raise this additional weight to the surface. A small lift bag can be clipped to your goody bag if necessary. If the lift bag and goody bag become too buoyant, and you are unable to control it, just let it go to the surface by itself.

!! WARNING !!

If you must release an item you are raising to the surface, be aware that it may lose buoyancy if the lift bag breaks the surface. The lift bag may lose all buoyancy and the object may sink again. Watch carefully for the object as it sinks down through the water so that it does not hit you and causes injury.

Do not use your drysuit as a lifting device. If you try to use the buoyancy of your drysuit for lifting while you are wearing the suit, and you lose your grip on the object, you may become excessively buoyant. This may result in rapid ascent.

!! WARNING !!

Never use the buoyancy of your drysuit for lifting heavy objects underwater. If you lose your grip on the object you are lifting, you may experience a rapid ascent. Rapid ascents are dangerous.

As you breathe the air from your tank during the dive, you will gradually experience an increase in buoyancy. To decrease your buoyancy, vent air from your drysuit by raising your left arm.

For most single tank recreational dives, you can achieve neutral buoyancy at depth with the exhaust valve on your suit completely open. A diver who is more heavily weighted may need to partially close the exhaust valve so the drysuit will retain enough air to maintain neutral buoyancy.

!! WARNING !!

Under normal conditions you should not inflate your buoyancy compensator underwater while using your drysuit. Controlling two separate air bladders, i.e. the BC and the drysuit, is extremely difficult. It is easy in this situation to lose control of your buoyancy and suffer a rapid ascent. Rapid ascent is dangerous and may cause air embolism or decompression sickness, both of which can result in serious injury or death.

The only circumstances under which you should consider inflating your buoyancy compensator underwater is if your drysuit is damaged and will not hold air.

While diving, you may find small amounts of water entering your suit through the wrist or neck seals. If you turn your head sharply to the side, the tendons in your neck may create channels for water to enter your suit. This can also be a problem if you have prominent tendons in your wrists. These situations are not uncommon, but can be avoided with experience.

TRIM

In most situations in open water, when you are swimming underwater, you should be neither head up nor head down. When your body is horizontal underwater we call this “neutral trim”. When you have neutral trim and neutral buoyancy, you can move in any direction underwater with minimal effort. Some divers use ankle weights to help keep their legs down but this is not essential in most cases.

ASCENDING

At the end of your dive, be sure to check your drysuit exhaust valve before beginning your ascent. Make sure that the exhaust valve is completely open by turning the head of the valve counterclockwise until it stops.

Your ascent must be controlled and at the speed required by the dive computer or dive table you are using. As you start towards the surface, you will become positively buoyant because the air in your drysuit is expanding. To maintain control of your buoyancy, you need to vent air from the drysuit exhaust valve.

Your ascent should be slow enough that you can stop it at any time by merely exhaling.

!! WARNING !!

Your first few ascents in your drysuit should be made next to a weighted line that can be used to regain control of your ascent if needed.

Monitor your rate of ascent by watching your dive computer or timer and depth gauge. Always stay within the ascent rate limits of your dive computer or dive tables unless you are making an emergency ascent.

!! WARNING !!

Most dive tables and dive computers require ascent rates that are slower than 60 feet (18 metres) per minute.

To control your ascent, raise or lower your left elbow, which will raise or lower the exhaust valve on your suit.

If you are ascending too fast, raise your left arm higher to allow the exhaust valve to vent more air. If this action does not slow you adequately, push down on the top of the exhaust valve to activate the manual override.

DIVING WITH YOUR DRYSUIT



If you are negatively buoyant and find it difficult to ascend, lower your left arm and add a bit of air to your drysuit to increase your buoyancy. Once you start to ascend, be ready to vent air through the exhaust valve to maintain control of your ascent.

Be prepared to stop your ascent at any moment. Control your rate of ascent so that you can make the recommended precautionary decompression stop at a depth of 10-15 feet (3-4.5 metres). Once you have reached the surface, partially inflate your buoyancy compensator before you swim back to the beach or the boat.

EMERGENCY PROCEDURE SKILLS

!! WARNING !!

The emergency procedure skills described in this manual should be practised in a controlled environment, such as a swimming pool, under the supervision of a qualified drysuit diving instructor. This manual is not considered a substitute for pool and open water training in the use of a drysuit. Knowing the procedures for a drysuit emergency is not enough. You must be able to perform the emergency procedure skills. Like any skills, you can only learn drysuit skills through instruction and practice.

You will want to master the following emergency skills (unless otherwise noted) before you use your drysuit in open water.

Recovering from an inverted position

If you are positively buoyant in you drysuit and turn upside down, you will find yourself drifting towards the surface feet first. It is essential that you regain control immediately since air cannot be vented from your drysuit when you are upside down.

In a situation where you are close to the bottom and find yourself upside down, use the following procedure to right yourself and regain control:

- 1) Swim hard towards the bottom.
- 2) Push off the bottom with your hands.
- 3) Roll your body to an upright position.
- 4) As soon as you are upright, vent your drysuit through the exhaust valve.

In mid-water, use a slightly different procedure:

- 1) Swim hard towards the bottom.
- 2) Bend forward at your waist.
- 3) Roll to an upright position.
- 4) Immediately vent your drysuit through the exhaust valve once you are upright.

If you are unable to recover to an upright position and are in an uncontrolled ascent, flare your body to reduce the speed of your ascent. Spread your arms and legs out away from your body, and try to get your fins parallel to the surface of the water. Try to slow your ascent as much as possible by creating drag and keep exhaling.

!! WARNING !!

Flaring is a last ditch procedure to be used in an emergency only. Do not practise this procedure unless you are under the supervision of a qualified drysuit diving instructor. Rapid ascents are dangerous and can cause air embolism or decompression sickness. Either of these accidents can result in serious injury or death.

Inflator valve stuck open

If the inflator valve on your drysuit becomes stuck in the open position, immediately disconnect the low pressure inflator hose from the valve and simultaneously vent any excess air through the exhaust valve. Be sure to practise this skill when you are wearing gloves. You must be able to disconnect the hose quickly and easily.

If you can't remember which direction to turn the exhaust valve to open it (counterclockwise), you can still manually vent your suit through the valve. Lift your elbow until it is the highest point on your body and push down on the top of the valve. Air will vent from your drysuit.

In a situation where you are unable to vent enough air through the exhaust valve, you can also vent air by opening your wrist or neck seal to allow air to escape from your suit. Of course, when you do this, water will enter your drysuit.

If you are still unable to vent sufficient air from your suit to slow your ascent, and you are experiencing an uncontrolled ascent, flare your body to reduce your speed through the water. Spread your arms and legs away from your body, move your fins parallel to the surface of the water, and slow your ascent by creating drag. Be sure to keep exhaling as you ascend.

! CAUTION !

If you continue to push down on the top of the exhaust valve after all the air is vented from your suit, water may enter your drysuit.

Inflator valve stuck closed

If the inflator valve is stuck in the closed position, terminate your dive at your first opportunity and do not descend any further. You may need to use your buoyancy control device to return to the surface. Be sure to vent any expanding air from your suit to control your ascent.

Water leaking through the exhaust valve

If the exhaust valve is allowing water to enter your suit, the drysuit will not hold air properly. Abort your dive immediately. Use your buoyancy control device as needed to help control your buoyancy and return to the surface immediately.

Exhaust valve stuck open

If the exhaust valve is stuck open, your drysuit will not hold air properly. Water will probably enter your drysuit through the open valve. If the exhaust valve is stuck open, end your dive immediately. Use your buoyancy control device as needed to return to the surface.

Exhaust valve stuck closed

If the exhaust valve sticks in the closed position, you will be unable to vent air properly from your drysuit. This may result in an uncontrolled ascent.

If the exhaust valve is stuck in the closed position, vent air from the drysuit by opening your neck or wrist seal(s). If you use this technique, water will enter the suit.

If sufficient air cannot be vented and you are experiencing an uncontrolled ascent, flare your body to reduce your speed through the water. Spread your arms and legs away from your body and position your fins parallel to the surface of the water. Slow your ascent by creating as much drag as possible. Be sure to keep exhaling as you ascend.

Slow air leak through the inflator valve

If you discover that your inflator valve is leaking air into your suit, disconnect the low pressure inflator hose and terminate your dive immediately. Ascend, venting air through the exhaust valve as you normally would.

Flooded drysuit

In the event of a zipper failure, a major tear in the suit, or a seal failure, your drysuit may flood. If your drysuit is flooded, use the following procedures:

- 1) Inflate your buoyancy compensator to establish positive buoyancy.
- 2) Position the leak as low as possible to minimize air loss.
- 3) Perform a controlled ascent.
- 4) Exit the water immediately after surfacing.

! CAUTION !

Practise the emergency skills listed in this chapter under the direct supervision of a qualified drysuit diving instructor. If you practise in a swimming pool, be sure to adjust your insulation for the water temperature.

If you are unable to establish positive buoyancy by using your drysuit or inflation of your buoyancy compensator, at that point you should drop your weight belt. Keep in mind that drysuits rarely flood, although a small amount of water may seem like a catastrophic failure. Make every effort to ascend using your buoyancy compensator before dropping your weight belt.

If your suit feels flooded, but in fact is not, inflating your buoyancy compensator and ditching your weight belt could result in extreme positive buoyancy. Depending on the volume of your buoyancy compensator, and the amount of weight you wear, you could be as much as 100 pounds (45 kg) positively buoyant. This much buoyancy would be nearly impossible to control and would result in an extremely rapid uncontrolled ascent.

!!! DANGER !!!

Ditching your weight belt after inflating your buoyancy compensator can result in serious injury or death due to rapid ascent. Do not ditch your belt unless you have already inflated your buoyancy compensator and are still unable to ascend and death is imminent.

Dealing with a dropped or lost weight belt

! CAUTION !

Read and study the emergency procedures for a dropped or lost weight belt until you understand them. Do not practise these skills except under the direct supervision of a qualified diving instructor.

If you drop or otherwise lose your weight belt:

- 1) Attempt to recover the weight belt. If you are unable to grab the belt...
- 2) Grab hold of any other stationary object — the anchor line or a rock — and vent your suit.
- 3) If you are still unable to control your ascent, get into a flared body position.
- 4) Remember to continue to exhale as you ascend.

STAYING COMFORTABLE BETWEEN DIVES



STAYING COMFORTABLE BETWEEN DIVES

When the weather is warm, you will probably want to unzip your suit while you are out of the water between dives. If you are still too warm, you may need to remove the upper part of the suit or remove it and your drysuit underwear completely.

REMOVING YOUR VIKING™ DRYSUIT - REAR ENTRY STYLE

You must remove all your other scuba equipment before removing your drysuit.

If the outside of your drysuit got dirt or sand on it after the dive, wash this material off before you remove your suit. Be sure to wash the waterproof zipper thoroughly before opening the suit if it is coated with sand or dirt.

Have your buddy unzip your suit completely before attempting to remove it.

! CAUTION !

The zipper on your drysuit must be completely open before you attempt to remove your drysuit. Failure to fully open the zipper can lead to damage or failure of the zipper.

Removing the neck seal

Make sure your suit is pulled up as high on your body as possible. Reach through the neck seal opening with both hands. Spread the neck seal by pulling against the palms of your hands. Never dig your fingernails into the neck seal.

While you pull the neck seal, use your arms to lift as you tuck your head to your chest. Gently pull the seal over your head.

Smaller divers sometimes need assistance in removing their neck seals. If you need help, have your buddy place one hand on your shoulder to brace you and with the other hand grab the suit at the opening for the zipper. They should then pull the suit towards them as you lift at the same time. Make sure they understand that they must not put undue stress on the drysuit zipper.

REMOVING YOUR VIKING™ DRY SUIT



Removing the wrist seals

Insert the index and middle fingers of your left hand under the right wrist seal on your suit. Slide your fingers along the inside of your wrist, keeping your fingernails against the inside of your wrist and away from the seal.

When your fingers are past the wrist seal, grab the sleeve of the suit between your fingers and thumb and pull the seal over your wrist. Pull your arm out of the suit.

Repeat this operation for your opposite seal using your right hand.

Removing the suit from your body

Slide the suspenders off your shoulders and fold the suit down to your waist. Sit down to remove the legs of the suit.

REMOVING YOUR VIKING™ DRY SUIT - FRONT ENTRY, SELF DON STYLE

1. First undo the external crotch strap. Pull excess body material up as high as possible.
2. Unzip your suit using left hand initially, while holding the suit material with right hand. When the zipper is approximately half way up, switch to undoing with right hand, until the zipper is fully open.
3. Then follow removal of neck seal and wrist seals from shoulder entry instructions.

TROUBLESHOOTING YOUR DRYSUIT

There are many different ways that a drysuit can leak if it is improperly maintained or used carelessly. If your suit is leaking, check the following:

I. Zipper leaks

- a) Zipper not fully closed.
- b) Damage or failure of zipper.
 - 1) Zipper damaged due to failure to open fully when dressing or undressing.
- c) Sand, dirt or salt caught in the zipper when opened or closed.
- d) Improper or inadequate lubrication of zipper.
- e) Underwear caught in zipper when closed.
- f) Overstressing the zipper.
- g) Failure of zipper due to age or heavy use.

II. Seal leaks

- a) Drysuit underwear caught under edge of seal.
- b) Hair caught under seal.
- c) Wrinkles or folds in seal.
- d) Improper adjustment of seal in relation to tendons.
- e) Age of seal leading to cracks or tears.
- f) Overtrimming.

III. Valve leaks

- a) Dirt, sand or debris caught in valve.
- b) Improper adjustment of exhaust valve.
- c) Exhaust valve stuck open.
- d) Minor leaks when valve is closed.
- e) Valve not properly fastened on suit.
- f) Valve parts worn through heavy use or age.

IV. Leaks in fabric of suit

- a) Failure of seams or chafing.
- b) Tears, punctures or splitting of material.
 - 1) Cuts due to sharp objects.
- c) Delamination of material with age, use or exposure to chemicals.

CLEANING

!! WARNING !!

It is essential that the drysuit is cleaned after every dive in order to remove any biological or chemical contaminants from the surface which may affect the lifespan of the suit.

With proper maintenance, your VIKING™ drysuit will give you many years of diving.

When you finish diving for the day, rinse the outside of your suit thoroughly with fresh, clean water. Be sure to remove any dirt, sand or salt that may have dried on the suit.

Swimming pools contain chlorinated water which should be regarded as chemically contaminated for the purposes of cleaning a suit. Please rinse the dry suit thoroughly with clean water after each immersion in this environment.

If the suit has been subjected to chemical or biological contamination, then we suggest the following cleaning options should be applied:

- Simple Green “D” is an effective degreaser which is non-toxic, and biodegradable
- A 5-7 % bleach solution will kill most biological contaminants
- Warm water with a **non-oil based** soap may be used for light contamination

Pay particular attention to the zipper and the valves. Rinse both the exhaust valve and the inflator valve with running water. The preferred method to rinse the inflator valve is to connect it to an air supply and operate the valve while flushing it with fresh water. The air pressure will help keep sand and debris from entering the valve seals.

!! WARNING !!

Drysuit valves must be carefully cleaned after every use with the same attention that should be used for a regulator. Inflator valves may stick open or shut due to lint, dirt or hair in the valve.

CARE AND MAINTENANCE OF YOUR DRYSUIT



If the inside of your drysuit has become wet, either because the suit leaked or you perspired inside the suit, rinse the inside also. Feel all the way down into the boots of the suit to be sure the suit is completely dry. If there is dampness only in the boots, this is probably due to sweat and should be rinsed out.

Use a mild solution of soap and water to wash the latex seals on your drysuit after every dozen or so dives. Body oils from your skin will shorten the life of your latex seals.

DRYING A SUIT

After you have rinsed the suit, open the zipper and hang the suit by the boots over a line or drying rack in a shady spot.

! CAUTION !

Never leave your drysuit in the sun.

! CAUTION !

Do not use elevated heat to dry a vulcanized rubber drysuit. As a rule of thumb every 10 degrees increase in temperature will double the rate of ageing.

Do not dry a suit where there is an elevated temperature. This may shorten the life of the suit. Do not dry a suit where there are devices that produce ozone such as electric motors, heaters, fluorescent lights etc.

When the drysuit is completely dry on the outside, feel inside the suit all the way down to the bottom of the boots. Any moisture inside the suit must be dry before the suit can be stored. Turn the suit inside out if needed so it will dry, too.

After your suit has dried completely and has been turned right side out, apply talcum powder to both sides of the latex seals. Close the zipper and lubricate it with either beeswax or paraffin wax.

Clean the drysuit zipper at least every 90 days with an old toothbrush and a dilute solution of soapy water.

MORE ON ZIPPER CARE

The drysuit zipper seals using the inside teeth and rubber sealing surfaces. As you might expect, this sealing surface requires some special care and attention. How long your zipper lasts and how well it works will depend on how good you are at taking care of your zipper. The majority of zipper problems are caused by either a lack of maintenance or improper maintenance. To get the most life out of your drysuit zipper we recommend the following procedures:

- 1) Before diving, close the zipper and lubricate it with zip lube, beeswax or paraffin wax on the outside teeth only.
- 2) Prior to each dive, make sure the inside teeth and sealing surfaces on your zipper are clean. If they are dirty, clean them with a toothbrush and soapy water.
- 3) If the zipper is covered with sand or dirt after diving, clean it with a toothbrush and fresh water before you try to open the zipper.
- 4) Whenever your buddy opens or closes your zipper, they must take care to avoid catching underwear material in the zipper as this will damage it in most cases and will prevent the zipper from sealing properly if undetected.
- 5) Always store your drysuit rolled up with the zipper open. This will reduce the stress on the zipper.
- 6) Inspect the zipper for teeth that are broken, missing or out of alignment. These conditions indicate zipper damage and must be inspected by a VIKING™ dealer before you use the suit again.

Never use any aerosol lubricants, such as silicone spray, on your zipper. Never lubricate the inside teeth of your zipper because wax and dirt will accumulate on the teeth. Any foreign matter that sticks on this sealing surface will prevent the zipper from sealing properly.

CARE AND MAINTENANCE OF YOUR DRYSUIT



FOLDING AND STORING YOUR DRYSUIT

Be sure the zipper is open on your drysuit before you store it.

Lay the suit out on its back on the floor. Turn the feet of the suit in towards each other and roll the suit from the boots up. Place the suit in its bag and store in a cool, dry place, away from devices that produce ozone, such as electric motors, heaters, etc.

! CAUTION !

Never store your rubber drysuit on a hanger.

! CAUTION !

Ozone will shorten the life of latex seals.

! CAUTION !

Extreme cold will cause latex seals to become brittle.

DISPOSAL OF DRYSUIT

All suits that are damaged beyond repair and cannot be made to pass all inspections and checks described above, must be taken out of service and disposed of.

The proper method of disposal will depend on local regulations. In general the suit should be treated as rubber waste and as such the proper method of disposal is normally incineration or landfill.

For suits that are contaminated, local regulations for the contaminants in question must be taken into account.

GLUING, GENERAL RULES

Wherever possible, drysuit repairs should be undertaken by a qualified drysuit repair service. If the drysuit owner undertakes any repairs, the following procedures should be followed to ensure that proper techniques are employed.

Do not inhale glue or hardener. See warnings in this manual and on glue container.

Adhesives

Use only glue recommended by Ansell. Other types of glue may damage the suit material.

Due to health and safety and transport limitations, Ansell is not able to supply adhesives particularly with accelerators. It may be necessary to source similar adhesives locally.

Adhesives are changing all the time, so please check with customer services which adhesives are applicable to suit materials such as polyurethane, nylon, cordura, polyester and VSN.

Adhesives such as Bostik 2402, Tivofix 8000 or similar 2-part adhesives work well for attaching seals etc. to trilaminate materials.

For minor repair (patching), use glue (polyurethane suits) or vulcanization solution (rubber suits) supplied with the VIKING™ repair kit.

Rubber patches and rubber solution may also be applied inside most trilaminate suit materials.

Please consult the following chart which lists all of the adhesives and solvents currently used during the manufacturing process, and also for after market repairs and patching. This is by no means an exhaustive reference, but does include adhesives which are known to be effective.

Adhesives and solvent chart for VIKING™ dry suits

SUIT STYLE	USED IN MANUFACTURING		
	SOLVENT/CLEANER	ADHESIVE	HARDENER
PRO, HD, PROTECH			
Latex components	Heptane	91 rubber	Desmodur
Neoprene components	Heptane	91 rubber	Desmodur
Rubber rings	Heptane	91 rubber	Desmodur
Bayonet rings	Heptane	Bostik NE 486	Bostikure D
Zipper	N/A	N/A	N/A
Pockets	Heptane	92 rubber	Desmodur
HDS			
Latex components	MEK	Bostik NE 486	Bostikure D
Neoprene components	MEK	Bostik NE 486	Bostikure D
HDS Rubber rings	MEK	Bostik NE 486	Bostikure D
Zipper	N/A	N/A	N/A
Pockets	MEK	Bostik NE 486	Bostikure D
VTS, SRS, WRS			
Latex components	Apollo wash	Evostik 3140	N/A
Neoprene components	Apollo wash	Evostik 8000	Bostik Acc F
Rubber rings	Apollo wash	Evostik 8000	Bostik Acc F
Bayonet rings	Apollo wash	Evostik 8000	Bostik Acc F
Zipper	Apollo wash	Evostik 8000	Bostik Acc F
Pockets	Apollo wash	Evostik 8000	Bostik Acc F
VSN			
Latex components	Apollo wash	Evostik 3140	N/A
Neoprene components	Apollo wash	Evostik 8000	Bostik Acc F
Rubber rings	Apollo wash	Evostik 8000	Bostik Acc F
Bayonet rings	Apollo wash	Evostik 8000	Bostik Acc F
Zipper	Apollo wash	Evostik 8000	Bostik Acc F
Pockets	Apollo wash	Evostik 8000	Bostik Acc F
HAZTECH			
Latex components	MEK	Bostik NE486	Bostikure D
Neoprene components	MEK	Bostik NE486	Bostikure D
HDS Rubber rings	MEK	Bostik NE486	Bostikure D
Bayonet rings	MEK	Bostik NE486	Bostikure D
Zipper (welded)	N/A	N/A	N/A
Pockets (welded)	N/A	N/A	N/A

SUIT STYLE	AFTERMARKET REPAIRS		
	SOLVENT/CLEANER	ADHESIVE	HARDENER
PRO, HD, PROTECH			
Latex components	Heptane	91 rubber	Desmodur
Neoprene components	Heptane	91 rubber	Desmodur
Rubber rings	Heptane	91 rubber	Desmodur
Bayonet rings	Heptane	91 rubber	Desmodur
Zipper	Heptane	91 rubber	Desmodur
Pockets	Heptane	91 rubber	Desmodur
HDS			
Latex components	MEK	Trell. 724	Desmodur
Neoprene components	MEK	Trell. 724	Desmodur
HDS Rubber rings	MEK	Trell. 724	Desmodur
Zipper	MEK	Trell. 724	Desmodur
Pockets	MEK	Trell. 724	Desmodur
VTS, SRS, WRS			
Latex components	Heptane	Trell. 724	Desmodur
Neoprene components	Heptane	Trell. 724	Desmodur
Rubber rings	Heptane	Trell. 724	Desmodur
Bayonet rings	Heptane	Trell. 724	Desmodur
Zipper	Heptane	Trell. 724	Desmodur
Pockets	Heptane	Trell. 724	Desmodur
VSN			
Latex components	Heptane	Trell. 724	Desmodur
Neoprene components	Heptane	Trell. 724	Desmodur
Rubber rings	Heptane	Trell. 724	Desmodur
Bayonet rings	Heptane	Trell. 724	Desmodur
Zipper	Heptane	Trell. 724	Desmodur
Pockets	Heptane	Trell. 724	Desmodur
HAZTECH			
Latex components	MEK	Trell. 724	Desmodur
Neoprene components	MEK	Trell. 724	Desmodur
HDS Rubber rings	MEK	Trell. 724	Desmodur
Bayonet rings	MEK	Trell. 724	Desmodur
Zipper (welded)	N/A	N/A	N/A
Pockets (welded)	N/A	N/A	N/A

REPAIRING A DRYSUIT



Patching

- Rubber suits (except HDS): Use rubber vulcanizing adhesive supplied with the repair kit.
- HDS rubber suits: Use Trell. 724 + Desmodur to attach rubber patches.
- VSN, Cordura, Polyester & HAZTECH materials: Use Black Witch adhesive with rubber patches.

Gluing preparations

- Ensure damaged area is dry. Clean the surface to be glued.
- Remove remains of old loose glue, oil and grease.
- Thoroughly sand down all new drysuit parts where they will be glued.
- Clean sanded area with heptane or white gas (does not apply to textile based fabric).

How to mix the VIKING™ 2-component glue

Immediately before use, the hardener should be mixed thoroughly with the glue. Add 1 part hardener to 10 parts glue. (Use the measuring cup provided.) The mixed glue can be used only as long as it is fluid, approximately 2 hours.

Gluing

- Apply a thin layer of glue on both surfaces to be glued. Let dry for 15 minutes.
- Apply a second layer of glue and let dry a minimum of 15 minutes or until tacky.

Neutralizing

- Neutralize excessive glue by applying unscented talcum powder.

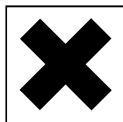
Curing

- Curing time will vary with room temperature. At 68 °F (20 °C) a minimum of 60 minutes is required, but the repair area should not be stressed for 3 hours and will be fully cured in 24 hours.
- If possible, avoid using the suit for 24 hours after a major repair.

!! WARNING !!

The glue and hardener may be harmful to your health by inhalation or skin contact or contact with your eyes. Read warning note below and follow the instructions on the kit.

!! WARNING !!



Hardener – Harmful

Contains Diphenylmethane - 4,4 - Diisocyanate and Ethyl-acetate. Contains Isocyanates; See information supplied by the Manufacturer. Harmful by inhalation. Irritating to eyes, respiratory system and skin. May cause burning sensation by inhalation. In case of contact with eyes rinse immediately with plenty of water and seek medical advice.

In case of accident or if you feel unwell, seek medical advice immediately. (Show label where possible.) Use only in well ventilated conditions.



Glue – Harmful – Highly flammable

Harmful by inhalation.

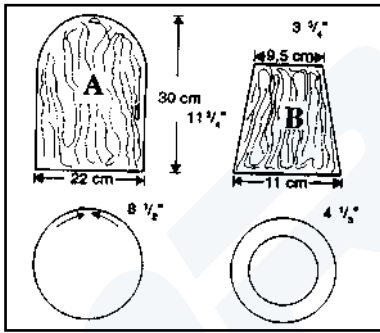
Contains Toluene and Butanone. Irritating to eyes and respiratory system. Keep container in a well ventilated place. Keep away from sources of ignition – No smoking. Do not breathe fumes. Avoid contact with eyes. Do not empty into drains. Take precautionary measures static discharges.

REPAIRING A DRYSUIT

Tools for repairs

These wooden tools are handy equipment for major repairs of latex parts:

- A. Cylinder with spherical top: For exchange of latex hoods and neckseals.
- B. Topped cone: For exchange of latex cuffs. All measurements in cm and inches.



PRESSURE TESTING

To determine the position of a leak/damaged area of the suit, carry out a pressure test as follows:

1. Seal openings

Seal neck opening, by for example placing a suitable-sized ball in the neck seal. Make sure the seal stretches and grips the ball.

Seal cuffs, by for example placing an empty plastic bottle in each of the cuffs making sure the latex grips the bottles.

2. Inflate and find leaks

Inflate the suit and locate the leak by using soapy water or by partial submergence of the suit in water. Mark the leak with a chalk before deflating the suit.

3. Verify repairs

After repairs, allow 3 hours for curing, and then carry out another pressure test to ascertain the integrity of the suit. Most adhesives do not reach full cure until approximately 24 hours from application.

! CAUTION !

***Risk of damage to the suit material due to over inflating.
Do not over inflate the suit.***

PATCHING

1. Locate the leak

Carry out a pressure test as described in *Pressure testing*.

2. Cleaning/Sanding

The suit must be dry.

Wash hands; oil and grease must be removed. Clean damaged area by rubbing with sand paper and remove loose particles. Apply three layers of glue, allowing 15 minutes drying time per layer.

3. Patching

Choose a suitable sized patch and remove the backing. Apply vulcanization solution (rubber suits) or two layers of glue (polyurethane suits) on the patch and the suit. Allow to dry and apply the patch to cover the damaged area.

Rubber patches will also work on some trilaminate materials, such as polyester and VSN. They may not work so well on Nylon.

Patch trilaminate suits on the inside surface. Use rubber solution.

4. Fixing the patch

Use a roller over the glued area to press out any air bubbles and to make sure the surfaces are firmly bonded. Pay special attention to the areas where the glued parts cross over tape.

5. Talcum powder (rubber suits only)

Neutralize excessive solution with unscented talcum powder.

The mix of talcum powder and rubber may aggregate the risk of latex allergic reactions. By using unscented talcum powder for neutralizing, this risk is reduced.

6. Verify repairs

After repairs, allow 3 hours for curing, then carry out a pressure test to ascertain the integrity of the suit, as described in *Pressure testing*.

EXCHANGE OF LATEX CUFFS

Wherever possible, drysuit repairs should be undertaken by a qualified drysuit repair service. If the drysuit owner undertakes any repairs, the following procedures should be followed to ensure that proper techniques are employed.

Gluing preparations

1. Remove the tape

On suits with tape around the latex cuffs, remove tape by using cleaning solvents. Use heptane or white gas.

!! WARNING !!

Risk of eye injury from contact with solvent. Wear proper eye covers to protect your eyes.

2. Remove the cuff

Pull latex until old glue releases.

3. Sand new latex

Sand new latex 3/4" (20 mm) on inside, and when using tape, 1/2" (12 mm) on outside as well.

Sand also suit sleeve 1" (25 mm).

4. Clean with solvent

Clean all surfaces to be glued. Use heptane or white gas.

Gluing

1. Apply two layers of glue

Apply two layers of glue with 15 minutes drying time for each layer, both on the inside of the new latex cuff and on the outside of the sleeve.

Trilaminar materials such as Nylon, Cordura, or VSN will require more layers of glue as it sinks into the surface.

REPAIRING A DRYSUIT



2. Attach the new latex cuff

Use a bottle or a round piece of wood inside the sleeve as a form to ease the installation of the new latex cuffs.

Apply the new latex cuff. Avoid stretching the latex cuff. Attach by using two opposite points and work your way around one side at a time. (Pull it loose and begin again if it becomes uneven).

There must be no folds or creases, the latex should lie smoothly along the cuff.

When the latex is properly attached, secure it by pressing firmly with the roller.

3. When using tape, apply two coats of glue to the area it will cover, on the outside. Trilaminate materials may need more layers of adhesive.

4. Apply tape

Apply the tape half on suit and half on latex cuff to cover the joint between latex and suit material. Smooth with a roller. Overlap cloth tape.

5. Apply talcum powder

Neutralize excessive glue with unscented talcum powder, especially on the inside of the latex part.

The mix of talcum powder and rubber may aggregate the risk of latex allergic reactions. By using unscented talcum powder for neutralizing, this risk is reduced.

6. Verify repairs

After repairs, allow 3 hours for curing, then carry out a pressure test to ascertain the integrity of the suit, as described in the section on *Pressure testing*.

SERVICE

Let an authorised VIKING™ dealer service your drysuit, valves, inflator hose, zipper and seals on regular basis and for more complicated repairs. At least one service per year must be undertaken, but more frequently if the suit is in heavy or extraordinary use.

! CAUTION !

Risk of severe damage to the drysuit or its equipment leading to malfunction, if the suit is not properly serviced. Service must be undertaken, even if the suit is not in regular use.

CONTAMINATED WATER DIVING

Foreword

Our goal with this chapter is to provide you with the information on VIKING™ dry-suits needed to make informed decisions to help ensure protection for the diver in contaminated water diving environments. In certain circumstances, your best decision may be not to dive.

!! WARNING !!

When possible, diving in contaminated water should be avoided. If you are not trained for this type of diving operation, do not attempt it.

The information in this chapter does not provide all the information or training needed to plan a dive operation. The diving supervisor and the diver must take responsibility for the safety of the diver, based on a risk assessment of the actual conditions at the dive site.

The data contained here has been developed from tests conducted under controlled laboratory conditions, not in actual diving environments. The user must determine the applicability of these test results for the actual exposure anticipated.

The test results are specific for VIKING™ materials and components. Do not apply these results to the performance of other manufacturers' diving equipment.

Suggested diving systems

The following diving systems offer varying amounts of protection. There are uses, environments and chemicals for which these systems are unsuitable.

The list shown below is by no means exhaustive. There are more combinations of equipment which may be suitable according to the level and type of contamination encountered. For instance, water which is biologically contaminated, may need a lower level of protection than water which is chemically contaminated.

It is the responsibility of the diving supervisor and the diver to review the available data and verify that the system is appropriate for the intended use.

VIKING™ HDS OR VIKING™ HD

- Attached vulcanized rubber dry hood (Magnum or Turbo)
- Attached cuff ring system or VIKING™ Bayonet glove system
- Attached dry gloves (see below)
- Full-face mask with positive pressure system and double exhaust valves

VIKING™ HDS WITH ATTACHED HELMET YOKE AND VALVES

- Attached cuff ring system or VIKING™ Bayonet glove system
- Attached dry gloves (see below)
- Demand helmet and double exhaust valves in the suit

VIKING™ HDS OR VIKING™ HD WITH ATTACHED HELMET YOKE (NO NECK SEAL OR VALVES)

- Attached cuff ring system or VIKING™ Bayonet glove system
- Attached dry gloves (see below)
- Free Flow helmet (air hat)

CONTAMINATED WATER DIVING



VIKING™ HAZTECH

- Attached HDS Magnum hood
- Attached HDS cuff/glove rings or VIKING™ Bayonet glove system
- Attached dry gloves (see below)
- Full face mask with positive pressure system and double exhaust valves

VIKING™ HAZTECH WITH ATTACHED HELMET YOKE AND VALVES

- Attached HDS cuff/glove rings or VIKING™ Bayonet glove system
- Attached dry gloves (see below)
- Demand helmet and double exhaust valves on the suit

VIKING™ HAZTECH WITH ATTACHED HELMET YOKE (NO NECK SEAL OR VALVES)

- Attached HDS cuff/glove rings or VIKING™ Bayonet glove system
- Attached dry gloves (see below)
- Free Flow helmet (air hat)

Gloves

For contaminated water diving, the HDS rubber mittens (2-finger and 3-finger rubber mittens) are recommended. Being made from the same material, they offer the same protection as the VIKING™ HDS suit.

VIKING™ also offers a range of gloves suitable for use in light contaminated water situations. The range includes: Latex 5-finger gloves, “Goodgrip” textured latex gloves, Viton®/Butyl rubber gloves and Nitrile/Chloroprene rubber gloves. These must be worn in conjunction with suitable glove liners, and also in conjunction with the VIKING™ cuff ring or bayonet ring system.

It is up to the diver to determine the suitability of each style of glove for the intended diving operation.

EN 14225-2 optional hazmat “HZ” and micro-organism “BIO” protection approval

All dry diving suits need to be tested and certified to EN 14225-2. Suits that are claimed to offer some degree of protection from chemicals and micro-organisms need to be tested against the additional requirements of EN 14225-2 for these kinds of protection. The symbols HZ and BIO are used to designate chemical and micro-organism protection respectively.

For testing of the BIO option, the standard EN 14226 Performance requirements and test methods for protective clothing against infective agents, is applied. From this standard the following tests are called up.
 ISO 16603, a penetration resistance test under pressure using synthetic blood.
 ISO 16604, a penetration resistance test for blood-borne pathogens using a bacteriophage.
 ISO 22610, a wet bacterial penetration resistance test.

All dry diving suits listed below are approved to the protection from micro-organisms (BIO) option of EN 14225-2.

For HZ testing, the table of chemical groups is as follows:

Category	Symbol	Chemical	Cas-nr.	Chemical family
Acids	Ac	H ₂ SO ₄ 50 % (aqueous)	7654-93-9	Inorganic acid
Bases	Bs	NaOH 50 % (aqueous)	1310-73-2	Alkaline solution
Polar solvent	Ps	Isopropanol	67-63-0	Alcohol
Hydrocarbon	Hc	Toluene 0.05 % (aqueous)	108-88-3	Aromatic hydrocarbon
Fuel oils	F	Liquid B - 70 % iso-octane/30 % toluene		Petroleum
		Liquid F - 80 % paraffin oil/20 % 1-methyl naphthalene		Diesel/aviation fuel
NOTE: The fuel oils B and F are as described in ISO 1817:1999				

CONTAMINATED WATER DIVING



The tests are permeation testing (ISO 6529), and involve the suit material and “critical interfaces” including zipper. Seams are also tested. Suits are then classified with a protection index as follows (the minimum acceptable breakthrough time is 20 minutes):

Low protection index:	20-60 minutes
High protection index:	> 60 minutes

The test results are given below.

Permeation test results

VIKING HDS				
CHEMICAL	PERMEATION BREAKTHROUGH TIME (MINUTES)			EN 14225-2 PROTECTION INDEX
	MATERIAL	SEAM	ZIPPER	
Sulphuric acid, H ₂ SO ₄ 50 % (aqueous)	> 480	> 480	> 480	High
Sodium hydroxide, NaOH 50 % (aqueous)	> 480	> 480	> 480	High
Isopropanol	> 480	> 480	> 480	High
Toluene 0.05 % (aqueous)	> 480	> 480	> 480	High
Liquid B	127	126	48	High/Low
Liquid F	> 480	> 480	> 480	High

VIKING HD				
CHEMICAL	PERMEATION BREAKTHROUGH TIME (MINUTES)			EN 14225-2 PROTECTION INDEX
	MATERIAL	SEAM	ZIPPER	
Sulphuric acid, H ₂ SO ₄ 50 % (aqueous)	> 480	> 480	> 480	High
Sodium hydroxide, NaOH 50 % (aqueous)	> 480	> 480	> 480	High
Isopropanol	> 480	> 480	> 480	High
Toluene 0.05 % (aqueous)	> 480	> 480	> 480	High
Liquid B	42	38	48	Low
Liquid F	309	135	> 480	High

VIKING PROTECH/COMBAT BE NAVY				
CHEMICAL	PERMEATION BREAKTHROUGH TIME (MINUTES)			EN 14225-2 PROTECTION INDEX
	MATERIAL	SEAM	ZIPPER	
Sulphuric acid, H ₂ SO ₄ 50 % (aqueous)	> 480	> 480	> 480	High
Sodium hydroxide, NaOH 50 % (aqueous)	> 480	> 480	> 480	High
Isopropanol	> 480	> 480	> 480	High
Toluene 0.05 % (aqueous)	> 480	> 480	> 480	High
Liquid B	48	32	48	Low
Liquid F	355	121	> 480	High

VIKING HAZTECH						
CHEMICAL	PERMEATION BREAKTHROUGH TIME (MINUTES)					EN 14225-2 PROTECTION INDEX
	MATERIAL	SEAM	BOOT¹ SEAM	HOOD SEAM²	ZIPPER	
Sulphuric acid, H ₂ SO ₄ 50 % (aqueous)	235	254	390	> 480	336	High
Sodium hydroxide, NaOH 50 % (aqueous)	> 480	> 480	> 480	> 480	> 480	High
Isopropanol	116	100	140	140	140	High
Toluene 0.05 % (aqueous)	> 480	> 480	> 480	> 480	> 480	High
Liquid B	43	47	62	63	56	Low/High
Liquid F	> 480	> 480	> 480	> 480	> 480	High

¹ Neoprene boot
² HDS Turbo rubber hood, HDS Magnum rubber hood and yoke seams

Decontamination - Recommendations and considerations

Decontamination shall be performed on the scene when a drysuit has been exposed to, or potentially exposed to, hazardous materials. On scene decontamination shall be performed while the suit is still being worn to minimize potential contamination of the wearer during removal.

Due to the vast number of chemicals and their different properties, no guaranteed decontamination procedure exists. The best way to decontaminate must be decided for the specific chemical encountered. This decision may only be made by people educated for this task and with a good knowledge in chemistry.

In the absence of such knowledge, the minimum decontamination shall consist of spraying the garment with water and scrubbing lightly with a soft bristled brush and using a mixture of Simple Green industrial cleaner and degreaser, or Crystal Simple Green mixed in a ratio of 1 part Simple Green to 10 parts water. This ratio applies to either product. This process should be repeated at least twice.

The health and safety of the diver, both during and after the decontamination process, and the health and safety of the personnel applying the decontamination agent, must be taken into consideration.

After removal, the drysuit must be placed in a suitable container for subsequent cleaning, additional decontamination, inspection or disposal.

Inspection

An assessment of the need for additional decontamination shall be made if the drysuit is to be reused after it has been exposed to hazardous materials and initially decontaminated. A close visual inspection of any diving equipment used in contaminated water is essential once the gear has been decontaminated.

During the inspection, the diver should look for any of the following:

- Brittleness of the material
- Colour changes in the material
- Swollen material

Any of the above conditions should make you immediately suspect the equipment may have been damaged and should not be used again without further examination by Ansell Protective Solutions AB. However, just because a piece of equipment visually appears to be in good condition, the performance cannot be guaranteed.

!! WARNING !!

Damage of diving equipment due to exposure to contaminants cannot always be identified by visual inspection. Caution must always be used before reusing equipment that has previously been exposed to chemical environments.

The assessment shall consider the severity of the chemical exposure including such factors as:

- Duration of the exposure
- Concentration of the hazardous materials
- Toxicity of the hazardous materials
- IDLH, PEL, TLV* recommendations
- Skin absorption and cancer notations
- Acute and systemic toxicity (poison, suspect carcinogen, carcinogen, teratogen)

The assessment shall consider the chemical affinity between the hazardous materials and the drysuit including:

- Breakthrough times
- Permeation rates
- Discoloration or other manifestations of the contamination
- Degradation

If there is any question if the drysuit can continue to be used, Ansell Protective Solutions AB should be contacted for advice. Please call to obtain an authorization before returning any suits.

*IDLH: Immediately dangerous to life and health. Environments that pose an immediate threat to life or health.

PEL: Personal exposure limit

TLV: Threshold limit value. Specifies the ceiling limit of a toxic substance an “average” person in reasonable health may be exposed to repeatedly on a daily basis with no ill effects. These benchmarks are set and revised on an annual basis by the American Conference of Governmental Industrial Hygienists.

!! WARNING !!

When possible, diving in contaminated water should be avoided. If you are not trained for this type of diving operation, do not attempt it.

Data contained in this chapter has been developed from tests conducted under controlled laboratory conditions, not in actual diving environments. The user must determine the applicability of these test results for the actual exposure anticipated.

The test results are specific for VIKING™ materials and components. Do not apply these results to the performance of other manufacturers' diving equipment.

There are uses, environments and chemicals for which these systems are unsuitable. It is the responsibility of the user to review available data and verify the system for the intended use.

VIKING™ TRILAMINATE & PU DRYSUITS



VIKING™ TRILAMINATE AND PU DRYSUITS

Ansell Protective Solutions AB has a range of lightweight drysuits to complement the traditional VIKING™ range of vulcanized rubber drysuits, designed for sports, technical, military and light commercial use.

Applications for these suits are similar to the rubber range, except that they are not designed or intended for contaminated water diving where there may be oil or similar contaminants, as it is impossible to clean these off the external surfaces.

The VIKING™ HAZTECH suit is an exception to the above. This material has been developed for work in contaminated waters. Please see the HZ table on page 85.

! CAUTION !

Trilaminate suits are not designed or intended for use in contaminated water conditions where hydrocarbons in particular will render the outside of the suit unusable. The VIKING™ HAZTECH is an exception, see page 85.

Suit material

The VIKING™ range of trilaminate and PU drysuits are manufactured from a range of materials as follows:

Suit	Material	Seams
VIKING HAZTECH	Ether based thermoplastic polyurethane (TPU) with knitted nylon interior	HF welded
VIKING VTS	Cordura/Butyl/Polyester	Stitched and internal vulcanized
	Nylon/Butyl/Nylon	
	Polyester/Butyl/Polyester	
VIKING VSN	Armatex nylon/Rubber/Armatex nylon	External: Stitched with elastic tape
		Internal: Vulcanized

Sizes

All suits are available in a wide range of unisex sizes. All trilaminate and PU drysuits share a common size range, details of which are available to view on the protective.ansell.com website.

Components and accessories

All trilaminate suit components are the same as for rubber suits.

Accessories are the same as for rubber suits except for the fitting of rubber hoods such as the Turbo and Magnum styles.

Trilaminate suits may be fitted with helmet yokes, but not for diving in nuclear activities or in chemically polluted waters. The VIKING™ HAZTECH suit is an exception, please see page 85.

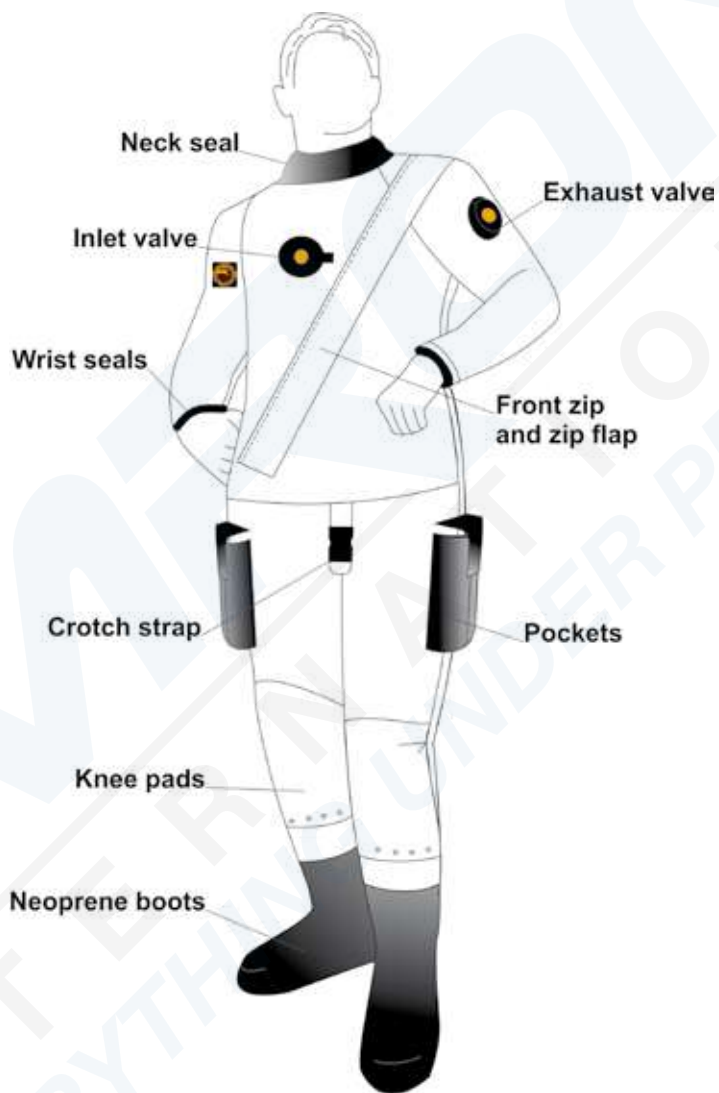
Instructions for use

Instructions for use, donning and doffing, disposal, cleaning, storage etc. are as per the general instructions contained in this manual, with the exception of contaminated water diving. The VIKING™ HAZTECH suit is an exception, please see page 85.

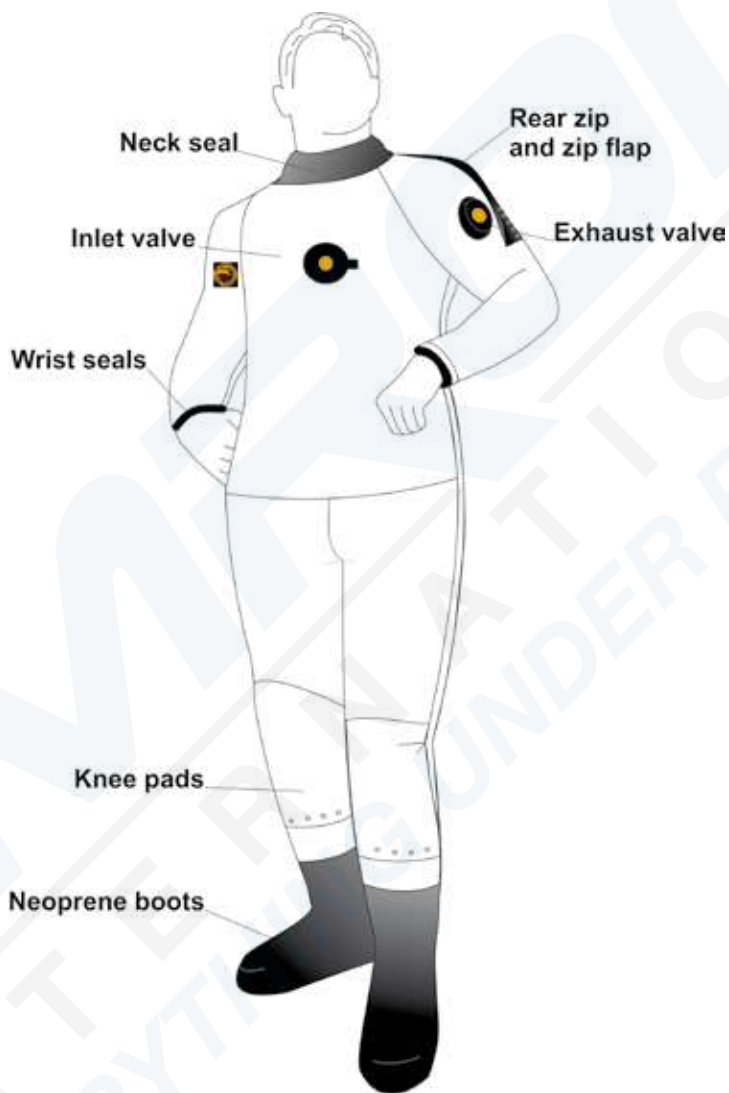
VIKING™ TRILAMINATE
& PU DRYSUITS

VIKING
THE WORLDWIDE
DIVING STANDARD

VIKING™ VTS/VSN Front Entry



VIKING™ VTS/VSN Rear Entry



VIKING™ HOT WATER SUIT



VIKING™ HOT WATER SUIT

The VIKING™ Hot Water Suit (HWS MK 2) is NOT a drysuit, and has different applications. A hot water suit is designed for long duration or saturation diving in cold or cool water temperatures. A hot water suit may be spending up to 4-6 hours working in water, and/or similar amounts of time in a diving bell.

Design, components and accessories

The VIKING™ HWS MK 2 comprises a suit body manufactured from 5 mm neoprene with a Rotex nylon exterior which is extremely hard wearing, and treated with a PU film to aid external cleaning.

The suit is fitted with a nylon front zip for easy donning and doffing. There are no seals attached to the hot water suit. Rubber tubing is fitted inside the suit, with holes drilled at intervals along the tube. The tube is attached to a hot water valve attached to the right hip of the suit body.

The hot water valve, designed specifically for VIKING™, has a unique “click” function, with 3 flow settings and a dump mode. The flow settings are HIGH, MED & LOW, and represent flow rates of approximately 49 litres/min, 44 litres/min and 36 litres/min. The three flow rates are obtained by a restriction of the flow inside the valve, whereas the dump mode simply directs the complete flow into the surrounding water. The inlet valve is a standard banjo fitting, which attaches to a QD 1/2" MPT fitting which is attached to the water supply hose.

The hot water suit should be used with hot water gloves and boots, which are sold separately, and are attached to the suit by way of Velcro® fixings on the suit, and on the gloves and boots.

Hot water suits will generally be used in conjunction with an air breathing helmet or band mask, and will therefore be surface supplied. Usual limitations to use (air or mixed gas breathing) will apply depending on the depth at which the suit will be used.

!! WARNING !!

Refer to page 15 with the exception of Para. 5

!! WARNING !!

Interruption of the hot water supply even for a very short period of time may lead to a rapid loss of core body temperature, and eventually hypothermia may set in. A backup water heater system must be available at all times during a hot water suit dive.

!! WARNING !!

A hot water suit must be used in conjunction with a hot water suit liner. This will help eliminate hot spots which could cause skin burns, and will help provide the diver with some thermal insulation, should the supply of heated water fail.

Sizes

The VIKING™ HWS MK 2 is available in the following sizes: SML, MED, LGE, EXL, SM Tall, MED Tall, LG Tall, and EX Tall. Refer to <http://protective.ansell.com> for full suit sizing information.

Components supplied with the suit

- Carry bag
- Owner's manual

Selecting and fitting a hot water suit

The suit should be tried on over the under garment to be used, to ensure a full range of movement is possible. Refer to *Selecting and fitting a drysuit*.

Donning and doffing

Put on undersuit first. Unzip nylon centre zip, put legs into suit and pull up to chest. Insert arms one at a time. Close centre zip. Attach hot water hose to valve banjo fitting. Attach boots with Velcro® and finally fit gauntlet gloves with Velcro®. Doffing is the reverse of donning.

Storage

The suit should be dried fully in between dives.

NB: Continued drying at high temperatures in an industrial dryer may lead to shrinkage of the neoprene material.

Store either on a hanger away from sunlight, or roll loosely and store in a bag away from heat and sunlight.

Inspection

Before and after each dive, the suit should be inspected for damage to the zip, ON/OFF valve, internal and external water tubing. Any damage should be assessed to ensure the suit is usable. If in doubt, do not use.

Cleaning

The suit should be washed with clean water or a mild soap solution after use in sea water. Afterwards, rinse thoroughly in cool, clean water and then air dry.

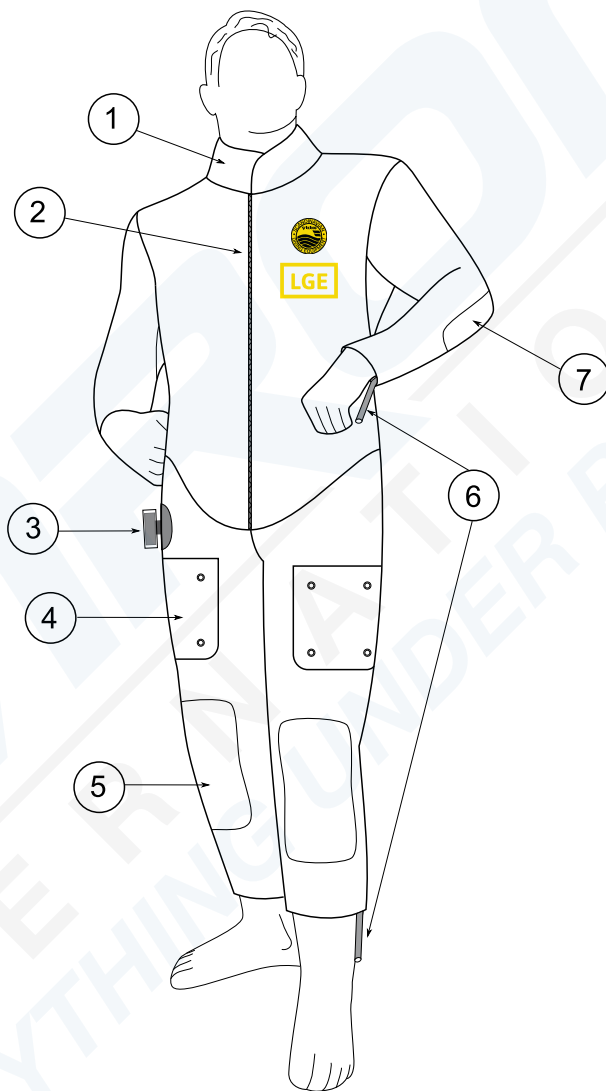
NB: Continued drying at high temperatures in an industrial dryer may lead to shrinkage of the neoprene material.

Disposal

Disposal of suit after useful life should be with regard to local regulations. In general, a suit should be treated as rubber waste, and as such, the normal method of disposal would be incineration or landfill. The valve should be removed first, and disposed of separately.

For suits that are contaminated, local regulations for the disposal of the contaminants in question must be taken into account.

VIKING™ HWS



1. COLLAR
2. ZIP
3. VALVE
4. POCKET
5. PU KNEE PAD
6. TUBE
7. PU ELBOW PAD

VIKING™ ON WATER RESCUE SUITS

Ansell Protective Solutions AB has introduced a range of on water rescue suits - the VIKING™ Surface Rescue Suit (SRS) and the VIKING™ Water Rescue Suit (WRS). These suits are manufactured from lightweight, but hard wearing trilaminate materials, similar to those used on VIKING™ drysuit products.

VIKING™ SRS and VIKING™ WRS are designed to be worn in cases of flooding and swift water rescue. The suits are available in a range of material weights and specifications and are suitable for use by groups such as First Responders and Technicians.

VIKING™ SRS and VIKING™ WRS are NOT diving suits, and are not intended to be used as such. They are manufactured utilising the same manufacturing methods, but do not have any form of valves fitted. All information and instructions given in this manual apply to VIKING™ SRS and WRS, with the exception of diving instructions and information related to valve components.

The VIKING™ WRS-D is a version of the VIKING™ WRS, with valves fitted. This suit can therefore be used as a diving suit. The VIKING™ WRS-D is certified to EN 14225-2:2005. Donning, doffing and user instructions are as per the VSN/VTS drysuits.

!! WARNING !!

VIKING™ SRS and WRS are not personal flotation devices and must be used with an appropriate personal flotation device where required.

VIKING™ SRS and WRS are certified according to the basic requirements of the European directive for personal protective equipment and tested using applicable parts of EN ISO 15027-1.

Suit material

VIKING™ SRS is available in Cordura/Butyl/Polyester, 450 g/m².

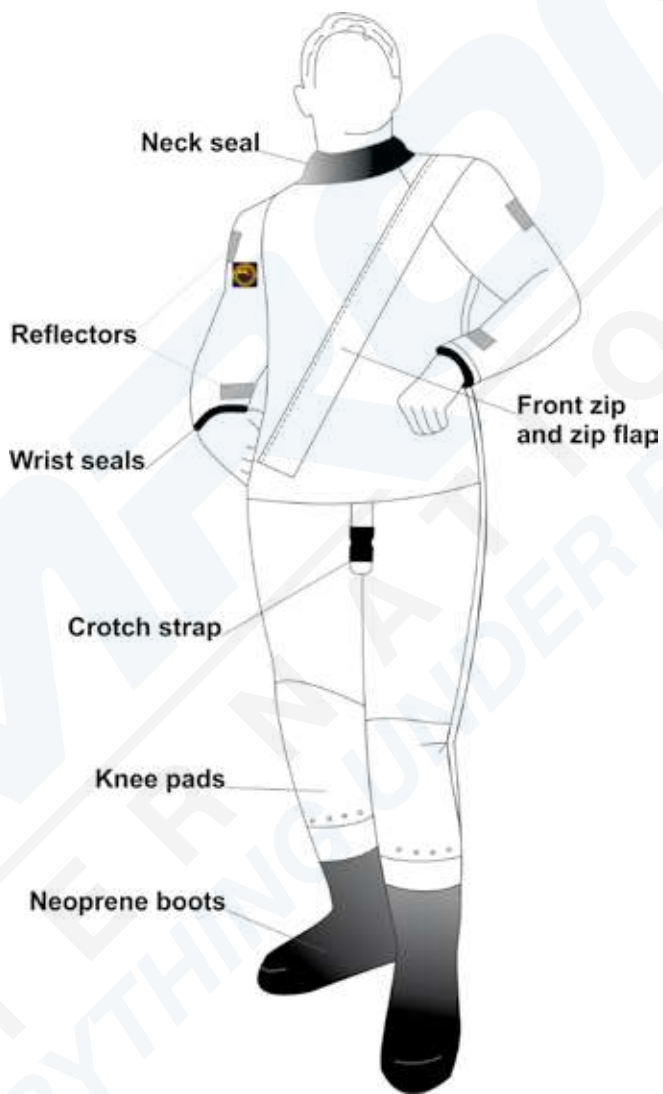
VIKING™ WRS is available in Nylon/Butyl/Nylon, 255 g/m².

Sizes

VIKING™ SRS and WRS suits are both produced in the same size range, although the SRS features an adjustable torso, whereas the WRS does not. Size charts are available on the VIKING™ website at protective.ansell.com.

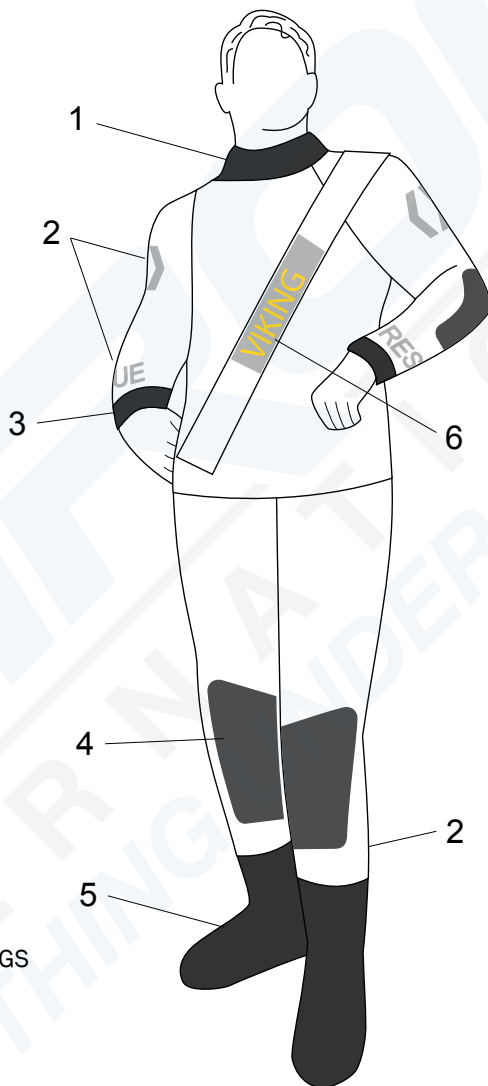
Suits should be tried on to ensure a full range of stretching and bending movements are possible.

VIKING™ SRS



VIKING™ WRS

NOTE: Also available in a diving version, **VIKING™ WRS-D**, which has inlet and exhaust valves fitted.



1. NECK SEAL
2. REFLECTIVE MARKINGS
3. WRIST SEAL
4. KNEE PAD
5. NEOPRENE BOOTS
6. ZIP FLAP WITH REFLECTOR

Design, components and accessories

VIKING™ SRS and WRS suits are all front entry design. The SRS has an adjustable torso, and the WRS has a fixed front entry torso.

Components of the VIKING™ SRS and the VIKING™ WRS are body material. Medium weight zip, zip flap, latex or neoprene wrist and neck seals, crotch strap (on adjustable torso suits only), neoprene boots, safety boots, or latex or material socks for use with an over boot.

Accessories include glove ring systems, bayonet glove rings, pockets and fitted hoods.

VIKING™ SRS and WRS suits are designed to be used in conjunction with suitable underwear for insulation. No insulation is provided by the drysuit itself.

!! WARNING !!

It is essential to adjust your insulation according to the environmental conditions where you operate. Overheating is extremely dangerous. It can lead to exhaustion, blackout, and in rare cases death.

Inspection

Before each use of the suit, it should be inspected for holes or punctures in the suit material. Zipper and seals should be inspected for holes, tears or degradation. Any faults should be repaired before further usage.

Putting on a VIKING™ SRS/VIKING™ WRS

Donning and doffing instructions are the same as for a diving suit.

Care and maintenance

Procedures for maintenance, cleaning, storage and disposal are the same as under the chapter for diving suits.

APPENDIX: CUSTOMER INFORMATION TO BE PROVIDED AT THE POINT OF SALE

In accordance with EN 14225-2 and EN 14225-3 we provide the following information which is intended to be made available at the point of sale.

Risks, conditions and limitations of use

Please see the information in following sections:

- **WARNING!** on page 15 of this manual. Para. 5 (buoyancy control) not applicable to Hot Water Suits.
- Safety instructions on page 13 of this manual. Para's 2, 5 and 7 not applicable to Hot Water Suits.
- Warning on allergic reactions on page 14 of this manual.

Size designations

For sizes see the marking in the suit which is explained on page 9 of this manual. Charts of available sizes are available at <http://protective.ansell.com>. See also *Selecting and fitting a drysuit* on page 17 in this manual.

Compatibility

Drysuits with latex neck seal and cuffs may be combined with a hood and gloves of your choice. Fixed gloves and hoods must be VIKING™ brand.

The inflator hose is manufactured with UNF 3/8" coupling and is compatible with all major diving breathing apparatuses.

Hot Water Suits - see page 93.

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Ansell Protective Solutions AB

Arenagatan 8B, 215 33 Malmö, Sweden

Tel: +46 (0)10 205 1800

order.protective@ansell.com

<http://protective.ansell.com>

