Try Scuba

Try Scuba

Table of Contents

The Ultimate Dive Experience

You are about to embark on one of the greatest adventures of your life.

Becoming a scuba diver is the first step on a journey that will change the way you experience the world forever, and gives you the ability to explore our last true frontier: the ocean.

The weightlessness of outer space is an experience limited to a few highly-trained astronauts.

As a diver, you will explore the wonders of a weightless underwater world, interact with incredible marine life, and discover wrecks and ecosystems hidden beneath the surface.

Seventy-two percent of our planet is covered in water - and with SSI, you can explore this final frontier.

Course Standards and Procedures

Your SSI Dive Center is part of an international SSI Family dedicated to the highest standards of safety and education.

This family includes SSI Dive Professionals, SSI Dive Centers and Resorts, and divers like yourself.

SSI has been an industry leader since its founding in 1970, and is constantly improving training materials and techniques to improve your personal safety and experience.

You can visit any SSI Dive Center around the world and be confident that you will receive a high-quality diving education experience, focused on building and enhancing your comfort and confidence.

The SSI Training Process

Your path to certification has two steps:

1. Complete the Digital Learning materials found in this manual. These materials are self-paced, and you can complete them anywhere, anytime, once you download them to your SSI DiveSSI app.
2. Complete the Academic Sessions and Pool/Confined Water Sessions with your SSI Dive Professional.

Certification Options

To meet the needs of today's divers, SSI created three pathways to become a certified diver.

Try Scuba

- One Academic Session/Safety Briefing
- One Pool/Confined Water Session

The Try Scuba program is a quick and easy introduction to the world of scuba diving.

It is perfect for anyone who is interested in the underwater world, and can be completed in a very short time.

After you finish your Try Scuba experience, you will earn the FREE SSI Try Scuba recognition card, which will be available on your MySSI app.

You can also credit your Try Scuba experience toward the Basic Diver program – ask your instructor for details!

Basic Diver

- One Academic Session
- One Pool/Confined Water Session
- One Open Water Training Dive

The Basic Diver program is a quick and easy way to experience the world of scuba diving before you become an Open Water Diver.

It is designed for people who do not have time to complete the entire Open Water Diver program, or who want to experience an open water environment before committing to a longer training program.

The Basic Diver certification qualifies you to dive under direct supervision of an Open Water Instructor for six months after earning your certification.

If you decide to become an Open Water Diver within six months, you can credit your Basic Diver certification to your Open Water Diver training.

Open Water Diver

This is SSI's most well-known and popular training program.

After earning your Open Water Diver certification, you will be able to dive with a buddy in environments and depths equivalent to those experienced during your training.

- Six Academic Sessions
- Six Pool/Confined Water Sessions
- Four Open Water Training Dives

Your instructor may adjust the number of training sessions to accommodate your needs or the dive center's training schedule.

They will also show – and help you to master – the skills needed to become a safe and capable diver during your in-water training.

Since SSI firmly believes in creating capable divers, not just issuing certification cards, you may participate in additional in-water sessions to ensure you have the skills and comfort level to be a successful diver.

Expectations for You

Water Fitness

Modern scuba diving is a safe and peaceful activity, enjoyed by people with a variety of physical abilities and ages.

Your instructor will have you show a minimum level of physical ability and water fitness before you start your open water training.

Digital Learning

These materials are the foundation of your training experience.

They include the theory and knowledge required to be a safe and comfortable diver, and directly connect this information to your objectives of becoming a certified diver.

Expectations for Your Instructor and Training Center

SSI training programs are an efficient, entertaining, and safe way to learn about scuba diving and the underwater environment.

This is due to SSI's dedicated and passionate instructors and training centers, as well as the SSI training philosophy, which prioritizes your comfort, safety, and dive experience.

As part of this training philosophy, SSI believes that there are four distinct components for creating capable divers.

These four components form the SSI Diver Diamond, and ensure that every SSI Dive Professional provides you with an exceptional training experience.

The SSI Diver Diamond

Knowledge

The ocean is a vast and mysterious place, filled with creatures that look entirely alien to our land-based brains.

Proper knowledge, which you gain by completing your digital learning materials and the academic sessions with your instructor, replaces any fears or misunderstandings with enthusiasm and excitement for adventure.

For example, you may think that sharks are mindless predators that will attack without warning.

Your instructor will teach you that sharks are a critical indicator of the ocean's health, and that seeing a shark underwater is a rare privilege for any diver.

Skills

Your instructor may introduce you to some of the basic skills used by certified divers.

These skills enhance your enjoyment of the underwater world, and are required if you continue with the Basic Diver or Open Water Diver programs.

Equipment

Your instructor and SSI Dive Center want you to be comfortable at every stage of your training.

They firmly believe that the best divers are those who understand that personally-owned, well-fitted equipment is more comfortable and safer than unfamiliar rental equipment.

You will also be more comfortable in equipment customized to your needs and diving styles.

Experience

The only way to gain diving experience is to actually go diving!

Your instructor will take you into a safe and calm pool/confined water environment where you can learn about scuba diving without the stress of waves, current, or increased depth.

Your MySSI Account

If you are reading these materials digitally, then you already have a MySSI account!

If not, or to review the features of MySSI, visit www.divessi.com and register or login.

You can also download the free MySSI app to your smartphone or tablet.

Check your email for your login credentials.

These are valid for both the online and app versions of MySSI.

Visit your SSI Training Center to schedule your training and receive access to more SSI Digital Learning.

The MySSI App

SSI designed the MySSI app to be an "all-in-one" tool for all your SSI adventures.

There are a variety of free features, as well as industry and training center news updates, immersive 360° video experiences, and a complete set of dive tables and hand signals for you to review before your next dive.

Digital Learning

- All your digital materials are available for offline access once you download them to the app.
- Your progress through the materials will automatically synchronize with your MySSI account once you connect to the internet and reopen the app.

Certification and Recognition Cards

- After your instructor verifies that you completed an SSI training program, your digital certification or recognition cards are viewable in the app.
- You can still purchase a physical card from your SSI Training Center.

Digital Dive Log

- Choose a dive site from SSI's database, or use GPS to create a new site.
- Choose from dive activities like Extended Range, CCR, and Freediving.
- Earn awards and recognition levels for reaching experience milestones and logging dives.
- Digitally share dives and sign logs with your personal QR code, or have your buddy, dive professional or SSI Dive Center verify your dive experiences with theirs.
- Download your dives directly from your dive computer (only available on selected computers).
- Share your experiences with family and friends with Facebook.

SSI Network

- Stay connected with your diving community and find new and interesting dive sites.
- View relevant industry news and find nearby SSI Training Centers.
- Learn about upcoming events in your area with the SSI Event Calendar.

Digital Insurance

- Show proof of accident and travel insurance plans (available from select insurers).

Navigating the Digital Learning Materials

Page Menu

Pencil Icon

- Use this icon to add notes for the page.
- You can add notes for the entire page, or add notes to specific paragraphs.

Bookmark Icon

- Use this icon to mark specific pages for future reference.

Navigation Menu

Back to MySSI Icon

- Clicking this icon will return you to your MySSI landing page.

Navigation Menu Icon

- This icon opens the Table of Contents menu.

My Bookmarks Icon

- This icon opens the list of pages you have already bookmarked.

My Notes Icon

- This icon opens the list of notes you have already created.

Page Navigation Icons

- These icons allow you to navigate through the materials.

Table of Contents Menu

Unseen Pages Icon

- Clicking this icon shows you any pages that you have not viewed.

Incomplete Reviews Icon

- Clicking this icons shows you any review that you have not passed.

Show Bookmarks Icon

- Clicking this icon shows you any pages that you have bookmarked.

Show Notes Icon

- Clicking this icon shows you any pages with notes that you have written.

Reset Filter

- Click this icon to reset all your filters.

Search Bar

- Use this bar to search for specific words or phrases within the program.

Section 1

Your Body and the Aquatic Environment

Objectives

At the end of Section 1, you will be able to:

1. List five air spaces in the body that can be affected by increasing pressure and describe its effects on these air spaces.
2. State the procedure used to equalize pressure in the ear during descent.
3. List the individual components of the Snorkeling System.
4. Describe the effects of depth on light penetration and body heat loss.
5. Describe the most effective and efficient breathing pattern for SCUBA.
6. List three Basic Rules of Scuba.

Introduction

If students have completed the academics (manual, videos, review questions) through home study before this session, you only need to make sure they understand the session content.

If you are conducting a traditional program, you can adapt this section to fit your classroom needs.

Correct the Review Questions for Each Session and Discuss Further Questions

If students have studied and come prepared to class, then you just need to ensure they understand the applicable information by asking content-related questions and conducting Diamond Dialogues and Workshops.

The Ultimate Dive Experience

You've just taken your first step toward becoming a diver for life! You're on your way to exploring a magical, mysterious and captivating world that has gone untouched and unchanged for centuries or even millennia. The knowledge and skills you build now will stay with you as you jump in for your first "Ultimate Dive Experience" — as well as many more after that.

Before you dip your fins in the water, you'll need to prepare yourself to embark on your journey toward becoming a diver for life with some important information about diving. Combined with the pool sessions that are part of your SSI Open Water Diver course, the knowledge you build studying this information will help you explore the planet's last great frontier for the rest of your life!

SSI offers the best diving education programs in the industry, which means that by completing the Open Water Diver course, you'll be ready to have the ultimate dive experience every time you jump in. As leaders in dive training, we take our responsibility seriously to ensure that the beautiful underwater landscape stays pristine for generations to come.

SSI, your Dive Center and your Dive Professionals all support the ongoing efforts to protect our oceans, coral reefs and all aquatic environments for future generations. In the early days of sport diving, the oceans were seen by many as an indestructible, self-renewing resource. We know now that it can be fragile at the hands of humans and exploration. We also know that it has an impressive capacity for regeneration when given the chance. Always dive as the guest that you are in this new environment. As long as you do, you will be welcomed and have many opportunities to return.

As an SSI diver, we encourage and invite you to share responsibility for protecting these valuable resources. One simple way you can participate is to embrace a personal ethic of leaving nature the way you find it. Many dive boats and dive resorts already have this policy, so we hope you will adopt this model and support it. Your behavior can help ensure that divers of the future will still be able to experience and enjoy the beauty of our aquatic world. Now, let's get started!

Effects of Pressure on the Surface and Underwater

To get started with your new adventure, you will first learn how pressure affects your body in air and water. Right now, you may not be aware of the air pressure surrounding your body on land because it is evenly applied in all directions. However, most individuals have felt the effects of pressure changing while flying or traveling to the mountains. You would recognize this feeling by your ears "popping."This phenomenon represents your body's adjustment to a relatively mild pressure change.

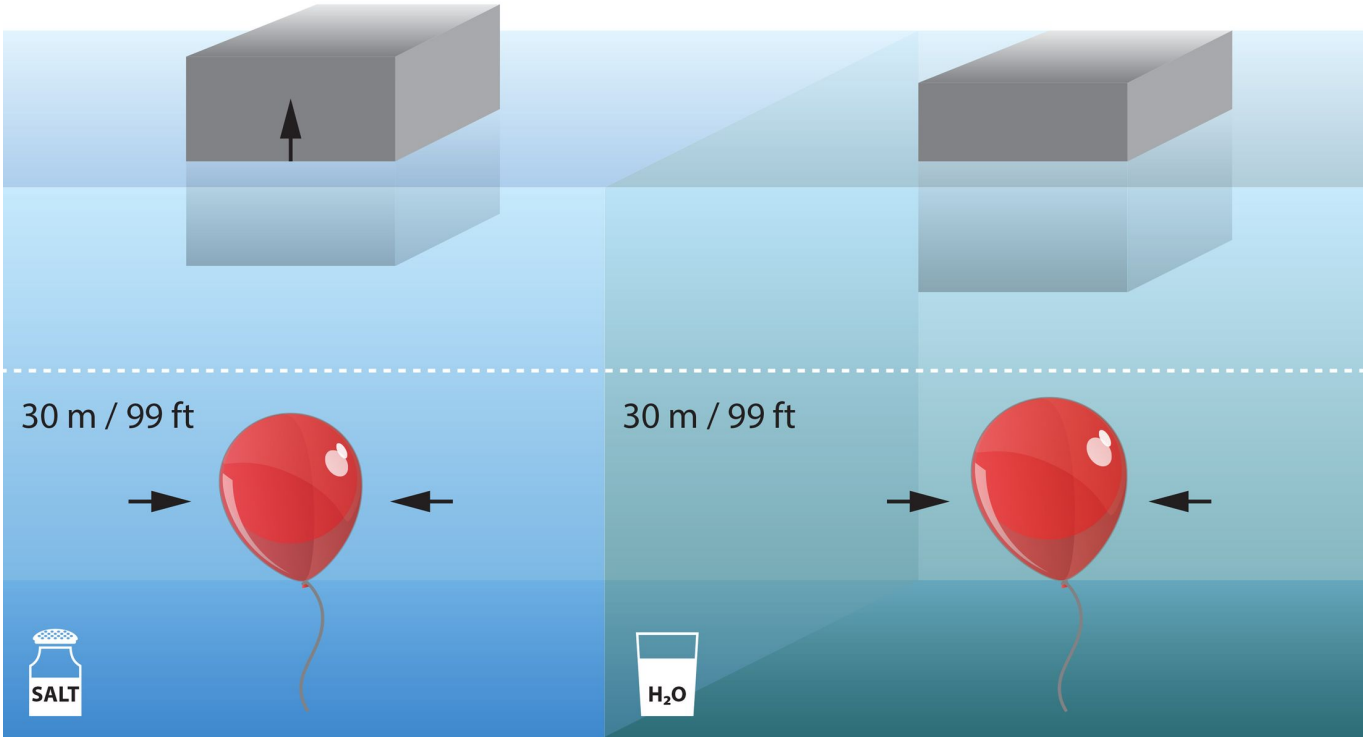
You might also have some experience with your body adjusting to water pressure changes. Have you ever experienced discomfort in your ears while descending to the bottom of a swimming pool? That discomfort is caused by the building pressure of the water against your eardrums as you descend. Now, imagine how it would feel to dive even deeper, 10 or even 20 meters below the surface — the discomfort would quickly give rise to pain and possible injury. To avoid injury, divers must be aware of immediate pressure changes upon descent and understand the effects of pressure on the human body.

The Weight of Air and Water

We know that air weighs approximately 1.29 grams per liter. One atmosphere — which represents the weight of a column of air one square centimeter extending from sea level to the outer edge of the Earth's atmosphere (about 400km) — equals about 1.0 bar of pressure. We are not usually aware of this air pressure because it is evenly applied on our bodies.

Pressure is defined as force per unit area and is commonly expressed in bar in the metric system and pounds per square inch (psi) and atmospheres in the Imperial system. It is common to think of pressure in terms of the number of bars and atmospheres.

However, we do become aware of pressure changes when we enter the water environment. Both freshwater and salt water weigh considerably more than air. Freshwater weighs 1.0 kg per liter, and salt water weighs 1.025 kg per liter. That means that a liter of water is about 800 times heavier than a liter of air — a pretty significant difference! An increase of 1 bar of pressure underwater takes place in a relatively short distance: only 10 meters sea water (msw) or 10.2 meters fresh water (mfw).



For each additional 10 meters of descent in saltwater or 10.2 meters in fresh water, another bar is added to the pressure on our bodies.

Pressure-Related Diving Injuries

Pressure-related diving injuries occur when a sufficient pressure differential exists between ambient pressure and the pressure in the air spaces in our body, or gas spaces that are in contact with our body.

Our bodies are almost three-fourths liquid, and the liquid portions of our bodies have no difficulty with pressure changes. At the depths that sport divers dive, the liquid areas of the body are incompressible. This means that they will not change as pressure increases or decreases. Gases, however, are compressible. Pressure on air-filled spaces in the body — from lungs to microscopic spaces in dental fillings — will compress and expand as the ambient pressure changes.

Squeeze: Primary Effects of Pressure on Descent

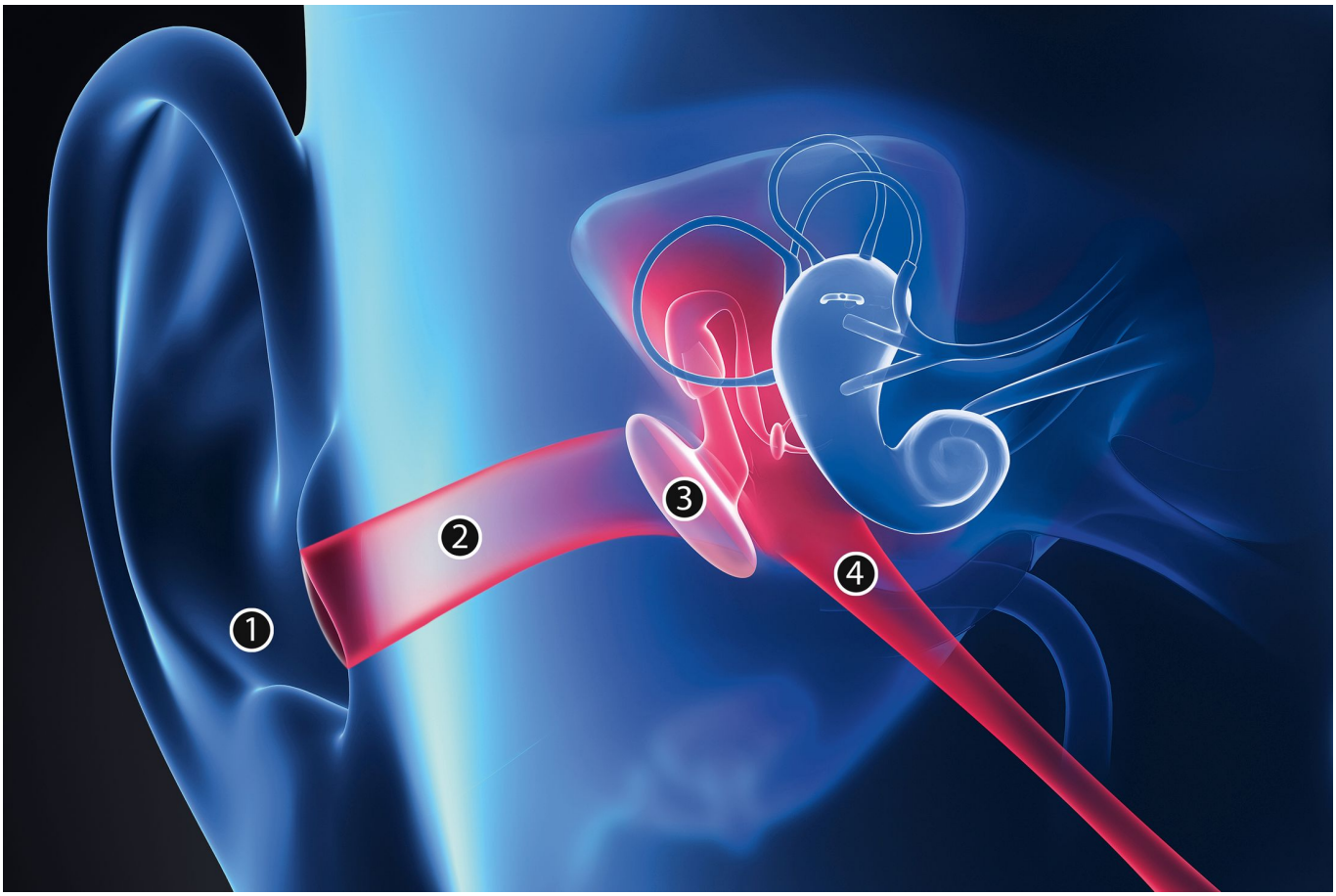
Pressure equalization protects against a condition known as "squeeze," the uneven application of pressure. Squeeze is always uncomfortable and, unless dealt with promptly, can lead to tissue damage. You will learn the proper equalization techniques for each body air space that can be subjected to squeeze — your ears, sinuses, lungs, teeth and intestines.

The Ear

Your ear is made up of the outer ear, the outer ear canal, the tympanic membrane, the middle ear and the Eustachian tube. The tympanic membrane, or eardrum, is a relatively thin membrane that seals off the middle ear from the external environment (air or, in our case, water). This membrane and its connective tissue are the most sensitive areas for squeeze.

The middle ear and the inner ear contain the body's balancing and hearing mechanisms. Separating the middle ear from the inner ear are two of the thinnest membranes in the human body, the round and oval windows. These membranes embody one of the reasons you are taught to gently blow to equalize your middle ears — damage to the round or oval windows may cause a leakage of fluid from the inner to the middle ear. This can cause a ringing or roaring in the ears, and even hearing loss. Window rupture can also cause severe vertigo and vomiting, a dangerous combination when underwater.

The Eustachian tube connects the middle ear with the back of the throat and allows air to pass from the throat into the middle ear. The Eustachian tube is very important to the equalization process.



1. Outer Ear 2. Ear Canal 3. Ear Drum 4. Eustachian Tube
Image © iStock

As a diver descends, external pressure (water) on the tympanic membrane increases and pushes the eardrum inward. If the diver fails to introduce additional air into the middle ear through the Eustachian tube, ear squeeze can occur.

Ear squeeze (aerotitis or barotitus media) is easy to recognize and prevent. It is the same discomfort felt when you dive underwater even in a shallow swimming pool. This discomfort or pain is the primary symptom that indicates that the eardrum and its connective tissue are under stress. Pain generally occurs before the eardrum ruptures, and it is an indication that some tissue damage may already be taking place. Therefore, you should never wait for pain to begin to start equalizing — a technique you will learn.

Injury can occur with a pressure differential of as little as 0.1 bar at a depth of only 1 meter. Even the added pressure of just 30 cm more of depth can lead to a perforated tympanic membrane. The most immediate result of a perforated tympanic membrane is loss of hearing, and with water rushing into the middle ear, the diver could experience vertigo.

Ear Squeeze usually occurs during descent and is extremely rare upon ascent. If you feel pain on the ascent, immediately stop and then slowly continue your ascent. If ear pain persists after a dive, or if there is blood in the ear canal (indicating a perforated eardrum), do not put anything in your ear and contact a physician.

The Sinuses

We have four pairs of sinuses: the frontals, the maxillaries, the ethmoidals and the sphenoidals. Sinuses are hollow spaces in the bones of the skull. They lighten the skull, warm and moisten the air we breathe, and cause our voices to resonate. Sinuses are lined with mucous membranes and are connected to the nasal passage by narrow tubes which can become blocked by congestion or irritation.

Sinus squeeze (aero sinusitis) occurs when congestion traps air in a diver's sinuses. As the diver descends, increasing pressure can cause the sinus membranes to rupture. If this happens, the result is that air in the sinuses is replaced by blood and tissue in a process of pressure equalization.

The first sign of sinus squeeze is usually a sharp pain or wedging sensation directly above the eyes. If you ignore the pain and pressure and continue descending, minor tissue damage occurs, resulting in a slightly bloody nose when you're done diving. Most divers have experienced sinus squeeze and it does not require medical treatment. However, if pain or congestion persists, consult your physician.

Sinus squeeze can easily be prevented by not diving with a cold or congestion. Do not use decongestants unless you have consulted your physician and explained that you will be taking medication while diving.

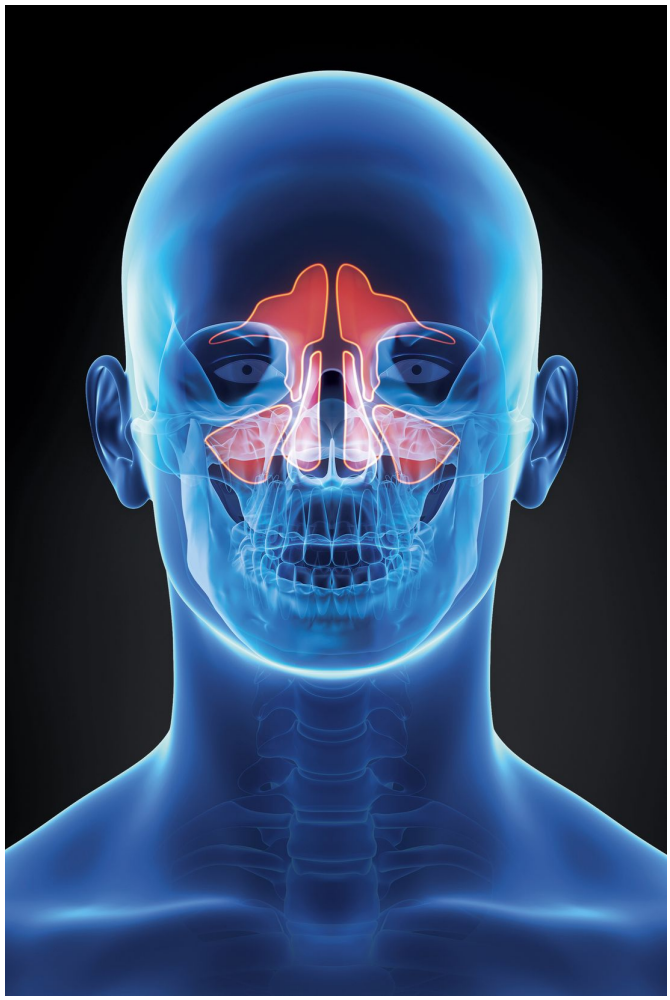


Image © iStock

The Lungs

Lung squeeze (thoracic squeeze) does not occur while scuba diving, but it can occur when snorkeling or freediving. If you descend even 1 – 2 meters below the surface without filling your lungs with air, the water pressure can compress the small residual volume of air in your lungs. This can cause your lung walls to collapse or, at greater depths, the lining of your lungs to rupture and release blood and fluid into your lungs in the process of equalization.

When you freedive, you can easily prevent lung squeeze by completely filling your lungs with atmospheric air prior to descending, staying above 20 meters and not releasing any of this air until you reach the surface.

Lung squeeze is easily prevented by taking a normal breath before descending while freediving.

Image © iStock

Equipment-Related Squeeze

There are two equipment related squeezes: mask squeeze and suit squeeze.

Mask Squeeze

Your mask forms an almost rigid pocket of air around your nose and eyes. Just like all squeezes, pressure increases, volume decreases and this pocket of air compresses against your face. Since your eyes and surrounding tissues are supplied with blood at ambient pressure, the difference between the pressure in your bloodstream and the air in your mask can cause surface capillaries in and around your eyes to rupture. This doesn't cause much pain, but you might not look very pretty. In severe cases the optic nerve can be damaged and blindness may occur. If you have any visual distortion after a mask squeeze consult a physician immediately.

Mask squeeze is easy to prevent! Ask your SSI Dive Professional to properly fit you for a mask and exhale into your mask every meter while descending.

Equalization Techniques

Prevention of ear squeeze is easy. The following equalization techniques relax the muscles that control the opening of the Eustachian tube and allow air to enter the middle ear at ambient pressure:

- Swallowing
- Rotating the jaw
- Valsalva technique

Valsalva technique

To perform the Valsalva technique, simply pinch your nostrils closed and blow gently until the pressure is equalized. DO NOT BLOW TOO HARD or try to force air into the middle ear. The Valsalva technique should be used very carefully with practice only after swallowing and jaw rotating do not work.

Rules for Equalization:

- Breathe Continuously and Never Hold Your Breath! This ensures proper equalization of your lungs on descents and ascents.
- Never Wait for Pain to Begin Before Equalizing! On descent, immediately begin to equalize, relax and equalize often throughout your descent. If possible, descend feet first in an upright position or by using a descent line.
- Never Dive With a Cold or Congestion. Mucus blocks the Eustachian tube, making equalization very difficult.
- Never Dive With Earplugs!

If pain develops, stop your descent using your fins or line; ascend until the pain stops. Try equalizing again. If the pain persists do not dive. If you feel pain on the ascent, immediately stop and then slowly continue your ascent.

The Snorkeling System

As we have already discussed, there is a definite link between owning your own equipment and your comfort in the water. This is because the equipment is personally fitted to you. This is your Total Diving System.

Your Total Diving System is made up of six sub-systems. In this section, we are only going to talk about the Snorkeling System.

Your Mask

Your dive mask is the first component of the Snorkeling System and gives you clear vision underwater, protects your face and eyes from irritants in the water, keeps water out of your nose and gives you some protection from cold water.

Unlike our amphibious ancestors, our eyes are adapted to see through air, not water. That's why, when you open your eyes underwater, your vision is blurred. The diving mask places a layer of air between your eyes and the water to allow clear vision underwater.

You should never wear goggles when diving below the surface of the water. Since goggles do not cover the nose, there is no way to equalize the air pressure around your eyes when you descend — causing eye damage.

1. Positive Locking Device 2. Frame 3. Lens 4. Nose Pocket 5. Mask Strap
Image © Cressi

Selecting the right mask requires the assistance of your SSI Dive Professional. The mask will be fitted to the contours of your face. A double seal along the mask edge is very effective in keeping water out. Flexible mask straps or comfort straps comfortably secure the mask to your face and locking devices keep your mask strap from slipping.

The lenses of your mask should be tempered glass to resist scratching and breaking. Most high quality masks today are also made with non-allergenic silicone. These materials are the softest and most durable. Some masks utilize two types of silicone: a harder compound near the frame for structure and stability and a softer compound close to your face for comfort and a perfect seal. Just as important, your mask should give you a good range of peripheral vision.

To test the fit of your mask, simply place the mask on your face without the help of the mask strap and inhale gently. If the mask stays, it fits. It's that easy!

Image © Mares

If you wear glasses, a high-quality mask gives you the option of putting your prescription in the mask lenses. Diving with a prescription mask can provide more improved vision for many divers than diving with contact lenses due in part to pressure changes underwater. Consult your SSI Dive Professional for more information concerning prescription lenses or contacts.

To prepare your mask for diving, clean it with an approved mask cleaning compound. Before each dive, simply apply a special anti-fog solution that you can get from your SSI Dive Center to maintain clear vision throughout the dive. Clean again to remove oils and contaminants whenever the anti-fog alone does not work.

Clearing water from your mask is a relatively simple skill you will learn and practice over and over. While diving, if water happens to enter your mask, merely tilt your head back and apply pressure to the top rim of your mask and start exhaling gently through your nose. It's really that easy.

Image © Aqualung

Snorkels let us swim on the surface and watch the world beneath, and they let us maneuver on the surface easily and breathe without lifting our heads out of the water. As part of the Total Diving System, the snorkel can help you conserve the air in your cylinder by using your snorkel to surface-swim to a dive site.

For unrestricted breathing and easy clearing, a snorkel should have a smooth internal construction with a large bore and self-draining vent, be made of relatively flexible material and have a comfortable mouthpiece. Your SSI Dive Professional will help you select the most comfortable snorkel for you.

Before you dive down, simply take a good deep breath from the snorkel. As you descend, the snorkel fills with water. Once back on the surface, most of the water will drain out through the built-in purge valve. To clear the rest of the water from your snorkel, exhale sharply and the remaining water will be displaced through the same valve. Your SSI Dive Professional will train you on proper breathing patterns and how to properly empty the water from your snorkel.

1. Mouthpiece 2. Self-Draining Purge Valve 3. Flexible Tube 4. Dry or Semi-Dry Vent
Image © Scubapro

Unlike swimmers, snorkelers and scuba divers do not use their arms for propulsion. Fins provide 100% of our propulsion. Fins are not built for speed — they are designed to propel the scuba diver effortlessly at a moderate rate of speed to cover great distances with low energy output. The right fins make the difference between an easy, fun-filled dive and a difficult, tiring one. During class, you will learn that for the best performance, you should kick your fins with your legs stretched out, kicking from the hips rather than the knees.

Today's fins are lightweight and sleek compared to fins of the past. You also have a few material types and combinations to choose from, including technopolymer and rubber. Technopolymer fins are usually thinner and lighter than rubber fins, offer more thrust and can help your buddy keep you in sight when made of high-visibility colors.

There are two types of fins: full-foot fins designed to be worn without dive boots, and open-heel fins designed to be worn with dive boots. Fin straps should have an adjustable heel strap with locking device unless they are of a stretchable type, such as bungee straps or stainless spring straps. The heel straps should be replaceable in case of wear or breakage (and it's always a good idea to carry an extra set of straps!). The fins should have a wide, fairly rigid blade to give more thrust and greater kicking ease. To be properly balanced, fins should be nearly neutrally buoyant in both fresh and salt water.

1. Blade 2. Vent 3. Foot Well 4. Buckle 5. Heel Strap
Image © Mares

Your Dive Boots

Dive boots are worn with open-heel scuba fins. They protect the foot from chafing in the foot pockets, from cold temperatures and from abrasion while walking to and from the dive site. Check with your SSI Dive Professional to find the right type and fit of boots and fins for you.

Your Exposure Suit

When you dive, you need thermal protection to keep you warm and comfortable. Just as you need appropriate clothing for different temperatures and activities on land, you also need appropriate protection for different diving situations.

Exposure suits (also known as wetsuits, drysuits, dive skins, and others) are made from a variety of materials and are designed to protect you in different water environments. Your SSI Dive Professional will work with you on selecting the type of exposure suit for your type of diving. We'll talk more about exposure suits in Section 2.

Your Mesh Bag

Your mesh bag holds all of your equipment and makes it easy to rinse in fresh water after a salt water dive. Maintenance is important to ensure your dive equipment's long life of good service.

Image © Aqualung

Maintaining Your Equipment

Here are some valuable tips for keeping your snorkeling equipment in top condition:

- Mark your dive equipment with your name or initials.
- Record all equipment in your SSI Total Divelog, MySSI and mySSI.
- After any dive, thoroughly rinse your equipment with fresh water and allow it to dry in a cool, well-ventilated area.
- Take special care of your mask.

If you want to learn more about taking care of your equipment, ask your SSI Dive Professional about the SSI Equipment Techniques course. You will be glad you did!

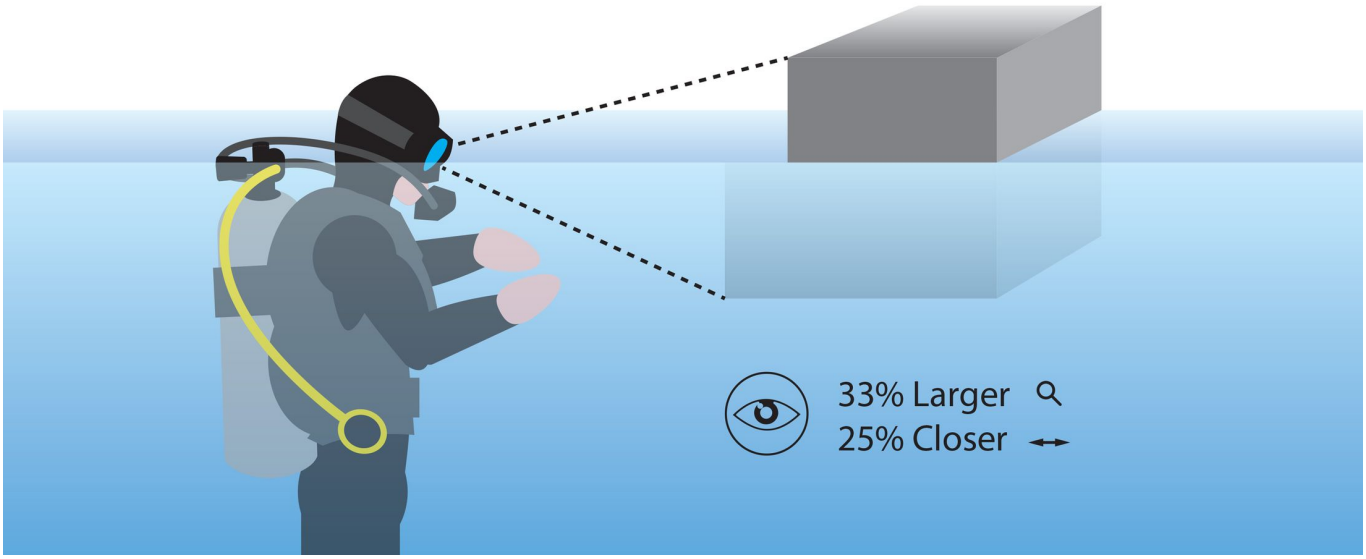
Adaptation to the Aquatic Environment

During your Dive Sessions you will learn basic snorkeling and freediving skills. While it may not seem necessary to learn these skills if your goal is to become a diver, these skills can come in handy. If, for example, you ever find yourself on the surface away from the security of land or your dive boat, simply inflate your Buoyancy Compensator (BC), put your snorkel in your mouth, and swim - it's that simple!

The aquatic environment is a beautiful, exciting place — but you might feel challenged by the many new sensations the water offers. Let's preview some of the things you might notice when you first begin to freedive, snorkel or dive.

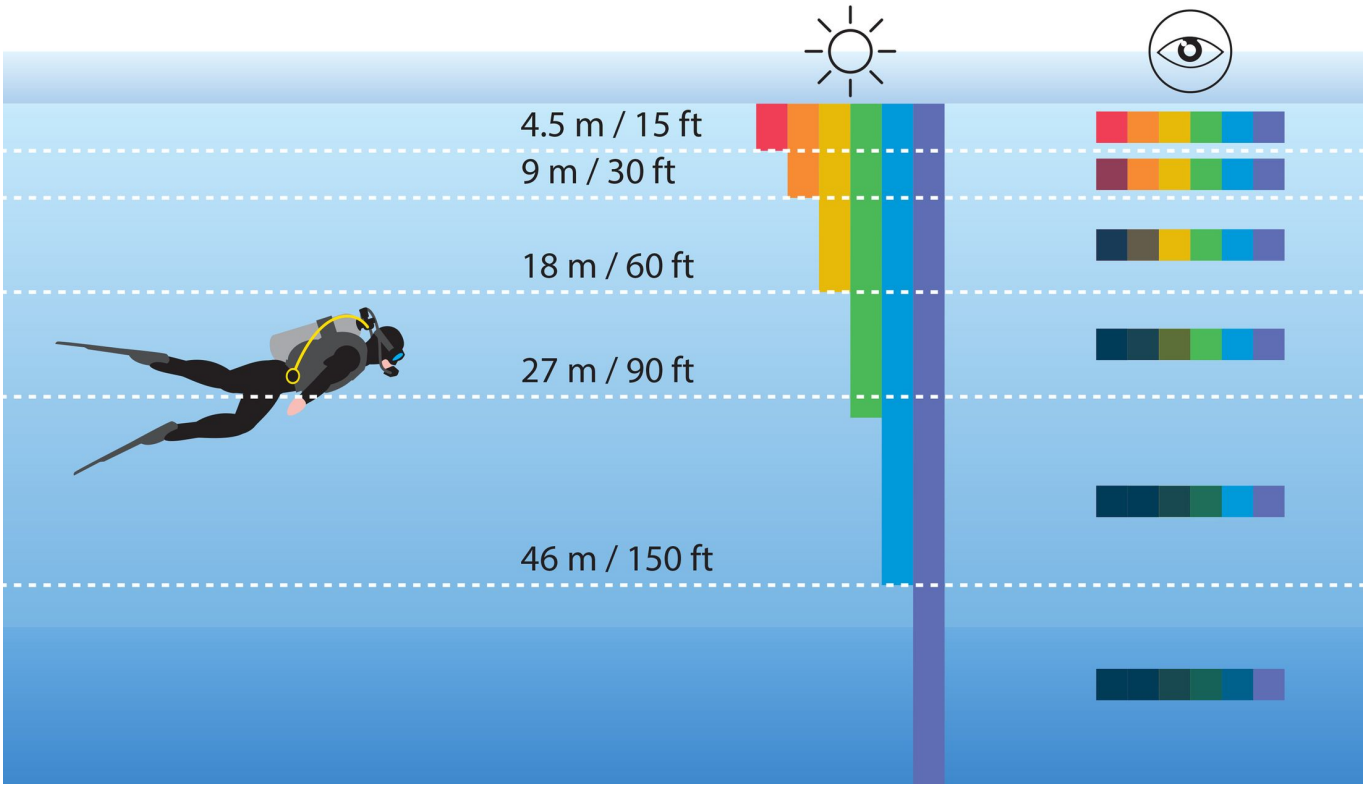
Vision Underwater

Underwater, vision changes in unique ways and you will experience an interesting optical illusion called refraction. Light rays bend as they pass from water into the airspace in your mask. This makes objects look 33% larger and 25% closer. This means that a 1 meter long fish you are looking at from a distance of 1.33 meters, will look like a 1.33 meter long fish at a distance of about 1 meter.



The illumination, or amount of light in the water, will vary according to the position of the sun, clouds, and surface wave conditions. Heavy water movement diminishes light penetration. In addition, light spreads when it encounters water molecules, it becomes softer, less harsh, and the intensity is decreased. This is called diffusion.

The deeper we dive, the more warm colors — such as red, orange, yellow — diminish in intensity and virtually disappear until we see only blues and purples. This is called absorption.



Particles in the water (turbidity) can also limit vision. Light rays break up in fantastic patterns as the water moves and diffuses the light. Variables affecting visibility underwater — refraction, illumination, absorption, diffusion and turbidity — can make the same diving spot look very different throughout the day.

Underwater Communication

Since we cannot talk underwater, we need to communicate by using hand signals. Pictured here are the most commonly used hand signals. Review these hand signals before heading to the pool. You can review them again before diving on the mySSI app.

Safety Stop

How Much Air

Half Air

Equalize

Direction

Cut

Come

Low on Air

Out of Air

Share Air

Ok?/Ok.

Ok?/Ok. (One hand occupied)

Ok?/Ok. (On surface at a distance)

Me/Watch Me

Level Off/This Depth

Ears Not Clearing

Go Up

Go Down

Stop/Hold It/Stay There

Question

Distress/Help

Something is Wrong

I Am Cold

Ship/Boat

Get With Buddy

Sound behaves very differently underwater than it does in air. Sound travels four times faster underwater and seems to come from all directions. This is because our ears have not adjusted to the increased speed. Sound is very poorly transmitted from air to water or from water to air, but sounds made underwater travel great distances.

If you cannot get your message across with hand signals, there are other underwater devices that can be used for communication, such as writing slates or wet notes.

Image © Subgear

There are also other signaling devices you can use for getting your buddy's attention, or the whole group's attention, such as your diver's tool or shakers. You can use your diver's tool by banging on your cylinder and a shaker for creating a loud sound. Both can be heard from a distance.

Clear communication is a key element. Therefore communication techniques should be discussed with your buddy prior to any dive.

Developing Proper Breathing Patterns

On your journey to becoming a diver, you may feel a little anxious when it comes to breathing underwater. However, you can breathe easy knowing breathing underwater is no different from breathing on the surface. One of the things that makes diving so amazing and freeing is that we carry our own life support system with us. This allows us to be untethered from the surface, and we can literally "fly" through liquid space. Now, the excitement of breathing underwater for the first time might increase your breathing rate. But once you are comfortable underwater you will gain control over your breathing and achieve a slow relaxed breathing pattern.

Your Delivery System is your underwater life support. The air you breathe with the Delivery System is delivered through a regulator, which automatically regulates cylinder pressure to ambient pressure, allowing you to breathe underwater effortlessly. As a recreational diver, the most common scuba system you will dive with is called an open circuit demand system. "Demand" means that the regulator will provide air as you need it. It also means that once you take a breath and exhale, this much of your air is now gone — hence the term "open circuit."

Recreational divers can also take advantage of the latest diving technology. Closed circuit, electronic rebreathers are similar to the Primary Life Support Systems used by astronauts. They recycle and recondition the gas breathed by the diver and provide increased dive time. Because there are no bubbles, divers can frequently get much closer to marine life they wish to observe or photograph. If you are interested in diving a rebreather, ask your SSI Dive Professional about the Rebreather program.

The regulator provides the diver with a "sufficient amount of gas at ambient pressure." Sufficient amount of gas at depth is determined by environmental conditions, the amount of work we do underwater and our physical conditioning.

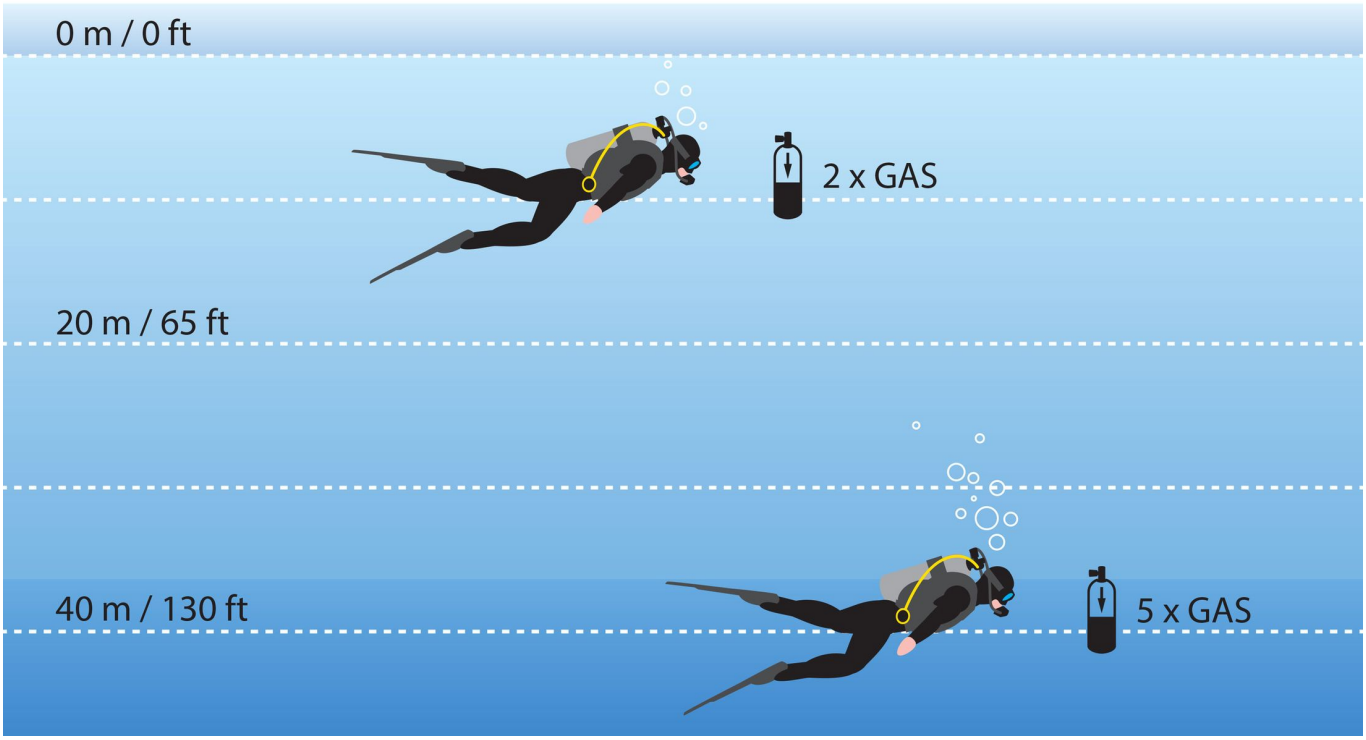
The most efficient breathing pattern for scuba is a deep inhalation followed by an even exhalation — deep, balanced and rhythmic. The key is to relax in the water and realize that your breathing pattern will automatically become normal with experience.

While at rest, we normally breathe about 6 to 12 liters of gas per minute. A warm and comfortable adult diver with minimal experience will breathe 12 to 15 liter per minute. This is useful as our scuba cylinders are rated in capacity by the amount of gas they hold in liters. For example, a 12 Liter cylinder filled with 200 bar (the most common cylinder) would last a diver with a surface consumption rate of 15 liters per minute a total of 160 minutes. We will discuss this more later, but a simple formula can be used to determine how long a cylinder of gas will last you at any depth.

The amount of gas that we use while diving, also known as our air consumption rate, can increase by 3 to 4 times if we are working heavily, if we are cold due to inadequate thermal protection, if we are in poor physical condition or if we respond improperly to anxiety-producing situations.

Excessive air consumption on the surface is not a problem, but when carrying a limited gas supply at depth, it becomes a significant consideration. Steel or aluminum scuba cylinders are typically filled in the range of 150 to 300 bar of compressed breathing gas — more than enough for the average sport diver, but still a limited gas supply.

Air consumption also increases in direct proportion to the depth you are diving — the deeper you go, the more gas you use, thanks to Boyle's Law. For example, a diver at two bar absolute (10 m) uses twice as much air as a diver on the surface at one bar absolute. A diver at five bar (40 m) uses five times as much air as a person on the surface. In addition, a diver sharing air with another diver can increase air consumption by a factor of two or more.



The Information System

Another component of your Total Diving System is the Information System. The Information System is designed to assist you in preparing and following a dive plan. It consists of your Dive Computer, Analog Instruments and your SSI Total DiveLog.

Analog Instruments

Submersible Pressure Gauge (SPG)

The SPG is the diver's "fuel gauge." It is the instrument that tells the diver how much breathing gas remains in the scuba cylinder. The gauge attaches to a high pressure port on the first stage of the regulator. Some things to look for include large markings and scratch resistant lenses. Gauges are available in imperial and metric units and can be digital as well as analog. The SPG should be monitored frequently throughout the dive.

Depth Gauge

Knowing your depth is important in adhering to your dive plan. You need to know when you have reached a targeted depth and you need to monitor your current depth to ensure that planned limits are not exceeded. Most analog depth gauges are calibrated at meters sea water (msw) and some are equipped with a maximum depth indicator which records the deepest point reached during a dive. Some analog depth gauges also have altitude compensation.
Digital gauges are more accurate than analog gauges and are standard in all dive computers.

1. Dive Depth 2. No-Decompression Dive Time Remaining 3. Pressure Gauge 4. Air Type
Image © Aeris

Timing Device

The most prevalent of the timing devices is the dive computer, but the dive watch is also an option for your timing device. The watch, of course, tells time, but it also helps the diver keep track of the time elapsing during a dive. A one-way bezel around the perimeter of the watch face is set at the start of the dive to indicate how many minutes the actual dive has been under way. Digital watches show time and elapsing time automatically with continuous readouts.

Another timing device is the dive timer. This instrument is automatically activated by pressure as the diver descends and it stops when the diver returns to the surface, thus showing the total time a diver has spent underwater. Dive timers keep track of time spent on the surface between dives as well. Watches should be rated to a depth of at least 100 meters or, better yet, 20 bar. Digital timing devices are a standard feature of dive computers and automatically record the total time for dives.

Your SSI Total DiveLog

With DIGITAL LEARNING - REAL DIVING, the final element of your Information System is your SSI Digital DiveLog – a permanent record of your certification information, beginning with your classroom, pool and open water training dives. Your SSI Digital DiveLog is not only important for validating experience, it also allows you to evaluate dives and make adjustments before your next dives.

If your preference is to have something you can physically hold and write this information down, ask your Dive Center or Dive Professional about the SSI Total DiveLog – two versions – paper or the cordura binder model. With the cordura binder, you can personalize your divelog with certification card holders and dive tables. Both have an equipment section, maintenance records and health and medical information

The Buoyancy System

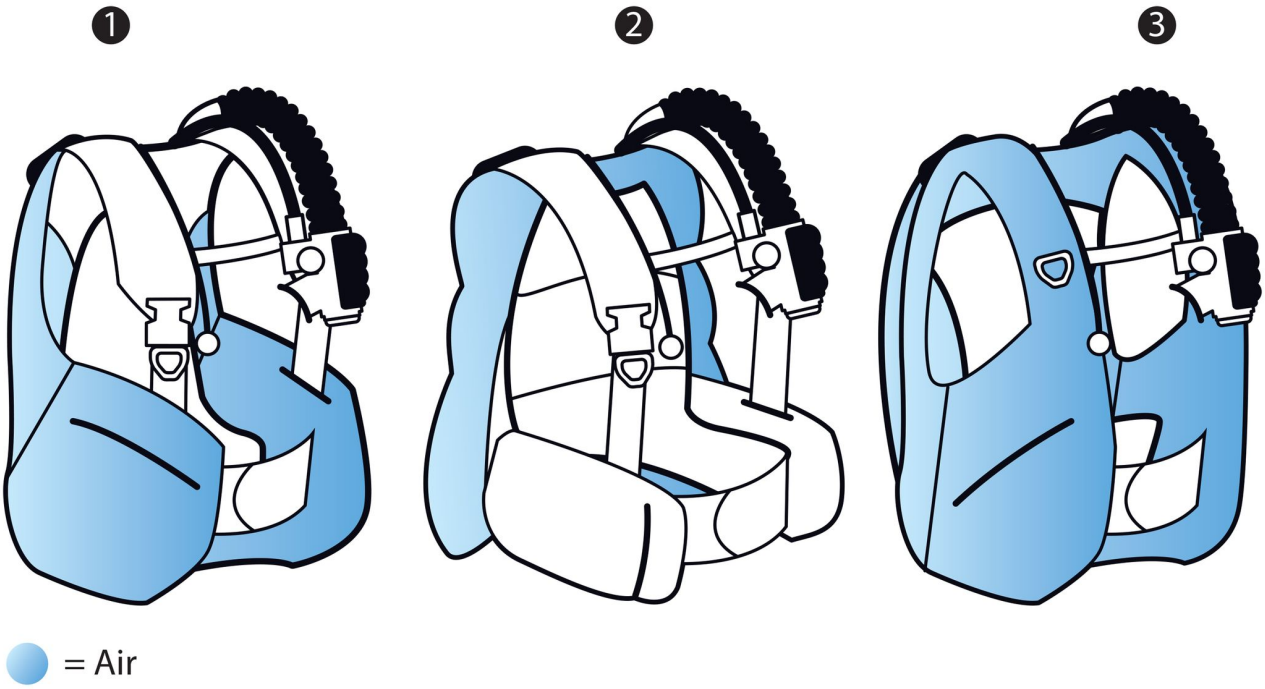
To keep you "flying" through the water without having to fight against your natural buoyancy, you'll use a Buoyancy System. It will help you descend to begin your dive effortlessly, stay neutral when you've reached a particular depth, and ascend when you're ready to return to the surface. Your Buoyancy System has two main parts: the Buoyancy Compensator (BC) and the weight system.

Your Buoyancy Compensator

Your Buoyancy Compensator (BC) is the main component of your Buoyancy System. Your BC provides you with surface flotation and is used to control your ascents and descents. You can easily control your descent by letting air out of your BC slowly. As you descend, the suit will compress and you simply add small amounts of air to your BC to remain neutral throughout the dive. Once you reach the surface, simply fill your BC for positive buoyancy.

The most important choice for a BC is fit and lift to keep a fully equipped diver floating on the surface.

Selecting the right BC requires the assistance of your SSI Dive Professional. The BC will be fitted to the contours of your body and will be suited to the type of diving you are planning. BCs are usually made of coated nylon welded together. Modern BCs come in various styles, such as single- and double-bladders and back-mount or hybrid flotation devices. In addition, BCs are equipped with dump and overexpansion valves at the shoulder and back for releasing gas from the BC in a head-down position.



1. ADV-Jacket/Front-Adjustable 2. Wing-Jacket/Back Flotation 3. Stabilizing-Jacket

1. Adjustment Strap 2. Inflator Hose 3. Overpressure Relief Valve/Dump Valve 4. Buckle 5. Weight with Weight Release
Image © Scubapro

BCs are equipped with an inflator for orally inflating and deflating the BC. You can also inflate your BC with a power inflator attached to the first stage by pressing a button to introduce air into your BC. As well, you can deflate your BC with a pull dump valve.

When trying to deflate the BC, always remember that air tends to follow the highest point of the BC. So, the easiest way to deflate your BC is by rolling into a vertical position and lifting your inflator high while pressing the deflate button or pulling the dump valve.

Some manufacturers have even developed mechanical or pneumatic inflation/deflation systems which allow the diver to stay in the swimming position and simply press or pull the pneumatic inflator.

Neutral buoyancy allows you to maneuver effortlessly and consume less air. Suspended in liquid space, you are neither descending nor ascending. You are in total control.

The Basic Rules of Scuba

Now, before we go get in the water, let's review the Basic Rules of Scuba.

The First Rule of Scuba: Breathe continuously!

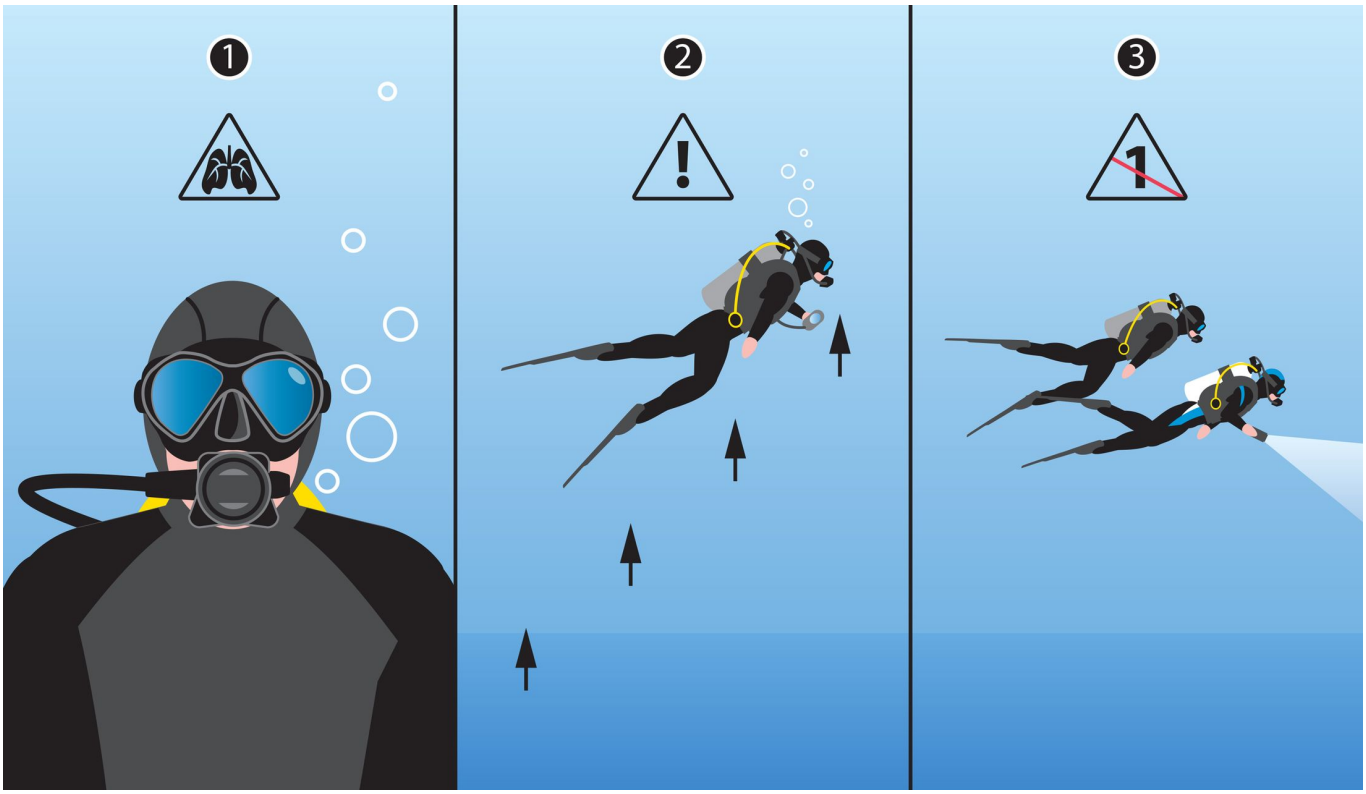
By breathing continuously, you will avoid a condition called overexpansion. Lung overexpansion would occur if an untrained scuba diver ascended from depth without exhaling. By applying Boyle's Law, you can see that if a diver's lungs were filled with compressed air at depth and (since as pressure decreases, volume increases) he held his breath while ascending, his lungs would expand. This would cause serious injury.

While you are on scuba, you must breathe continuously in and out in a rhythmic pattern. If your regulator is out of your mouth at depth for any reason, you should always exhale a small stream of bubbles.

The Second Rule of Scuba: Ascend slowly and maintain control!

The best way to control your ascent is by watching your dive computer. Never exceed an ascent rate of 9 meters per minute. Most dive computers have an ascent alarm to tell when you are ascending too fast.

The Third Rule of Scuba: Never dive alone or beyond your level of training!



1. Breathe continuously 2. Ascend slowly and maintain control 3. Never dive alone or beyond your level of training

As an open water diver, your maximum depth is limited by your training. Never dive alone or beyond your abilities.

Opportunities in Diving

Your diving opportunities are only limited by your imagination and your physical capabilities. Recreational diving is the "Ultimate Dive Experience" to be enjoyed with family and friends. Your diving adventures can take you to the most spectacular places in the world. You can dive reefs and walls, explore wrecks, dive beneath the ice and closely observe marine life both large and small. And with an underwater camera or video, you can bring back exciting images to remember for a lifetime.