

MANAGEMENT



RAIDTM 

STATIC APNEA SPECIALTY

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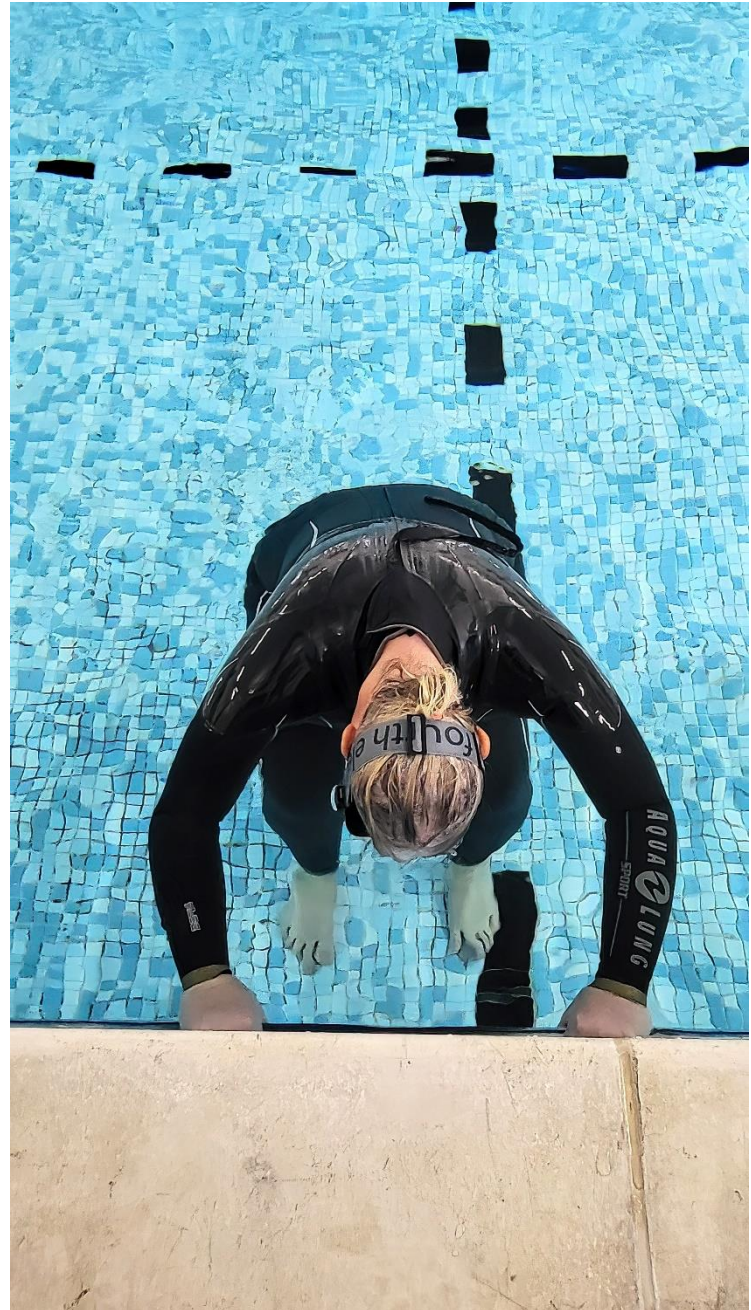
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INTRODUCTION

Welcome to the RAID Static Apnea Specialty, part of the Freediving Program. Static apnea, also known as static breath holding, is one of the most mentally demanding disciplines in freediving. It is a great way to train your mammalian dive response, learn relaxation techniques and mental focus, and to train for other freediving disciplines.

During static apnea, there is no movement, no need to equalize. There is nothing to take your mind off the fact that you are lying face down in a pool, against all common sense, holding your breath. You may be in a public place, where you can hear sounds around you, children playing, people stopping to ask your buddy what you are doing and whether you are OK. You need to concentrate, cut out all distractions, and focus your mind, but you can't. Your thoughts are darting around, conspiring with your mind to get you to breathe.

During this course, you will learn how to perform static apnea safely and confidently, discover new techniques for both relaxation and mental focus, and learn techniques to practice and improve your performance. You will also learn how to buddy correctly and safely for static apnea, including coaching and support techniques to help your buddy's performance, and how to rescue your buddy in the unlikely event they have a hypoxic episode.



WHAT IS STATIC APNEA (STA)?

WHAT IS STATIC APNEA (STA)?

Put simply, static apnea is holding your breath while floating passively, face-down, on the surface of the water. This is typically performed in a pool, and this course will cover proper static technique and supervision for STA. Static apnea is a popular competitive discipline but can also form an important part of your freedive training.

BREATHING FOR FREEDIVING

If you've already completed the RAID Open Water Freediver certification, or Foundation Freediver certification, or completed a RAID Try Freediving course, you will have covered breathing for freediving. Let's recap on what we learned.

The full process of a freedive can be divided into four stages:

1. Relaxation
2. Pre-dive breath
3. Breath hold/dive
4. Recovery breathing

The overall quality and experience of a dive is very much a function of preparation. It's helpful to think of each dive as a circle, rather than a linear, goal-oriented line. In this way, we can better envision the flow from the relaxation stage to the dive, to recovery and relaxation again. If any part of the process is compromised, the circle is broken, and the experience diminished.

RELAXATION

The process of stilling the mind actually comes way before the static apnea breath hold. It is useful to follow a plan, create a preparation strategy that maximizes routine and minimizes stress. Breathing correctly is key to this, ensuring that you do not hyperventilate. By keeping levels of CO₂ stable in the blood and your breathing preparation gentle and relaxed, your body moves into the parasympathetic state and this in turn relaxes the mind.

Freedivers use the relaxation stage to adopt a conscious, calming and relaxed breathing pattern, preparing body and mind for the next dive.

The three goals for the relaxation stage are:

- a) Avoid hyperventilation
- b) Achieve a deep state of relaxation
- c) Focus your concentration on the dive ahead

Avoiding Hyperventilation

When we first start paying attention to the breath, it's perfectly normal to breathe too much, although this is counter-productive to safety, relaxation and oxygen availability.

Breathing too much (hyperventilation), greatly increases the risk of blackout in breath hold diving. As freedivers we avoid hyperventilation by consciously adopting a relaxed, natural, breathing pattern during the relaxation stage.



Tidal Volume Breathing

If you are in the water, rest on the surface and let buoyancy support you. Relax your entire body - using only as much effort as needed to keep your mouth or your snorkel above the surface. We will discuss ways to start your static breath hold later in this manual.

For dry practice, find a comfortable position - use rolled blankets or pillows to support any parts of your body that may need it, such as knees, lower-back, and neck.

Relax your abdomen completely, allowing it to move easily with each breath. Avoid using the middle and upper breathing spaces. After a few minutes of relaxed breathing, the amount of air moving through your lungs will naturally settle toward tidal volume*. If you feel the urge to take a deeper breath or sigh, go ahead. Don't suppress or over-control. Remember, our objective is to avoid breathing too much.

- Reminder - tidal volume is the volume of air you breathe while at rest

Once you've established a comfortable rhythm, try extending your exhalations, gradually making them up to twice as long as your inhalations, whilst ensuring that the volume of air exhaled is the same volume inhaled. When this becomes easy you can introduce a brief pause after each exhalation to amplify the relaxation effect.

This type of relaxed abdominal breathing stimulates the parasympathetic nervous system (relaxation response). Lengthening exhalation and adding a slight pause enhances the effect and can help restore balance if you find you've been over-breathing.

Relaxation

When the breathing pattern has become natural, you may want to let it slip into the background - allowing the body to take control. At this point, any of a variety of relaxation techniques can be helpful.

Here are a few examples:

- Focusing on the sensations of floating in water can very effectively quiet the mind. Let your body move passively with the water, and simply attend to any sensations that arise.
- Body scan - bringing awareness to various parts of your body and consciously relaxing them. In addition to areas of obvious tension, include some you don't normally pay attention to, such as your tongue, eye sockets, ears, etc. The neck in particular tends to hold a lot of tension in freedivers - as we instinctively try to lift our heads out of the water.



Focus

Some people find it useful to visualize the dive during the relaxation stage. It's important to visualize every stage of your dive, and the same goes for a static breath hold. Include all the small details, for example, your body position during relaxation breathing, your pre-dive breath, how you will get into the correct position for the static breath hold and so on. We will talk more about visualization later in the manual and give you some techniques to try in the pool.

PRE-DIVE BREATH

When you are fully relaxed and ready to perform your dive, you will take your pre-dive breath. The pre-dive breath consists of three parts.

1. A quick inhale...

BREATHING FOR FREEDIVING

2. ...followed by a full exhale – attempt to squeeze out as much air from your lungs as you can
3. A three-part breath:
 - Breathe into the abdomen - this includes breathing into the back, front and sides of the abdomen and pelvis
 - Breathe into the ribs - expand the middle breathing space, including both front and back of the ribcage as well as side-to-side (out into the armpit area)
 - Breathe into the upper chest - the last part of your inhalation should fill up the very top of your chest, neck, and shoulder girdle

The lungs are bigger at the bottom than the top. To ensure that you are fully utilizing this space, the full breath should be taken slowly, focussing on the feeling of the air reaching spaces which are not often used in everyday life. Don't fight or force this breath. Release it if it feels unnatural and try again after relaxing a little.

BREATH HOLD / DIVE

Now that you have taken your pre-dive breath, you can commence your breath hold. Your instructor will guide you through the process and techniques used during a dive, here we'll focus on the sensations that occur during a breath hold.

The Urge to Breathe

As CO₂ levels increase, you'll begin to feel the impulse to take a breath. As you have learned in your Open Water or Foundation Freediver course, it is this increase in CO₂ and NOT the absence of O₂ that stimulates the urge to breathe. If you've avoided hyperventilating during the relaxation stage, you'll have plenty of O₂ remaining at the onset of this urge.

Diaphragmatic Contractions

As your breath holds become longer, you may experience what are commonly known as contractions. These involuntary spasms of the diaphragm are your body's way of trying to get you to take a breath, expel CO₂, and bring blood acidity back to normal.

Contractions may feel unpleasant at first, but once you become accustomed to the sensations, you'll learn to relax through them. With training, your tolerance of CO₂ will increase. This, and remaining relaxed, can delay the onset of contractions.

Other signs of elevated CO₂ levels include:

- An urge to swallow.
- Tightness or burning around the chest.
- Headaches (after prolonged periods of high CO₂ - usually caused by too short a relaxation stage between multiple dives).
- Strong urge to let air out. (Avoid releasing air during a dive – this will be treated as a blackout situation and rescue initiated immediately).
- Heat in the body.

Breath hold diving is very much a mental discipline. It's difficult at first but, like any skill, becomes easier and more natural with practice.

RECOVERY BREATHING

At the end of a dive or breath hold, we want to restore oxygen levels as quickly as possible. There are different techniques, but the principle stays the same - to quickly bring fresh oxygen-rich air into your lungs, and to have it absorbed as quickly as possible.

Technique

At the end of a long breath hold your body wants to forcefully exhale in order to purge CO₂. We want to prevent this for two reasons:

1. A very brief and shallow exhale allows us to take fresh air in as quickly as possible. A deep exhalation can abruptly lower the concentration of oxygen in your blood - greatly increasing the likelihood of a blackout or hypoxic fit.

Recovery breaths consist of a quick, passive exhale, a strong inhale with a wide-open mouth, and a pause with closed lips and glottis. During the pause, the chest and diaphragm are contracted with moderate force - as if holding back a cough - while the breath is held for 1-3 seconds. This pattern is repeated 4 or more times - depending on the intensity of the breath hold.

Even with this technique, it can take a full minute for the oxygen to reach your brain. Once you feel recovered, the final part of every freedive is to make the “OK” sign by putting the thumb and forefinger together and saying, “I am OK”, while looking at your buddy.

RAID Note: The number one rule of freediving is to always dive with a qualified buddy.

You and your buddy act as safety divers for each other. There are different methods of buddying depending on the freediving discipline, but the role is always the same - to look out for and assist the diver and be there to act in case anything goes wrong. We will discuss in detail, the role of the buddy in static apnea later in this manual.

To assure complete recovery after a dive, the buddy must monitor a freshly surfaced diver for a full 45 seconds. In competitions it is not uncommon for a diver to surface, remove his/her mask or nose clip, signal with the OK sign, say “I’m OK” then blackout or experience a hypoxic fit.

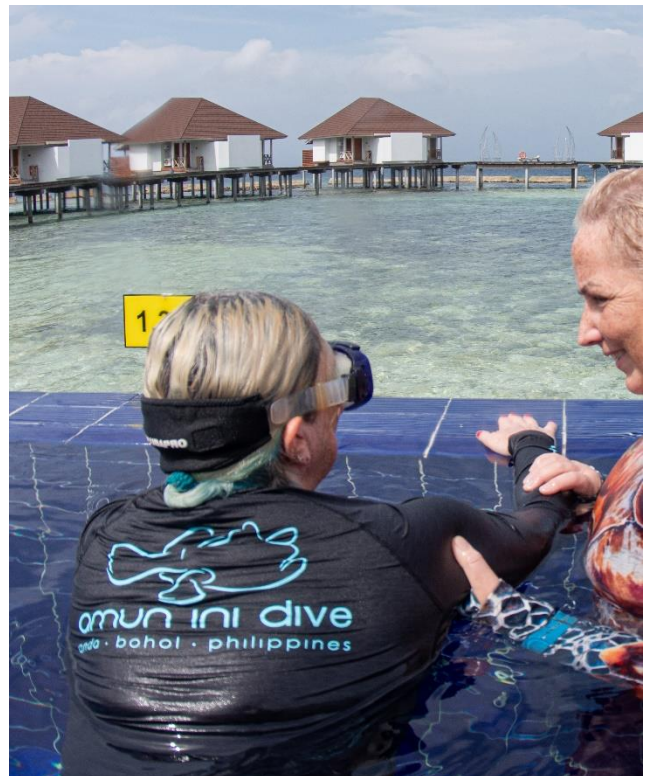
Here is a summary of the steps involved in recovery breathing:

1. Small, passive exhale without activating any breathing muscles.
2. Sharp inhalation with wide open mouth.
3. Pause with closed lips and glottis, bearing down with moderate force to create pressure for 1 to 3 seconds.
4. Repeat at least four times, or more if needed.
5. Make the “OK” sign and say “I’m OK”.

Make a habit of doing recovery breaths after every static dive, regardless of its time. Recovery breathing does not come naturally, so it's important to program it through repetition.

Diver's lives have been saved by having this procedure so deeply ingrained that it was performed when they were barely conscious.

That concludes the 4 stages of a static breath hold. Let's now recap on the dangers and sensations of hyperventilation.



HYPERVENTILATION

Hyperventilation is defined as breathing more than necessary to sustain the current level of metabolic activity. While it's not uncommon for this to occur during the course of a day, it is extremely dangerous when combined with in-water breath holding. Hyperventilation will lower the level of CO₂ in your body but will not increase O₂ levels in your blood which, when at rest, are typically between 96 and 99% saturated.

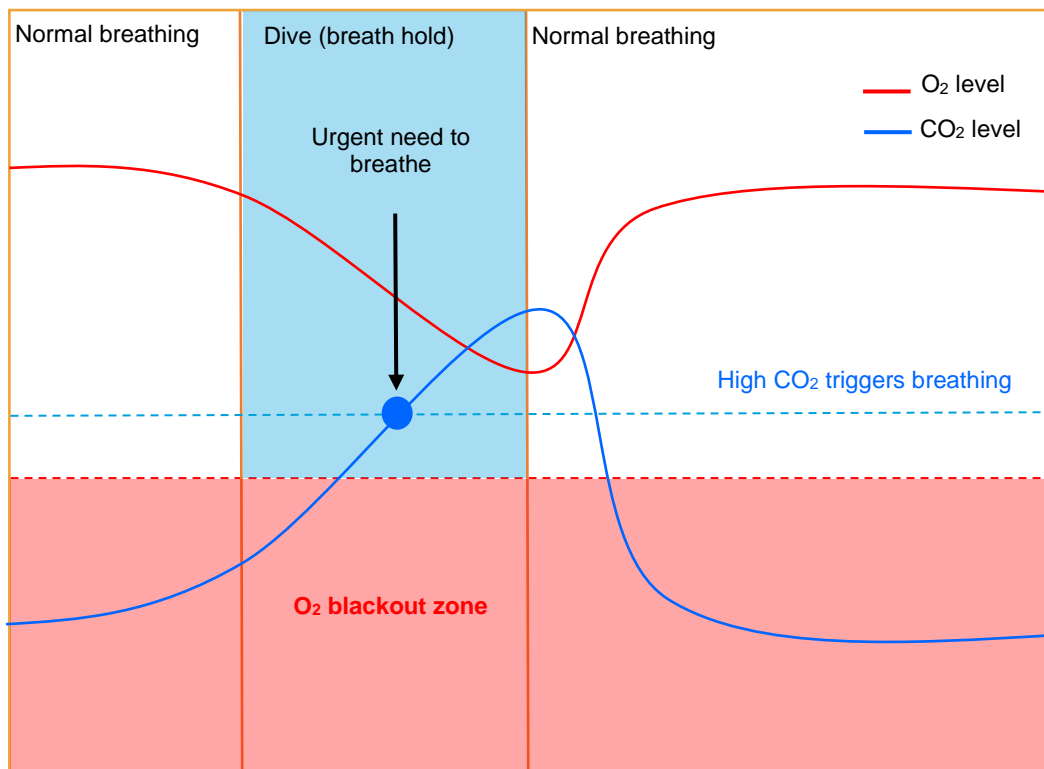
Hyperventilation raises the risk of a hypoxic blackout in the following ways:

1. Reduced CO₂ increases blood alkalinity - reducing our ability to absorb oxygen (the Bohr effect - see below).
2. Low CO₂ delays the urge to breathe - further increasing the risk of hypoxia (low O₂).
3. Hyperventilation increases O₂ consumption by accelerating the heart rate and stimulating the fight-or-flight response (sympathetic nervous system).
4. The capillaries in the brain contract (cerebral vasoconstriction), reducing blood supply to the brain and contributing to loss of consciousness.
5. Repeated dives with hyperventilation have a cumulative effect - progressively reducing the amount of O₂ available in your blood and tissues.

In the following graphs, you can see the relationship between CO₂ levels and the urge to breathe. Remember that it is a rise in CO₂ that triggers the urge to breathe, **not** a reduction / lowering in O₂ level.

The first graph shows the O₂ and CO₂ levels in the blood over the duration of a safe static breath hold. Stable and consistent O₂ and CO₂ levels are shown on the left in the relaxation stage (normal) breathing.

The dive ends when the diver has an urge to breathe, triggered by rising levels of CO₂.

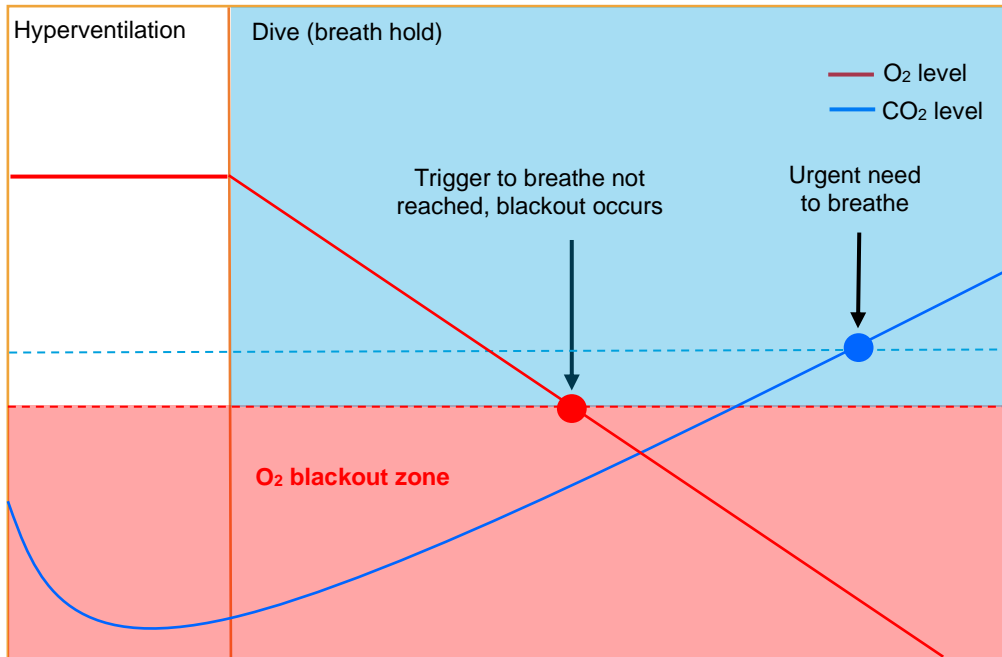


The second graph shows how hyperventilating before a dive affects O₂ and CO₂ levels. You can see that the O₂ level is unchanged by hyperventilation, however CO₂ levels decrease dramatically.

BREATHING FOR FREEDIVING

This pre-dive state is likely to result in a blackout (BO). The urge to breathe, triggered by rising CO₂ levels, does not come until after a lowering in O₂ level, to the point where consciousness cannot be sustained, and the diver blacks out. Put simply, the urge to breathe comes too late.

The dive duration is longer, but at the cost of a blackout situation.



Sensations / Symptoms of Hyperventilation

The technical term for low CO₂ caused by hyperventilation is Hypocapnia. Developing the ability to feel the more subtle signs of hypocapnia takes time and practice. Below is a list to provide some guidance, but not having these symptoms does not necessarily mean you are not hypocapnic.

The best prevention is to use the conservative relaxation stage breathing pattern described in this manual, and to engage some of the dry practice suggestions that follow in order to refine your sensitivity and tolerance.

Sensations / Symptoms could include the following:

- 'Light-headedness'.
- Mild-to-extreme euphoria.
- Dizziness/disorientation.
- Tingling in the extremities and/or all over the body.
- A metallic taste in the mouth.
- A contraction of the muscles in the hands and/or feet, which can extend to the whole body - 'carpedal spasm'.
- Convulsions.
- Unconsciousness.
- An unusual feeling of well-being.
- Sudden extreme hunger.

EQUIPMENT

You may already have some pieces of your own equipment.

Correct equipment is essential to gaining the most out of your freediving. Having correctly fitted, comfortable equipment is vitally important. The wrong equipment or badly fitting equipment can be a huge distraction, especially during static apnea, when you are not moving, and your mind may be easily distracted. Below is a list of equipment you may need for a static apnea session.

Again, your instructor can advise you if there are pieces of equipment you still need:

- Exposure Suit – correct type and thickness for freediving. Depending upon the water temperature in your area, you will require a wetsuit that protects you from the cold and the environment. Generally, we will use either a 1-piece freediving pool suit or a 2-piece hooded suit of between 2-5mm thickness, depending on water temperature.
- Hood – you lose a large amount of heat through the head. It is important in cold areas to have an exposure suit that has an attached hood, or you should have a separate one if not integral to your suit.
- Mask – ideally low volume.
- Goggles. For pool disciplines, you may choose to use a pair of swimming or freediving goggles. Either will work fine in a static session if that is your preference.
- Nose-clip. If you wear a pair of goggles rather than a mask, a nose-clip can be a useful addition to your freediving equipment. There are many different types and makes. The purpose is to keep the nostrils closed, so that water does not enter them.
- Snorkel. Depending on how you perform your relaxation breathing, you may want to immerse your face and use a snorkel. If you do, choose a simple, non-purge, flexible “J” shaped snorkel. Immersion of the face in water can activate the mammalian dive response, so some divers like to do their relaxation preparation breaths this way.
- Instruments – it is recommended to have a timing device so that you can safely buddy for each other. This can be as simple as your watch, a stopwatch or a freediving watch / computer.

HOW TO PERFORM STATIC APNEA

STARTING YOUR BREATH HOLD

First, we want to check your buoyancy. Lying on your back with arms and legs still, establish whether you are floating or sinking. If you float, exhale fully. Are you still floating on the surface? If you sink either with a full breath or on a full exhale, you might want to use some kind of flotation device to keep you on the surface. Pool noodles and swimming floats can be used effectively to keep you in a comfortable, relaxed position on the surface for your relaxation stage breathing. Your buddy can help you with getting floats in the right place and removing them when required, so if you feel you need extra flotation, experiment with the positioning of noodles and floats to see what works for you. If you do not have access to flotation aids, your buddy can hold you in place by placing their hands underneath your back.

RAID NOTE: Your buoyancy will change depending on your body composition, exposure suit thickness and salinity of water. If you lose or gain significant amounts of weight, your body composition changes, you wear a different exposure suit, or change location from freshwater to seawater or vice versa, be prepared to re-check your buoyancy.

There are three main positions in which you can perform your relaxation stage breathing before you start your breath hold, and which one is right for you very much depends on how comfortable you are during your pre-dive preparation breathing in these positions.

HOW TO PERFORM STATIC APNEA

1. The first position is to begin on your back, lying face-up in the pool, with your airways clear of the water. This puts less pressure on the chest and abdomen as they are not submerged, so it is very easy to take the pre-dive breath at the end of the relaxation stage.

If you choose this method, your buddy will help you onto your back, making sure you don't collide with the poolside. Once you have done your pre-dive breath, you bring one arm out to the side, then lift it vertically in line with your chest. Carry on this movement, bringing your arm across your body, and the action of crossing your arm over your body will turn you over in the water, so you are face-down. If you struggle to get this right, your buddy can help assist.

If you have been using pool noodles or swimming floats during your relaxation stage, they are usually removed at this point by your buddy so you can relax comfortably in the water. If, during your buoyancy check, you found that you sink in the water with a full inhale, you may want to remain lying with the support of flotation devices. Most people don't need to, they will generally float well on a full inhalation, but if you find you are sinking and it is a distraction, you can keep pool noodles in place for the breath hold (they will be removed before you end your dive, see the section on Ending your Breath Hold).



2. The second position, for people who are not comfortable performing the relaxation stage on their back, is to crouch facing the poolside, using the edge of the pool as a platform to support yourself. Your airways remain out of the water for the relaxation breathing, and pre-dive breath, and when you are ready to start your breath hold, you simply let go from the side and let your face gently lower into the water. Your buddy can help you into the water, making sure your head doesn't make contact with the poolside.
3. The third way to perform static apnea is to begin face-down in the water with your snorkel in. With this method, there is no moving into position after you take your pre-dive breath, as you are already in the correct position. Your relaxation stage breathing, and pre-dive breath are all performed through the snorkel, and the snorkel removed from the mouth once the pre-dive breath has been taken.

HOW TO PERFORM STATIC APNEA



Photo shows a diver using pool noodles to float comfortably on the surface. You can experiment with numbers, types and positions of floatation aids if you are unable to remain on the surface comfortably.

WHAT YOU MAY FEEL / EXPERIENCE DURING YOUR BREATH HOLD

During your breath hold, you may feel a number of sensations. Many of these feeling may be generated in your body from something you can hear, see, or touch, but the mind can also create sensations. The body and the mind are one, and as well as looking after the body in maintaining a relaxed, comfortable position in the water, we also have to look after the mind to ensure that it is also relaxed.

As mentioned above, you may encounter many different feelings during your breath hold. Let's take a look at some common sensations freedivers experience during static breath holds.

- The urge to swallow
- The urge to spit out air
- Heat building through the body
- A burning sensation in the chest
- Panic
- Pressure building up in the chest or throat
- Tightness
- The urge to urinate
- Diaphragm contractions

Diaphragm contractions – what are they?

Diaphragm contractions are the body's natural response to increasing CO₂ levels. High CO₂ levels stimulate the diaphragm to move, which manifests in the urge to breathe. Contractions can be anything from a mildly uncomfortable fluttering in the abdomen, to unpleasant convulsion-like movements that travel through the entire body. The feelings you may encounter during a dive are very variable from person to person. Some people may never experience contractions, others may start to feel them after a relatively short breath-hold.

It's worth mentioning that you might experience one, many, or none of these sensations during your breath hold. Many people have the ability to completely clear their mind during static apnea and achieve an almost sleep-like state. Whatever your breath hold brings, try to recognize the various stages of your dive and become familiar with the feelings you experience.

For those of us who do not have that ability to “zone out” during a breath hold, and may struggle with the sensations we are feeling, there are a number of techniques we can use to overcome these feelings and distract the mind. Let's look at some techniques for distracting the mind from the task at hand and focusing on other thoughts. This is called Visualization.

VISUALIZATION FOR STATIC APNEA

One of the most challenging things during a static breath hold is what to think about? What can you concentrate on that stops you from thinking about the urge to breathe? You may find that your first breath holds have your mind racing, telling you to lift your head from the water, stop this craziness and take a breath. As you become more accustomed to static apnea, you will start to move beyond the initial stages of mental panic and may then find that you have to think of something to occupy your mind.

Visualization has long been used in various forms and in many different sports and activities. All over the world, there are many examples of this. We find visualization and relaxation in meditation and yoga, which are most commonly recognized for relaxation. Visualization is the process of creating a mental image in your mind. It uses sensory information; touch, taste, hearing, sight and smell, and imagination to simulate an experience or situation that feels real. It can be used for both relaxation and for focusing the mind and is a powerful tool when used during the discipline of static apnea.

Techniques to Focus and Distract the Mind

Here are some of the most useful things to think about when holding your breath.

1. Initially, try to allow your mind to drift off and think of nothing at all. Many people have the ability to simply “drift off” and clear their mind of everything. If this is you, don’t worry about trying to focus on a particular thing. Just let your mind clear naturally.
2. If you can hear your heartbeat, visualize it slowing down.
3. Use your heartbeat as a metronome if you can feel or hear it – count 1 for every 4 heartbeats, maybe up to 10 and then start again at 1.
4. If you cannot feel your heartbeat, slowly count to a low number e.g. 5 or 10 and then start again at 1.
5. Slowly scan through the body, checking each part of you is relaxed. If you note a part that is not relaxed, check back from time to time to make sure it hasn’t tensed up again. You may find that there is always one or more parts of your body that tense up – if you find that, be sure and check those areas frequently.
6. Use the rotation of consciousness from yoga nidra to bring your awareness to different parts of the body in turn – there are 2 main types of rotation of consciousness, Satyananda and Himalayan. The Satyananda rotation starts with the right hand, and travels up the body, before traveling back down to end on the foot. This is then repeated on the left side. After that, the focus moves up the back of the body and down the front of the body. The Himalayan rotation starts at the crown of the head and moves around the body in a set pattern, before returning to the starting point. Yoga nidra also has different subsections within a practice that could be useful during a static breath hold. There are many resources for this practice available online.
7. Imagine walking into your house, and through each room in turn. Imagine every small detail in each room, what you can see, feel, hear and smell as you wander from room to room.
 - Sing the lyrics to a song you know well.
 - Repeat part of a song or phrase.
 - Repeat a mantra.
 - Recite a poem.
 - Slowly count backwards from a high number.
 - Imagine a place you know well that makes you happy.
 - Slowly count - backwards, forwards and / or using intervals - any method that keeps you focused.

HOW TO PERFORM STATIC APNEA

In every dive, there will be an easy phase and a struggle phase. During the easy phase, it is much easier to imagine, count, visualize, etc. During the struggle phase, it can be very difficult to focus the mind.

There are lots of other techniques that can help you with static apnea. You can start the breath hold with your eyes shut, only opening them when you can't seem to control your mind any longer.

Remember to use your buddy. Some freedivers don't like any sound at all to distract them, however others use their buddy very effectively, to act as a coach, or leading you on a guided visualization, giving you things to think about and encouraging you to maintain your breath hold.

Everyone is unique, and you will find your own method for stilling your mind. Keep experimenting though, as often new techniques can help even if you then decide to turn back to the old ones.

IMPORTANT: Only ever train in water with a qualified and experienced buddy with you at all times

COMMUNICATING WITH AND RESPONDING TO YOUR BUDDY

During your static breath hold, your buddy will be carefully monitoring you. They will ensure that you are close enough to the edge of the pool so you can reach the side with your hands, while being far enough away that you don't bump your head on the pool side.

You may have the sensation of spinning, floating away or sinking during your relaxation breathing stage and during your breath hold when floating. Be reassured that your buddy will keep you in the right place, perpendicular to the pool edge.

Before your dive, you and your buddy will discuss their role. You may want them to talk to you, coach you, give you time checks and so on. We will discuss in more detail the buddy's role later in this manual.

One of the main ways that your buddy will communicate with you is through the tapping system. Depending on the duration of your breath hold, your buddy may ask you to give them a signal that you are still in control. This is usually done with a single tap on your shoulder.

As the diver, you should return this signal by lifting a single finger while your hand remains relaxed and in the water. Do not lift your hand or finger from the water to return the signal, as this will consume energy unnecessarily. If your buddy does not receive your signal, that is a warning to the buddy that rescue may be required. A maximum of 2 shoulder taps are performed. If the diver responds to neither, blackout is assumed, and rescue must be performed immediately.

There are many more ways in which your buddy may help you. These are discussed in the Buddying section of this manual.



ENDING YOUR BREATH HOLD

We've talked about the sensations or feelings you might experience during your static breath hold, for example contractions, where the diaphragm twitches or convulses, or perhaps a burning feeling in the upper chest, or the urge to spit out air. Whether it is one of these feelings, or a pre-discussed time interval that ends your dive, there is a correct protocol to finish the static breath hold in a safe, controlled way.

1. Firstly, lift one hand to the pool edge. Your buddy will have maintained your position in the water during your breath hold so that you are close enough to easily touch the pool edge. The first hand lifted to the side is an indication to your buddy that you are nearing the end of your breath hold.
2. Then, bring your other hand to the edge of the pool, so that both hands are holding gently, but securely, onto the pool edge.



3. Next, bring your feet down and place them on the bottom of the pool so that you are in a crouching position, with your face still in the water. Your buddy can help at this stage by sweeping your legs down to the pool floor with one arm. If you have a thick exposure suit, you may find it difficult to bring your feet underneath you, so arrange with your buddy before the dive to help you.

Normally, pool noodles or swim floats will have been removed before your breath hold, but if you have been floating using a flotation device during your breath hold, your buddy will remove them at this stage before your feet come down to the pool floor.

Pro-tip: When the urge to breathe comes, and you decide to end your dive and bring your hands to the pool edge and your feet beneath you, you may feel that you can hold your breath a little longer. Be prepared to experiment with this. You can also ask your buddy to count you down slowly from 10, to extend your breath hold.

4. Only when you have four points of contact, i.e. both hands on the pool edge, and both feet firmly planted below you on the bottom of the pool, do you bring your face out of the water.

IMPORTANT: Do not let any air out until your face is out of the water and you are looking at your buddy. Never let any air out while your face is still in the water.

5. Once your airway is clear of the water, bring your face up to look at your buddy, and perform recovery breaths as described in the earlier section. Your buddy will have hold of you underneath the armpit nearest them, and they will encourage you to look at them and perform recovery breaths correctly.
6. Once you have performed 3 to 4 recovery breaths, more if you feel you need to, or if your buddy tells you to continue, give your buddy the OK signal and tell them that you are OK.

BUDDYING FOR STATIC APNEA

To recap those points:

- Relaxation breathing in a position comfortable for you. Check your buoyancy and use flotation devices if you need to.
- Take your pre-dive breath and move into the static apnea position with your face immersed in the water. Try to relax your body and mind.
- You may experience a number of thoughts and sensations during your breath hold. Acknowledge these, but don't focus on them.
- Use visualization techniques to try to distract your mind and focus on something other than holding your breath. If you are able to clear your mind and think of nothing, then do this.
- Respond to signals from your buddy. If they tap your shoulder, be sure to respond to their signal by lifting a finger (but do not lift or move your hand from the water – this should be a small movement, using minimal energy).
- When you want to end your breath hold, get into the correct position. Both hands should be gently but securely holding the edge of the pool. Your feet must be beneath you, on the pool floor, in a stable position.
- When you are in the crouch position, you may feel like you can continue your breath hold. If it feels right, continue to hold. Make sure you continue to respond to any communication signals from your buddy.
- When you end your breath hold, lift your face completely clear of the water. Look at your buddy and perform recovery breaths. A minimum of 3 or 4 recovery breaths is mandatory, more if required. When you are fully recovered, give the OK signal to your buddy and verbally communicate that you are OK.

Stay warm, you will lose temperature quickly as you are not moving. Make sure you have the correct exposure protection for the conditions.

When you take part in a static apnea session with your buddy, perform a series of holds to activate the mammalian dive response, but don't wear yourself out. **Don't alternate** who is breath holding between you and your buddy. Your mammalian dive response will not activate if you switch between each dive. There are examples for conducting a static apnea session later in the manual.

BUDDYING FOR STATIC APNEA

Your job as a buddy is to supervise the static session, helping your buddy through the entire session, and ensuring they are safe and in control at all times. This starts right from the start of the session, from helping them relax, helping them get into position, communicating with them, and supporting them both mentally and physically.

RAID NOTE: Establish what your buddy wants from you at the beginning of the session – don't second guess them. Some divers may want coaching or reassurance, others may want complete quiet. Have the conversation before you start.

Let's walk through a typical static session and identify the buddy role at each stage.

RELAXATION STAGE

As a buddy, you will assist your diver in getting into whatever position they choose for the relaxation breathing stage. If they choose to do their preparation breaths on their back, face-up in the water, help them into this position, making sure they do not bump the poolside with their head or any other part of their body when they move into position. If your diver does not float and needs flotation devices, such as pool noodles or pool floats, to support them, it is your responsibility to help position the flotation devices so that the diver is comfortable.

You need to keep the diver close to the edge of the pool and perpendicular to it. In order to move the diver, you can gently hold bony parts of their body, for example, hip, shoulder, knee. Check their breathing to make sure that the diver is not hyperventilating. Make sure they are fully relaxed in the water and not holding tension in their body. If they appear tense, coach them through relaxing these parts of the body.

You will need to let the diver know when they should start their breath hold. Discuss beforehand what countdown they want to use. For example, if you are doing a 3-minute relaxation period, you might communicate the following time checks to the diver. 3 mins, 2 mins, 1 min 30, 1 min, 45 secs, 30 sec, 20 secs, 15 secs, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1secs. Whatever you decide with your buddy, you need to be able to communicate this clearly to them and loud enough so they can hear you. If you are standing up, with your face a long way from their (neoprene-covered) ears and whispering, they aren't going to hear you, especially in a crowded, loud public swimming pool! Get low, make sure you are communicating close to your diver, loudly and clearly.

In competition

If you decide to compete in the static apnea discipline, each governing body will have their own set of rules about timings for static apnea dives. You will be given a count-down and then typically an "official top" (OT) time (the time at which your dive should start). You will have a window (typically 10 seconds but check with the organizers) after your OT in which to start the breath hold. If you start before the OT, or after the window, you will likely receive a penalty or possibly a disqualification.

STARTING THE BREATH HOLD PHASE

Your buddy may need help to get into position. If they have been using pool noodles or swim floats during the relaxation phase, these are normally removed now. If they are on their back and use the arm-over-body technique to roll over in the water, be prepared to help them if they move their arm incorrectly and need assistance rolling over. The technique is to bring the arm across the body which will naturally turn the diver in the water, but if the arm is brought up over the head which sometimes happens with inexperienced divers, you can assist them by gently taking hold of their arm and helping them over into position.

Your buddy may want to use pool noodles or swim floats during their breath hold if they are negatively buoyant, even on a full inhalation. If this is the case, you may need to reposition any flotation devices to make sure the diver is comfortable during the breath hold phase. Speak to your buddy and establish numbers, types, and positions of flotation devices if needed.

DURING THE BREATH HOLD

We discussed earlier the different sensations a diver might be feeling during a static breath hold – feelings of spinning, floating away, or even sinking. These feelings are very common. Even though the diver is not moving, it's imperative that you are focused during the diver's breath hold, maintaining control and positioning.

As a buddy, you can help reassure the diver by being attentive and keeping them close to the side (imagine a hand span – this is the approximate distance between the diver's head and the pool edge you should maintain).

Keep the diver perpendicular to the pool wall. You can do this by gently moving the diver into position – try to find a place you can touch that won't distract the diver. Bony parts of the body are better, for example, the side of their shoulder or knee. Pool suits with back zips quite often have a long fabric zip pull, and these are ideal for holding onto, and keeping them in position in the water. You don't want to touch any part of the diver that may distract them and keep your touching to a minimum. If you do not maintain the diver's position in the water, are inattentive or do not communicate in the manner you discussed prior to the session, they may lose trust in you and start to doubt your abilities as a buddy, which will be an added stressor, distracting them during their breath hold.



IMPORTANT; When buddying for static, we NEVER touch the diver's head, or place a hand on their back. Psychologically for the diver, this can feel as if they are being held under the water.

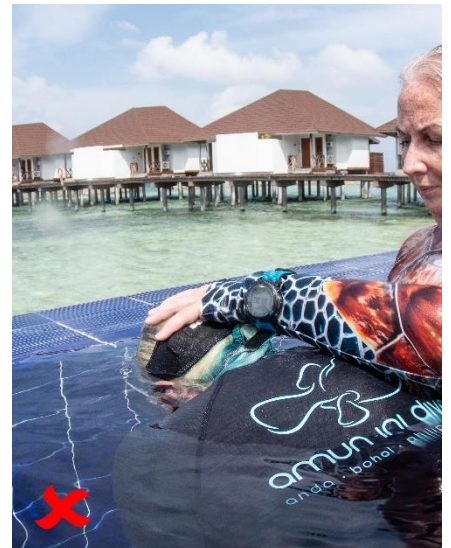


Hold on the bony parts or onto pieces of the diver's clothing to keep them in place.

Do not place your hand on either their back or the head during a diver's static breath hold.

COMMUNICATION

There are many forms of communication for the buddy. The first is a system to ensure that your diver is in control and safe. The tapping system is widely used for this. This is usually done with a single tap on the diver's shoulder. Establish with your buddy which side they prefer to be tapped on, and make sure you are stood on that side of them for the duration. The return signal for the tap is a single finger lift – on the same side as your tap.



When you see this signal, you can communicate back to your diver, so they are not wondering whether you have seen it. To acknowledge that you've seen their return communication, you say "I see your signal", making sure you bend down close to their ear, and speak loudly and clearly.



BUDDYING FOR STATIC APNEA

Remember, their ears are underwater, the pool may be noisy, and they may be wearing a hood, all things which hinder their ability to hear you. In the event that your buddy does not respond to your tap, give one more tap. If there is still no response, you must assume the diver has experienced a blackout, and you must rescue immediately, following the Rescue, Response, Revive protocol. See the section on rescue later in this manual.

RAID NOTE: If the diver is wearing a thick exposure suit, make sure your tap can be felt! It's no use lightly touching their shoulder if they can't feel it. Your tap needs to be definitive and easily acknowledged.

Talk to your buddy before the session about how they want the communication to work. Your buddy may find it helpful to be coached or reassured during their static dive. There are a variety of techniques you can use. Some people like to hear a time check. For others, this can be distracting and too goal-oriented and counter-productive. With a time, check, the diver might want you to tap them after a specific duration and then at defined intervals.

They may also want you to verbally communicate the time as well as tap, and again, if doing this, make sure the diver can hear the time check. Get low in the water and close to their ear – remember they may be wearing a hood, their ears are underwater, and it might be a loud public space, so speak clearly and loudly. Would they prefer “random” taps that are not given at a specific time interval? For some people, hearing “that's 1 minute” for example, will distract them and throw their focus.

For others, just telling them they are doing great, and giving positive encouragement can work. Some divers may want a detailed visualization, akin to a guided meditation to distract them from the breath hold and focus their mind elsewhere.

When communicating with your buddy, it is essential to establish what methods you are going to use before you need to use them. Have the conversation before you start your static session and be open-minded to try new techniques and see what works for you.

No matter when you have agreed to tap the diver during the first part of the breath hold, it is imperative that taps are given no more than 10 to 15 seconds apart during the last third of the breath hold.

RAID PRO-TIP: If you are performing a static session in low visibility, and recognizing a finger lift in the water is difficult or not possible, consider other communication techniques, for example lightly squeezing the diver's hand, and receiving a return squeeze in response. Remember to always acknowledge that you have received the diver's response with “I see your signal” spoken loudly and clearly, near to the diver's ear.

MONITORING BEHAVIOR

Returning of taps is an important part of buddying, but it's not your only sign that a dive might not be going as intended. It is possible for a hypoxic diver, on the verge of loss of consciousness, to return taps as normal. As a buddy, there are a number of signs we need to look out for throughout the breath hold phase. Watch out for shaking, shivering, moving or fidgeting, parts of the body tensing up etc. Essentially, anything different from normal could signal hypoxia, and if you see any change in behavior of the diver or any abnormal behavior, you must assume they are experiencing a hypoxic event and end the dive.

If you see any air escaping the airway, this is a sign of a blackout, and you must rescue the diver immediately. See the section on rescue later in this manual.

AT THE END OF THE STATIC BREATH HOLD.

When you see your buddy bring a hand to the side of the pool, this is a sign that they are in the struggle phase of the breath hold and are ready to end their breath hold. When both hands are at the side of the pool, help them to bring their legs underneath them into a stable crouching position by sweeping their legs with an arm to overcome the buoyancy of their legs. Ensure your buddy is in the correct position to exit the static breath hold - both feet on the pool floor, both hands on the poolside.



If pool noodles or other flotation devices have been used, these would normally have been removed at the end of the relaxation stage, before apnea, but if the diver was using noodles and / or floats during their breath hold, remove them now.

It may be some time before they end the dive. Sometimes moving into the crouch position is enough of a distraction to extend the breath hold, sometimes by minutes. Be prepared to continue with your choice of communication if they maintain the breath hold (e.g. continue the tap system).

IMPORTANT: No matter how much the diver wants to end the dive, they **MUST** come into this position first. As the diver, if you remove your head from the water when you are floating and not in a stable position with your feet firmly on the pool floor, and you have a hypoxic episode or a blackout, your head will go straight back in the water. It is far easier to deal with a hypoxic episode or blackout with a diver in the crouch position, than with a diver face down in the water.

BUDDYING FOR STATIC APNEA

When the diver brings their face out of the water, place your hand (the one nearest to them, i.e. the one furthest from the poolside), underneath their armpit for support. Make sure they have a good clearance between their face and the water. They shouldn't be looking down with their mouth barely out of the water. Ensure that they are looking at you and encourage / coach them through their recovery breaths. Monitor their condition – are their eyes focused and looking at you, or are they glazed over and unfocused? What color are their lips? As a buddy, we are looking for signs of hypoxia. Very pale lips or very blue / purple lips and unfocused eyes can be good indicators of hypoxia.

In competition

There will be an established surface protocol for ending a static breath hold during competition, and this may vary slightly depending on the organizers. You can expect that a number of tasks will need to be completed in a particular order within a given timeframe, for example:

- removal of all equipment covering the eyes and / or airways (e.g. mask, goggles, nose-clip etc.)
- a visible OK signal, that is visible to the judge(s)
- a verbal OK signal to the judge(s)

During the breath hold, the buddy will be allowed to touch the diver and communicate through safety signals. At the end of the breath hold, the buddy is not allowed to touch the diver or coach them through their surface protocol. Each organization may have slightly different requirements, so make sure you know what is expected.



Make sure they are performing recovery breaths correctly. If they are not, perform recovery breaths yourself, and ask them to copy you. If you suspect that the diver is hypoxic, have them repeat proper recovery breaths until they are recovered. 3 to 4 recovery breaths is the absolute minimum after any breath hold, and the diver may need to do more, so coach them through this process.

IMPORTANT: It may be tempting to start asking the diver how they are feeling, or even congratulating them if they have achieved a personal best.

But you must resist – don't ask any questions or strike up a conversation with your buddy until they have completed recovery breaths and are fully recovered from the dive.

If your buddy is hypoxic after a dive and starts to talk without having completed sufficient recovery breaths, they may experience a blackout.

CONSTRUCTING A STATIC PRACTICE SESSION

If you are performing static apnea in shallow water in the sea, and not in a pool, you can use a weight belt with weights on, placed on the seabed floor as an anchor point for the diver to lightly hold onto during their dive. In lieu of the pool edge, as a buddy, you can use your arm offered in front of the diver as a support at the end of the dive. All the same rules apply whether you are performing a static session in the pool, sea or other body of water, and it must always be possible to stand up with your airways clear of the water. **NEVER** perform static out of your depth.



There may be a temptation from the diver to push their limits as they feel are in a safe environment, but as with all aspects of freediving, progression should be incremental, measured and safe. You want the diver to feel safe, but you don't want them to adopt a blasé attitude. There is a subtle balance between feeling confident and having trust in your buddy, to adopting a nonchalant, carefree approach, thinking that if you suffer a hypoxic episode, it doesn't matter, as your buddy is there to sort it out.

RAID NOTE: Communication with your buddy is key! Remember, for some people, the idea of someone talking to you during your dive is too much, counter-productive and off-putting, but other people respond really well to coaching. Experiment with what works for you and your buddy and establish a system that works for you.

FAMILIARITY AND ROUTINE

The discipline of static apnea is very difficult as there is nothing to take your mind off what you are doing. It is important to relax, no matter what the circumstances are. You might be in a public swimming pool, with lots of distractions, like kids playing and yelling, lots of noise and splashing. If you can establish a set routine, so that each part of your static practice becomes familiar, in spite of distractions, it will make it easier for you to relax. A set routine, and familiarity with that routine, and with the feelings and sensations you may experience, will also help in new locations, a new swimming pool, for example. Don't under-estimate the value of repetition, routine and familiarity. It will make your session easier and improve performance.

CONSTRUCTING A STATIC PRACTICE SESSION

There are many techniques we can use when practicing static apnea. All involve a series of breath holds, performed one after another. Remember, in order to activate the mammalian dive response, we don't switch between who is the buddy and who is the diver between breath holds.

Some of the techniques you could use during your static session are covered below.

STARTING OUT

The first thing to do, especially if this is your first attempt at static apnea, is to learn how we perform static breath holds and what it feels like. It's all very well knowing the steps involved on paper, but it's entirely different actually doing it. So, for your first breath hold, we will find a relaxation position that works for you and perform a short breath hold, 45 seconds or so, just to get used to the feelings you experience.

For example, your practice session might look something like this.

Relaxation breathing	Apnea (breath hold)
2:00 mins	0:45 mins
2:00 mins	1:00 mins
2:30 mins	1:30 mins
3:00 mins	Between 1:30 and 2:00 mins

During this first practice, we are learning what feels right for us, how to start and end the breath hold, the positions and relaxation techniques that work for us, and so on. This is not a session to push your limits or see what your maximum breath hold is. We are simply getting used to the feelings and sensations we have and practicing with our buddy. We will practice communication, the tapping system, and also determine what we want from your buddy during your breath hold. Do you want them to talk to you, coach you, guide you through a visualization, or do you prefer quiet?

Now that we have learned what static apnea feels like, what can we do to progress during our practice sessions? There are many schools of thought about how to increase apnea performance – some people put themselves under stress and have contractions during every breath hold. However, there are many other people who adopt a much more relaxed approach, and these people can build up a phenomenal performance in every discipline with little to no stress, and without ever becoming uncomfortable. In summary, you don't have to feel uncomfortable, stressed, or "on the edge" to progress during your training.

INCREASING YOUR BREATH HOLD TIME

One way to increase your breath hold performance is to perform a series of breath holds in increasing duration. Discuss with your buddy how you want to perform the breath hold series, including:

- breath hold durations.
- the signs you are going to use both during the breath hold.
- the signs you are going to use to signify the end of the breath hold duration.
- the recovery time in between each breath hold.
- any coaching / time checks you want your buddy to perform.

CONSTRUCTING A STATIC PRACTICE SESSION

Here are a couple of examples, including relaxation breathing / recovery times in between dives.

Series - increasing breath holds, example 1	
Relaxation breathing	Apnea (breath hold)
-	0:45 mins
1:45 mins	1:15 mins
2:15 mins	1:45 mins
2:45 mins	2:15 mins

Series - increasing breath holds, example 2	
Relaxation breathing	Apnea (breath hold)
-	1:00 mins
2:00 mins	2:00 mins
3:00 mins	3:00 mins
4:00 mins	>3:00 mins

Even if you have discussed a defined duration for your breath hold, always come up when you feel you need to. Don't push it just to reach a target. Extending your breath hold beyond an urgent feeling to end the hold will cause stress and may lead to a hypoxic episode.

For more information on determining the recovery time needed between each breath hold, refer to the sub-section on recovery times at the end of this section.

BREATHE TO CONTRACTION / URGE TO BREATHE

If you are someone who struggles with the feeling of contractions or a very strong urge to breathe, this type of static apnea series may help. For the first breath hold, you will hold until the first contraction, or the strong urge to breathe. Remember, not everyone feels contractions, but most people will reach the point where they have a strong desire to either spit out air or stop and breathe in. Your next hold will be to the same point – the first contraction or strong urge to breathe – but now add 15 seconds beyond that point. The following hold will be to contraction / urge to breathe plus 30 seconds. Use this as a guide and be prepared to adapt this to suit you. If contraction plus 30 seconds is too much, try contraction plus 20 seconds.

You'll need ample recovery time in between breath holds. 2 to 3 minutes should typically suffice (depending on your breath hold duration).

CONSTRUCTING A STATIC PRACTICE SESSION

An example series using this approach might look something like this.

Relaxation breathing	Apnea (breath hold)
-	First contraction* - 0:45 mins
1:45 mins	First contraction* plus 15 seconds – 1:00 mins
2:00 mins	First contraction* plus 30 seconds – 1:15 mins
2:30 mins	First contraction* plus 45 seconds – 1:30 mins

* or strong urge to breathe

The next two methods are also commonly used for static training and can also be used for dry-training. Both CO₂ and O₂ tables require you to have some idea of what your maximum breath hold is. It's likely that if you are starting out, or maybe you are a more experienced depth freediver who has little static apnea experience, and therefore don't know what your maximum breath hold is. We don't want to push to a point where you have a hypoxic episode to find out what your breath hold is, so when establishing your maximum breath hold, it is **critically important to work with an instructor** who can more easily tell signs of hypoxia.

Your max breath hold should not be to the point of hypoxia!

CO₂ TRAINING TABLES

The purpose of CO₂ training tables is to train the body to deal with the effects of CO₂ build-up in the body that typically occurs during a breath hold. As we know, the primary trigger for the body's urge to breathe is rising CO₂ levels. With regular practice, you can train your body and mind to remain calm and delay the urge to breathe even as CO₂ levels rise.

CO₂ tables work by repeating a defined duration of breath hold with shortening recovery intervals between breath holds, preventing full expulsion of CO₂, which allows its gradual build-up in the body.

The duration of breath hold for CO₂ tables is typically around 60% of your maximum breath hold duration. Start with an easily achievable breath hold duration and give yourself a reasonable period of recovery time after the first hold. The breath hold is then repeated for the same duration, but the recovery time is decreased by 15 seconds. Continue this cycle of the same duration for breath hold, and each cycle reduce your recovery time by a further 15 seconds.

CONSTRUCTING A STATIC PRACTICE SESSION

Let's look at an example. Imagine your maximum breath hold is 2 minutes 30 seconds. 60% of this is 1 minute 30 seconds. A typical CO₂ table for this freediver might look like this:

EXAMPLE CO ₂ TABLE (full breath hold)		
Set	Breathe	Apnea (Breath hold)
1	-	1:30 mins
2	2:00 mins	1:30 mins
3	1:45 mins	1:30 mins
4	1:30 mins	1:30 mins
5	1:15 mins	1:30 mins
6	1:00 mins	1:30 mins
7	0:45 mins	1:30 mins
8	0:30 mins	1:30 mins

If the above table is too difficult, then the last recovery time can be one minute. If it is too easy, the last recovery time can be fifteen seconds.

O₂ TRAINING TABLES

O₂ tables are used to acclimate your body to lower levels of O₂. By training, you can teach your body to operate efficiently and effectively when O₂ levels are lower.

O₂ tables are similar to CO₂ tables, in that sets or cycles of breath hold, and recovery periods are repeated. However, instead of repeating the same duration of breath hold and decreasing the recovery time, in O₂ tables, we increase the breath hold duration and maintain the same recovery period. As a rule of thumb, the final breath hold in the set should be no more than 80% of your maximum breath hold.

For example, for the same freediver with a maximum breath hold of 2 minutes 30 seconds, a typical O₂ table would look like this:

EXAMPLE O ₂ TABLE		
Set	Breathe	Apnea (Breath hold)
1	1:30 mins	0:45 mins
2	1:30 mins	1:00 mins

CONSTRUCTING A STATIC PRACTICE SESSION

3	1:30 mins	1:15 mins
4	1:30 mins	1:30 mins
5	1:30 mins	1:45 mins
6	1:30 mins	2:00 mins
7	1:30 mins	2:00 mins
8	1:30 mins	2:00 mins

Again, as with CO₂ tables, experiment to find the configuration that suits you.

In summary, O₂ tables train the body to tolerate lower oxygen levels, which can enable you to use oxygen in your body more efficiently when low on O₂.

You should only practice CO₂ and O₂ training tables two to three times per week. You should not practice CO₂ tables on the same day as O₂ tables.

Both CO₂ and O₂ tables can be practiced dry as well as in the water, so you can practice your technique even when you don't have access to the pool.

If you are short on time in the pool and both you and your buddy are doing a static session, consider performing tables on a passive exhale. Your breath hold will be shorter, meaning the tables can be completed in a shorter time. Your pre-dive breath will be exactly the same, but after the full inhale 3-part breath, you will exhale a small amount of air passively (not engaging the ribs or diaphragm, do not force air out),

Here is an example of a passive exhale CO₂ table.

EXAMPLE CO ₂ TABLE (partial breath hold)		
Set	Breathe	Apnea (Breath hold)
1	-	0:30 mins
2	2:00 mins	0:30 mins
3	1:45 mins	0:30 mins
4	1:30 mins	0:30 mins
5	1:15 mins	0:30 mins
6	1:00 mins	0:30 mins

CONSTRUCTING A STATIC PRACTICE SESSION

7	0:45 mins	0:30 mins
8	0:30 mins	0:30 mins

This table above will take 12 minutes and 45 seconds to complete, whereas the CO₂ table for the full breath hold in the earlier section would take 20 minutes and 45 seconds to complete.

It is also possible to prepare for a static session outside of the water on the side of the pool, for example breathing exercises or short breath holds. Some people may prefer this, rather than the whole session to be conducted in the water.

GAMES TO PLAY DURING STATIC APNEA SESSIONS

Static apnea sessions don't have to be boring. You can play games in order to train for static apnea. A simple game to play is to set an easily achievable breath hold duration, for example 45 seconds. In buddy pairs, all the divers will prepare for the breath hold at the same time and will start the breath hold together. Each diver must try to guess when the defined duration is reached, with no indicators from the buddy, and without looking at a timer. Whoever is closest to the duration wins.

Your instructor may have other games you can add to your static breath hold sessions, which you can discuss during your confined water sessions.

RECOVERY TIME BETWEEN BREATH HOLDS

How long you will need to recover between breath holds is largely dependent on the duration of the breath hold. A good rule of thumb is to recover for the breath hold duration plus 1 minute. For example:

Apnea (breath hold) duration	Recovery / relaxation breathing duration before next breath hold
1:00 mins	2:00 mins
2:00 mins	3:00 mins
3:00 mins	4:00 mins
4:00 mins	5:00 mins
and so on...	

As you are not moving during static breath holds, lactic acid will not build up in your muscles. This means the body can reach equilibrium again faster after a static breath hold, so your recovery times should be shorter than for a dynamic apnea swim.

Remember to perform a series of holds to activate the mammalian dive response, but don't tire yourself out. Don't switch with your buddy between dives, the mammalian dive response will not activate if you alternate who performs the breath hold.

HYPOXIA, BLACKOUTS AND RESCUE – QUICK REVIEW

IMPORTANT: Never dive alone – always dive with a trained buddy

Keep a log book, detailing each practice session. Include details of the series of holds you performed, what worked well, and what didn't go so well for you. If you had a particular visualization or focus technique that helped you, make a note of it. Record the environmental factors, location, water temperature, any significant distractions you noticed. Keeping a log book is a great way of recording practice sessions, and the more information you record, the more useful it will be when referring back. You can keep an eye on your progress between sessions and compare different techniques between sessions.

Your buddy is a vital part of your dive. Having an attentive, helpful buddy can make the difference between a frustrating session, where you never felt quite in control or confident, to an enjoyable progressive practice, where your buddy helped coach you through breath holds to a personal best.

RAID NOTE: You can train comfortably without putting yourself under any stress and still progress. Training doesn't have to be unpleasant, difficult, or uncomfortable.

There is no specific performance requirement for this course in terms of a breath hold duration. However, if you intend to use this course to replace the static apnea performance requirement in either the Advanced or Master Freediver, the requirements for breath hold duration are shown in the table below.

RAID Course	Static apnea performance requirement (minimum)
Advanced Freediver	2:30 mins
Master Freediver	3:30 mins

HYPOXIA, BLACKOUTS AND RESCUE – QUICK REVIEW

If you've already completed the Open Water Freediver certification, or Foundation Freediver certification, or completed the Try Freediving course, you may remember that we learnt about hypoxic fits and blackouts. In your confined water training for this static apnea specialty course, you will have rescue scenarios to complete, so let's do a quick review of the terms and rescue techniques.

WHAT IS HYPOXIA?

The human body has a limited supply of oxygen. Most of this supply is carried in our oxygenated arterial blood. If we push our freediving too close to, or past the limit of our oxygen supplies (hypoxia), it is possible to experience a low oxygen related situation. Hypoxia occurs when there is a deficiency in the amount of oxygen available for our tissues. Signs of hypoxia become obvious when the arterial oxygen tension drops below the critical threshold.

1. Hypoxic fit (HF)

A hypoxic fit is a loss of motor control caused by a lack of oxygen to the brain. Severity ranges from almost unnoticeable tremors in the hands to whole body convulsions.

After a severe hypoxic fit, a diver may be disoriented and usually has no recollection of what happened. Hypoxic fits normally resolve on their own with the assistance of a safety diver, however severe hypoxic fits can progress to a blackout. Without assistance, the diver is at risk of drowning.

HYPOXIA, BLACKOUTS AND RESCUE – QUICK REVIEW

Hypoxic fits normally occur immediately after a diver has surfaced.

2. Blackout (BO)

All breath hold related loss-of-consciousness has the same basic cause - lack of oxygen to the brain.

When oxygen levels fall below the threshold required to maintain consciousness, a blackout occurs. This is the body's way of protecting critical brain tissue by reducing the brain's demand for O₂.

The dynamics that contribute to this happening vary with depth. In freediving, we categorize blackouts according to the depths at which they occur; underwater, or surface.

The level of oxygen in the blood which is required to maintain consciousness is around 10%, or a partial pressure (ppO₂) of 0.10. However, a blackout is likely to occur at around a ppO₂ of 0.12, and hypoxic fit at a ppO₂ of 0.16.

Let's imagine a static breath hold where you are comfortable and confident, and wanting to achieve a personal best.

Your maximum breath hold in water to date is 2 minutes, but you've been doing a lot of practice by way of dry-training and are looking to achieve a 4-minute breath hold. You've had a recent illness, but before this you were achieving breath holds during dry training of nearly 4 minutes.

You start your breath hold and feel pretty confident. Your buddy knows you well and you trust them. This gives you a false sense of security, and you push your limits. You are not fully recovered from your illness, and this has a detrimental effect on your ability in this session. You use oxygen during your dive, and your ppO₂ drops to 0.12 bar. You lose consciousness and your buddy rescues you.

Hypoxia Threshold (Low ppO ₂)		
ppO ₂	0.21	Normal PpO ₂
ppO ₂	0.16	Hypoxic Fit
ppO ₂	0.12	Blackout likely
ppO ₂	0.10	Minimum to sustain consciousness

WHY DOES IT HAPPEN?

The simple answer is that we all have a limit. Staying within this limit is one of the skills of freediving successfully. If we push too far, too long or hyperventilate before diving, we can exceed our limit and have a possible blackout. The human body has an amazing protective feature when we are freediving if our O₂ limit is reached. As the O₂ level drops to a ppO₂ of around 0.10, the brain switches off to preserve the remaining oxygen well before it is completely exhausted.

Other physiological manifestations happen at this point too: the throat/larynx will spasm and create a seal so as to not let water enter the lungs. In the past, this has been explained as dry drowning. The laryngospasm will only last a short while and affords a window of opportunity to rescue a freediver from the water – hence why it is so important to freedive with a buddy.

RAID NOTE: Your performance may change daily – it is dependent on many factors: how much sleep you had, how hydrated you are, what you've eaten, stress factors in your life, illness, even your surroundings, perhaps a very noisy pool, or unfamiliar buddy. Don't assume that what was an easy dive one day will be easily achievable the next. Do what feels comfortable and don't push your limits.

Most cases of O₂ level drop in static breath holds are caused by freedivers hyperventilating before a dive, or maintaining the breath hold too long, too quickly in their freediving. Taking a more relaxed, consistent progression to freediving will afford you far more enjoyment, progress and safety.

IMPORTANT: You may hear people say that having a hypoxic fit or blackout is a way of discovering your limits – this is not true. You are not discovering your limits; you are vastly exceeding them!

SIGNS AND SYMPTOMS

Symptoms range from looking a little pale or feeling low in energy to a complete loss of consciousness. The following section describes how to recognize symptoms of hypoxia in yourself and others, and signs of a blackout at the surface.

Signs of hypoxia include:

- Trembling.
- Shaking.
- Jerky head movements.
- Inability to control the body.
- Inability to keep the head above the water.
- A glazed look.
- Reduced responsiveness.
- Confusion.
- Slurred words or inability to speak.
- Blue lips (cyanosis).
- Not returning taps.

IMPORTANT: After experiencing a hypoxic fit, a diver's energy reserves are exhausted. They should stop diving for the day (24hrs) and, if possible, should breathe pure O₂ for 5 to 15 minutes.

Signs of hypoxia and/or blackout during static apnea include:

- Freediver behaving abnormally – for example, moving, tensing, shaking. Anything unusual about the freediver's behavior can indicate a hypoxic episode or the onset of a blackout.
- Exhaling air – as the freediver loses motor control, they lose the ability to hold the air in the lungs, and air can escape through the mouth. This may coincide with the rhythm of the contractions from the urge to breathe.
- Loss of consciousness. This can be a sudden change or a gradual one as the O₂ level decreases.

IMPORTANT: Staying alert and keeping an eye on your buddy for any of these signs is imperative.

HOW TO AVOID HYPOXIA AND BLACKOUT

The good news is that blackouts and hypoxic fits are rare and easy to avoid. By never hyperventilating and simply taking a relaxed progression to time in your static apnea freediving, you can successfully freedive without ever experiencing a hypoxic event. Do not progress your freediving until your past efforts feel easy. For example, if you are very comfortable with a breath hold to 3 minutes, then it is a good time to progress, but only a small amount at a time. If a breath hold duration feels difficult, then it is unwise to progress further, as you are at greater risk of hypoxic fit or blackout. Have fun with your freediving and keep it drama free.

Freediving becomes easier the more we do it and, in fact, your progression will be far more successful by avoiding hypoxic events.

Practical steps to avoiding a Hypoxic fit / Blackout

1. Do not push your limits. Only progress when you feel very comfortable at a certain time, and then only progress conservatively.
2. Wear proper freediving equipment that fits correctly, including form fitting suit, low-volume mask, or goggles with nose-clip for static. These will help you conserve oxygen and, alongside being relaxed and comfortable, enable you to use less O₂.
3. Progress conservatively. Make sure your previous breath hold time was an easy success before you go further. If your previous dive was difficult, then it is a fast way to failure by trying to push further.
4. Avoid over breathing / hyperventilating. Taking too many large breaths will turn your blood pH alkaline (the Bohr effect). In this state, the bond between hemoglobin and oxygen becomes very strong and the oxygen will not be released from the red blood cells to the tissues where it is needed. This can cause hypoxia.

PRO-TIP: If you find before a freediving session that you do not feel great, perfect or in good condition for a freediving performance, don't hesitate to abort your session. There could be many reasons for feeling unwell, such as being cold, tired or sick. You will find you may use more oxygen than you normally would, so wait until next time to challenge your time, distance or depth.

HOW TO MANAGE A HYPOXIC FIT OR BLACKOUT

The response to any hypoxic event, regardless of depth, is the same. There are 3 main parts to a rescue.

- **RESCUE** – Bring the freediver to the surface. Keep them securely on the surface with their airways out of the water.
- **RESPONSE** – Remove any facial equipment.
 - For a hypoxic, conscious diver, clearly and firmly coach the freediver through their recovery breathing. People can appear angry and aggressive when hypoxic. It's not personal and is part of the body's defense mechanism. It is likely that they will have no recollection of this after the hypoxic episode when they are fully recovered.
 - For an unconscious diver, blow air across the eyes and cheeks. Gently tap the face. Loudly instruct the freediver to breathe, using their name.
- **REVIVE** – Unconscious diver - if the freediver remains unresponsive after thirty seconds, begin rescue breaths. If they do not revive within another minute, call for help, remove from the water and commence CPR.

PRO-TIP: If a freediver experiences a hypoxic fit, you can support the freediver until they regain complete composure, but be ready to initiate Rescue, Response, Revive, as a hypoxic fit is commonly followed by blackout. After a hypoxic fit, check the freediver for injury. If a hypoxic fit occurs in a pool, they may have hurt themselves or another diver through contact with the pool-side.

Summary

Remember that the diver's airway should be supported securely out of the water. As the rescuer, one arm should be supporting the diver under their armpit with your hand on the diver's chin in a pistol-grip. The diver's head should rest on your shoulder, clear of the surface of the water. With your other hand, you can remove facial equipment, e.g. mask, and gently tap the diver's face.

Your instructor will remind you of the rescue steps during your pool sessions, and you will practice rescue scenarios from both simulated hypoxic fit and blackout.



SUMMARY

The discipline of static apnea is very difficult for most people, as there is nothing to take your mind off what you are doing. It's important to relax no matter what circumstances are, and to build a routine so that everything becomes familiar, almost second-nature. Familiarization is particularly useful for static breath hold sessions. It can make it easier for you to relax, even if there are distractions or you are in an unfamiliar place, such as a new pool location. There can be many distractions during a static session, for example other people using a public swimming pool, children, other classes going on and so on. If you can learn to relax and focus your mind elsewhere, you can shut out all the external distractions.

Having said all this, it is possible to hold your breath for a long time with zero preparation if you are very relaxed. There's no one definitive way to complete a static apnea session. Be prepared to experiment with different approaches during your sessions and see what works for you and your buddy.

A final word on safety during static apnea. You are more likely to push your limits in a pool, as you may have a false sense of security. You are in relatively shallow water, not out of your depth, and can stand up easily with your airways out of the water. The visibility, if you are in a pool, is likely to be fairly good, so you can see the bottom of the pool and your buddy right next to you. It's important to do what feels good on the day. Don't go for a target time, and remember that your performance will change daily, depending on numerous factors, for example, how much sleep you've had, whether you've had a good or bad day at work, how hydrated you are and so on.

RAID PRO TIP: You can still progress to world-class levels without ever experiencing stress, contractions or any feelings of discomfort. You don't need to stress your body or mind during the process of static apnea.

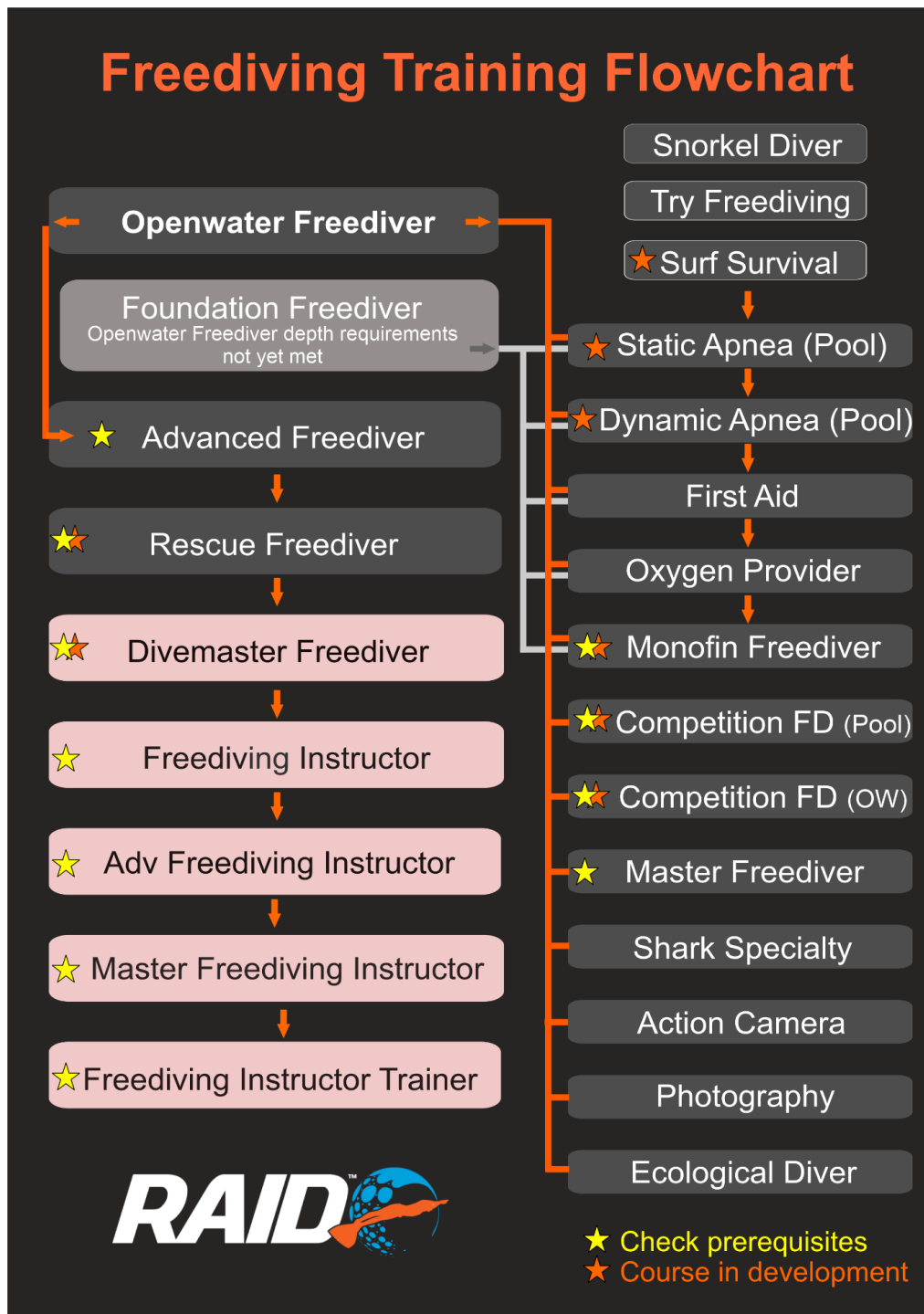
We look forward to seeing you in the pool for your static session!

CONCLUSION

Congratulations on completing the RAID Freediving Static Apnea Specialty course. You now have some useful tools for relaxation and focus, and for improving your breath hold performance in a safe and progressive way. If you haven't already completed it, the RAID Dynamic Apnea Specialty is a great addition to further your pool training. Ask your instructor or local dive center for details.

Our sincere thanks to you, from all the team at RAID.

FREEDIVING TRAINING FLOWCHART



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