



**MAKE DIVING SMART**

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China

**AKUANA<sup>®</sup>**

# **DRYSUIT User's Guide**

**Feed your curiosity**

[www.akuana.cn](http://www.akuana.cn)

One in a million !

Wonderful choice you have made with your drysuit election. Please take a moment to read through this document. It is provided to answer many frequently asked questions and also as a platform for our recommended care, use, and storage.

We recommend that you do not exceed your level of training and wish you many years of safe diving.

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**AKUANA Drysuit Users' Guide**

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# 1. INTRODUCTION

Thank you for buying our tri-laminate model, these products will open a new world of comfort and security in your diving adventures.

Dry suit diving demands specific techniques and training beyond those required for wetsuit diving. If you have not dived in a dry suit before, we strongly recommend you contact a local instructor for education and practice using your new dry suit under controlled conditions.

Both inexperienced and experienced users should thoroughly read and understand this manual before diving in the dry suit.

## ! WARNING

We strongly recommends all divers undergo training and familiarization with a certified instructor before using this product.

The following are important safety guidelines every diver should adopt before diving in a dry suit:

1. Follow a complete dry suit diving course with a certified instructor and from officially recognized approved training agency.
2. Always dive with a buoyancy compensator.
3. Become familiar with all your equipment before diving.
4. Practice dry suit diving skills in safe conditions until confident of your ability.
5. Ensure your buddy is completely familiar with and understands all your dry suit diving systems.
6. Weight should be set to achieve neutral buoyancy with an empty tank. Do not add more weight than this. You should be able to achieve a 5 minute safety stop at 3 meters (10 feet), neutrally buoyant with a tank containing around 30 bar (500 psi) or less.
7. Inspect the zipper, seals and valves for damage before each dive.
8. Perform regular preventative maintenance on the suit, valves, zipper and seals.
9. Only allow qualified individuals or Authorized Dealers to perform service on the suit.
10. Understand your personal diving limitations. Do not exceed your limit.

# 2. Materials

## Tri-laminate

The tri-laminate suits are constructed of a three-layer fabric (hence the name tri-laminate) consisting of a middle waterproof barrier of butyl rubber sandwiched between a tough nylon exterior and special polyester blend interior. The suit is sewn together with a purpose-modified sewing machine that provides a stitch that stretches. The tri-laminate suit operates on a slightly different principle than the neoprene, as the tri-laminate material has neither inherent

buoyancy nor thermal protection. This style, known as a membrane suit, simply provide a waterproof shell under which the diver can wear the correct choice of undergarments to suit the conditions. The suit is more flexible than neoprene, and allows the diver a broader comfort range (especially in the warmer temperatures) than neoprene.

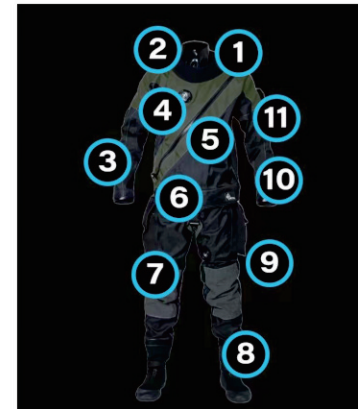
## AKUANA Arctic tern drysuit ( polyester-butyl- polyester)

- \* 300D tri-laminate material
- \* Military grade
- \* Used under rigorous environment including wreck and rock caves



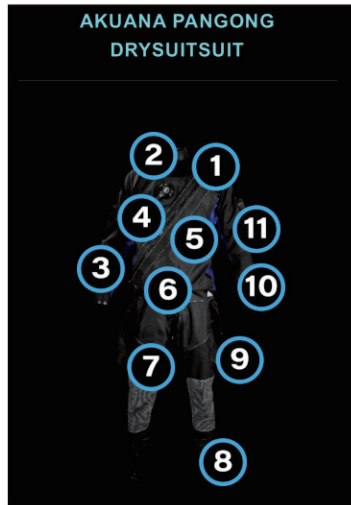
## AKUANA Matrix drysuit

- \* 70D Ripstop tri-laminate material
- \* Military grade
- \* Light weight and soft
- \* Balance of the durability and weight



#### AKUANA PANGONG DRY SUIT

- \* Ripstop and Vulcan trilaminate
- \* 3D cutting for free movement
- \* Customized color and sizing

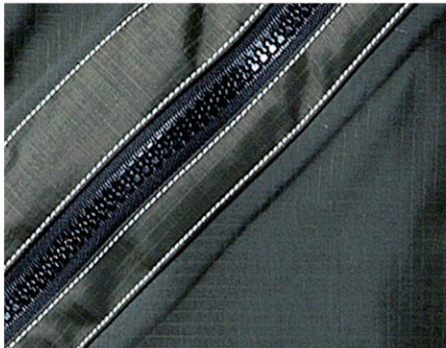


#### WARNING

Never depend on any dry suit as your sole source of flotation and buoyancy control. Always dive with a suitable buoyancy control device equipped with a separate inflation system.

### 3. WATER PROOF ZIPPER

AKUANA dry suits use a waterproof zipper situated diagonal on the front section of the torso. It is positioned so that it closes from left to right. This is because most people are right handed and will be less likely to damage the zipper, or catch clothes or foreign objects in the zipper while closing it. Advise your buddy to place one finger directly in front of the slider as it is closed, helping to guide the undergarment or foreign objects away from the zipper teeth. Also make sure that your buddy fully tucks in the interior zipper lap before closing the zipper.



#### WARNING

Clothing or foreign objects caught between the zipper teeth will cause them to separate, destroying the waterproof integrity of the zipper. This damage is permanent and is not repairable. Have your buddy exercise care when closing and opening the zipper.

##### 3.1 Maintenance of the Zipper

It is the teeth of the zipper that interlock and create firm even pressure on the polymer zipper tape, creating the seal. These teeth, the zipper tape and the outer clamps must be kept clean and lubricated to operate properly and give long product life.

Lubricate the YKK aqua seal zipper.

- \* Apply lubricant to the bottom-Seal only.
- \* Open and close few times. The lubricant will then become distributed evenly along the zipper.
- \* Do not over lubricate the zipper. The dirt will stick to the lubricant.



Lubricate the BDM metal zipper





### 3.2 Correct usage of zipper

- \* Pulled angular and donned or doffed not fully open, the zipper slider may disintegrate from teeth.
- \* Overstretching of the top and bottom stops should be avoided as this may lead to above damages.



### 3.3 Cleaning the zipper

- \* Regular cleaning with fresh water and use of a suitable lubricant is advised in order to prevent damage to the tape and seals.
- \* Use clean cloth and fresh water to clean the zipper from any sand or dirt.
- \* When closing the zipper always make sure that under clothing will not get stuck in the zipper teeth.



## 4. Neck and wrist seals

AKUANA dry suits are fitted with flexible latex neck and wrist seals for watertight integrity. But you can also choose the quick-exchange system which uses silicon neck and wrist seals.

### 4.1 Trimming the Seals to Fit

The seals have concentric raised ridges functioning as cutting guides to assist you to accurately trim the seals to fit. The seals are slightly tapered so they get larger when trimmed. Using a sharp pair of scissors, trim one ring off at a time until the seal is comfortable but still snug on your neck and wrists. Use care and precision with sharp scissors when trimming ridges. Leave a smooth surface, as ragged edges can allow tears to form, which will require replacement of the seal.



### ! WARNING

Do not trim too much, or the seals become too loose and may leak. Make sure you cut the seals cleanly and leave no nicks that can develop into a tear.



### ! WARNING

Blood flow can be restricted by seals that are too tight, which can ultimately lead to injury or death. Do not wear the seals too tight.

### 4.2 Storage & Maintenance

Store the dry suit so the seals are dry, cool (below 25 Degree Celsles) and out of direct sunlight. Ultra-Violet light will degrade the latex over time. If the seals have been exposed to cold temperatures, they will become stiff and lose their flexibility. This condition is not permanent. and can be resolved by a brief immersion in warm water. Before storing the suit for any length of time, dust the seals inside and out with pure talc as a preservative. Do not use perfumed cosmetic talc, as it contains oils which can damage the latex. Do not use oils or lotion on the seals. Avoid contact with copper.

### 4.3 Possible Allergy Risk

A small percentage of people have an allergic reaction to natural latex, the material from which the neck & wrist seals of some models are manufactured. This allergy can range from mild to severe skin rash and itching. It is the responsibility of the user to pre-determine if he or she has Latex allergy, or to recognize it during use, and discontinue use of the suit until the problem can be rectified. This usually means removing the latex seals, and installing new seals made of alternative materials.

### 4.4 Quick exchange systems

Round quick change systems

- \* Round design (Small and compact)
- \* Designed for use with silicone and latex seals
- \* Works as attachment platform for Round dry glove system
- \* A slim and comfortable solution with minimum bulk volume
- \* Increased freedom of movement



Opportunity to choose from a variety of seals and to change them whenever you want to SLÄGGÖ Flex Ring



- \* Flexible with superb comfort
- \* Can be mounted in a great range of garments
- \* Designed for use with silicone and latex seals
- \* Compatible with OBERON Dry Glove System
- \* Increased freedom of movement

#### 4.5 Exchange seals.

Wrist seals

Step 1:



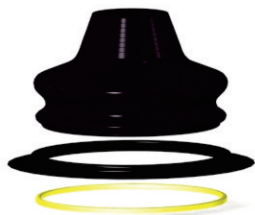
Step 2:



#### 4.6 Exchange the neck seal

Step1:

Be sure to remove the plastic clip first (12 pieces) and then remove the neck seal with the yellow ring

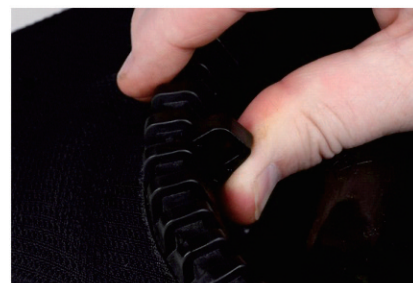


Step2:

Change the seal and use special tool or hand to put the yellow lock ring back to the PU ring



Step3: After changing the neck seals , make sure all the clips are back in place



## 5. Fitting of the drysuit

Tri-laminate drysuit are easier to fit in than neoprene wetsuits. However, a good fit is still required. You should be able to reach both hands over your head, and be able to squat on your knees without restriction, while wearing the dry suit and the heaviest undergarments you intend to wear.

The suit should not be tight in the crotch, or too long. If the legs are too long, air volume in the suit can dislodge the boots off your feet.

To ensure a good fit:

- \* Wear the bulkiest undergarment you are likely to wear under the suit.
- \* Make sure the suit is not restrictive in any area.
- \* Make sure you can raise both hands above your head, touch your toes, and squat to your knees without restriction.
- \* Make sure the crotch (with suspenders properly adjusted) is not more than 10cm below your crotch.
- \* Make sure you can easily reach both valves.



NOTE: You will be considerably more bulky in a dry suit than with a wetsuit and the boots are bigger. If you already own a BC, Make sure that it will not be too tight. It should be properly over the dry suit. Also make sure that your feet in the dry suit boots or socks will not be uncomfortable, or else purchase larger boots or socks. Having fins that are too small to wear will result in foot cramps, potentially dangerous situation.



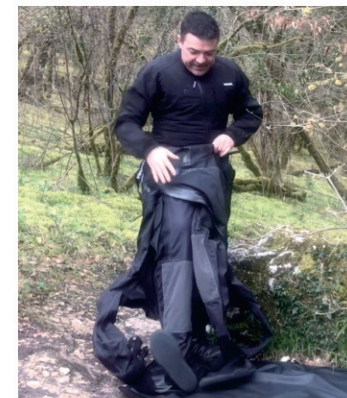
## 5.1 Donning the Dry Suit

- \* First remove your watch as it could tear wrist seals.
  - \* Lay the suit out and do a quick overall inspection to ensure it is in good order. Please refer to Pre-Dive Suit Checks.
  - \* Dust the inside of the latex seals with talc.
  - \* Lubricate the zipper with the wax stick provided in the repair kit.
  - \* Remove all jewelry—sharp edges can destroy the seals.
  - \* Fold the torso of the suit inside out over the legs to about waist level, so the suspenders are exposed.
  - \* Make sure the suspenders are correctly attached, and are not tangled or twisted.
  - \* Sit down if possible and insert foot first into the suit, making sure you do not tangle foot in suspender.
  - \* Grasp suit material at calf level and gently ease foot into Boot. Pull up on leg.
  - \* Repeat with other leg.
  - \* Grasp torso and ease suit up so that the crotch of the suit is correctly positioned.
  - \* Raise suspenders over shoulders and adjust so they support of the suit.
  - \* Insert the arm all the way through the seal, do not push too hard.
  - \* Make sure that if the dry suit undergarment is equipped with thump loops, they are fully retracted, and not caught between the seal and your wrist. This will cause a leak.
  - \* Grasp the neck seal with both hands. Fingers are in the inner surface thumbs on the outside. Make sure your fingernails do not tear the latex. Spread the opening wide enough to draw the neck seal over your head, and adjust so it is comfortable.
  - \* Instruct your buddy to draw the zipper closed from left to right, keeping one finger in front of the slider to prevent clothing and foreign object damage to the teeth. Make sure the slider is drawn tight up against the rubber stop on the right hand side. If the slider is not tight against the stop, the zipper will leak.
  - \* Fold the extra part of the dorsal. Buckle the crotch strap.
  - \* Open the exhaust valve. Crouch and release the air in the suit.
  - \* Attach the low pressure hose with quick disconnect fitting to the inflate valve. Depress the side inflate button briefly to ensure the valve is working properly. Air will enter the suit, partially inflating it.
- Disconnect the low pressure inflate hose.
- \* To check the proper function of the exhaust valve, turn it to the “OPEN” and crouch to your knees. The suit should deflate and you should hear the air escaping from the valve.
  - \* Hood. Pull the hood over your head and position comfortably. Tuck the neck of the hood under the neoprene neck cuff for a more watertight seal and better insulation.
  - \* Gloves. Pull on each glove and fold the neoprene outer cuff over the glove for a more watertight seal and better insulation.

NOTE: Latex is an excellent watertight seal material but has virtually no insulation value. It is important to adjust the neoprene wrist and neck over cuffs properly so that they help insulate the latex seal against the cold water. This feature is an important advantage over dry suits that use unprotected latex seals. The outer cuffs also protect the latex seals from abrasion and UV degradation.



Pic A: Check valves and seal



Pic B: insert foot first into the suit



Pic C: Raise suspenders over shoulders



Pic D: Left arm first





Pic E: Make sure the seal is not folded



Pic F: Right arm in



Pic G: draw the neck seal over your head



Pic H: Close the zipper



Pic I: Fold the extra part of the dorsal



PIC J: Crouch and release the air

## 5.2 Doffing the Dry Suit

To take off the dry suit, follow the same procedures for donning the suit, but in reverse Order.

## 6. Application for use

The Tri-laminate dry suits are made of the finest materials and to extremely high standards of workmanship. However, they must be used within reasonable limits.

### WARNING

DO NOT:

- \* Exceed the maximum depth to which you are currently certified.
- \* Use the dry suit as a buoyancy lifting device.
- \* Use the dry suit without a separate buoyancy control device.
- \* Use inflation gases other than air except argon.

### 6.1 Pre-Dive Suit Checks

Before EVERY dive, make sure the suit is in good condition by checking the following:

- \* No visible damage to materials or accessories anywhere on the suit.
- \* Check latex or smooth-skin neoprene seals for small tears or holes.
- \* Verify inflate and exhaust valves are intact and functioning properly.
- \* Check low pressure hose and fittings are intact, undamaged, and properly connected.
- \* Inspect waterproof zipper for excess wear or any damage.

### 6.2 Post-Dive Suit Checks

After every dive, complete all the pre-dive checks listed above, and inspect suit for any possible new damage. Repair any damage immediately.

## 7. Risk assessment

Dry suit diving, as any other aspect of advanced SCUBA diving activity, carries a degree of inherent risk. These include:

### 7.1 Hyper/hypothermia

Dry suits are often used in extreme temperature conditions, where there may be combinations of cold surface conditions and cold water, or hot surface conditions and cold water. It is important to know your own personal thermal safe range, to avoid over heating, or becoming chilled. While a dry suit and warm undergarment have excellent thermal protection, they do have limits and your safe & enjoyable time in the water is variable based on water temperature and condition, workload, and your own body type. Hypothermia is the cooling of the body core to unsafe levels. Hyperthermia is the overheating of the body core to unsafe levels. Hyperthermia in dry suit use is most often experienced during surface intervals in hot weather, or during periods of excessive workload in warm, shallow water.



## 7.2 Change of Buoyancy with Depth

As the Tri-laminate material is a membrane and lacks a closed cellular structure, the material itself does not change buoyancy with depth. However, the air trapped within the suit by the thermal undergarment will be compressed and the diver compensates for this by adding air during descent and venting air during ascent, to remain neutrally buoyant.

### WARNING

Buoyancy control in a dry suit is more complex than in a wetsuit and is a vital skill to be learned during the instruction in the use of a dry suit.

## 7.3 Loss of Thermal Insulation at Depth

As Tri-laminate is a membrane only, the thermal insulation value of the material alone is minimal and does not change with depth. However, divers planning to spend time at greater depths must account for the colder temperatures normally found there by wearing added under suit protection.

Using AKUANA Opah drysuit version heating vest will be a good way to keep warm even when the dry suit is flooded.

## 7.4 Fitting the Suit

Proper fit in a dry suit is very important. Too loose a it will allow such hazards as too much air moving around in the suit, difficult buoyancy control and if the legs are too long, the boots can slip off the divers!™ feet. Seals that are too loose will leak. Too tight a it can result in restriction of blood flow causing loss of feeling in the extremities, or lack of oxygen to the brain. Seals that are too tight will also restrict blood flow.

## 7.5 Inflation Gases

We recommend using air for inflation. Argon can be used by properly trained divers. Do not use gas mixes with elevated oxygen levels, or with helium (Tri-Mix, etc.). Helium is an excellent heat conductor, and will significantly reduce the thermal efficiency of the suit, risking hypothermia.

## 7.6 Proper Maintenance

A dry suit is a complex piece of equipment designed to keep a diver comfortable in extreme conditions. Treat it with respect, maintain it properly, and inspect it for wear and damage BEFORE & AFTER each dive. Failure to take these precautions may be hazardous.

# 8. Trouble shooting

## 8.1 Leaks

### Zipper

- \* Slider not closed all the way. Have your buddy check for full closure.
- \* Zip has failed –inspect for split in closed teeth.
- \* Zipper material failed- can either be punctured or damaged by abrasion.
- \* Foreign material caught in teeth (dirt, sand, debris.)
- \* The zipper is old, worn out, or damaged in some other way—have it replaced.

### Valves

- \* Installation has loosened. Check back plate screw for tightness.
- \* The exhaust valve may be improperly adjusted, or there may be debris(sand, hair, etc.).
- \* Valve parts may need servicing or replacement due to use and wear.

### Seals

- \* Seals leak for two reasons, damage or interference.
- \* Check the seals for holes or tears caused by sharp objects, wear & tear, or chemical damage.
- \* Check that there are no foreign objects such as hair, sections of undergarment.
- \* Check for over trimming.

### Sock or materials

- \* Check the materials for holes or tears caused by sharp objects, wear & tear, or chemical damage.

## 8.2 Leak Testing Your Suit

Your dry suit can be tested for leaks by plugging the wrist and neck seals with objects of suitable size, closing the zipper and using the low-pressure inflation hose attached to the inflate valve to inflate the suit. Wrap an elastic band around the seal to help the plug stay in place under pressure. Start with the adjustable exhaust valve set at the lowest release pressure, and gradually increase until the suit is firm, but not hard. This way you will not stress the seals, fabric or seams of the suit. Once the suit is inflated, submerge it a section at a time in the bathtub, and inspect for leaks. Small bubbles will appear if a leak is present. Alternately, lay the inflated suit down outside, and slowly pour warm soapy water over the suspected areas. The soap solution will blow small bubbles, or create fine foam over the leak. Once the leaks are located, mark the area, rinse and dry the suit thoroughly, and follow the repair kit instructions.



Method 1: Fill water on land



Method 2: Fill air in water

# 9. Cleaning, Disinfection & Decontamination

## 9.1 After each use:

If suit got wet inside. Clean inside with clean fresh water to prevent bacterial development.

Latex seals

Lightly dust with non perfumed talc.

Degreasing If the suit is exposed to oil or grease, clean with a mild grease cutting detergent and a soft brush. Rinse with clean fresh water.

## WARNING

Do not allow oil or grease residue to remain on suit for any length of time. It may degrade the material.

### 9.2 Storage & Transport

Dry suits are best stored on the hanger that hangs the suit upside down by the feet with the zipper open. It is important that the drysuit is not stored folded or rolled, which may lead to long term deformation and a breakdown in the structure of the material.

Keep in a cool dry place out of the sun. Keep copper away from the latex seals. Additional advice may be found in specific sections above. Transport the suit in the nylon bag provided. Try to clean excessive dirt and sand from the suit before placing it in the bag.

## 10. Accessories

### 10.1 Hood

### 10.2 Bag

### 10.3 P-Valves

### 10.4 Dry glove

Round quick connect glove

- \* Push to connect the gloves to the quick wrist
- \* Pull the glove or use flat surface to pry the connection to take off the gloves



OBERON systems

- \* Outer diameter: 130 mm
- \* Connects with the PU-Ring of SLÄGGÖ Flex Ring (Modular Quick Change Solution)
- \* Fits to most common dry gloves



### 10.5 Koala 300 Undergarment



## 11. Warranty

AKUANA drysuit has 1 year warranty for the drysuit on zippers, valves, boots, socks, seams, fabric and workmans except:

- \* Neck and wrist seals - 6 months of warranty from the date of purchase.

Warranty does not cover:

- \* The water proof zipper damage because of lack of lubricant is not covered under warranty.
- \* AKUANA will not be liable for any further loss, damages, or expenses, including incidental or consequential damages directly or indirectly arising from the sale or use of the product.
- \* All paint finishing, powder coating, material stitching that is chipped, damaged, or unthreaded through customer use is not covered under warranty.
- \* AKUANA does not warranty any product for aesthetic look. Issues with look that do not affect function of the product are not covered under warranty.
- \* All warranties become null and void if the customer or Dealer has in any way shape or form altered the internal or external structure of the product.