



















### **Dive discipline**

It is a rule of BSAC that the Dive Manager has the authority of the Branch Diving Officer to suspend a member from diving if instructions are not obeyed.  
(See Authorised branch dives)

### **Dive leadership**

See [Authorised branch dives](#) / [Buddy diving](#) / [Dive planning and organisation](#).

### **Dive management**

The Dive Manager should be appropriately qualified or have an assistant who is qualified for the dive(s) to be undertaken.

The Dive Manager must know and document:-

- Divers' names and pairing
- Divers' cylinder size and contents
- Divers' planned decompression schedule
- Divers' planned decompression technique
- Divers' back up plan in case of an emergency
- Dive start and finish times

The Dive Manager should complete a full dive log.

Additionally for mixed gas diving the Dive Manager must know and document:-

- Divers' gas mixes for bottom, travel and decompression
- Divers' maximum operating depth (MOD)
- Divers' cylinder sizes and contents for all gases
- Rebreather divers' absorbent material life and primary set-points

### **Dive planning and organisation**

When planning any dive the following factors should be considered:-

- The divers' experience and qualifications
- The divers' current fitness to dive
- The divers' depth limitations
- A suitable dive platform and experienced skipper (for boat diving)
- A safety backup plan for all aspects of the dive in case of an emergency

Additionally, technical diving involves planning for the various combinations of gas mixtures to be used at different depths and also accounting for loss of gas mix scenarios. This requires a very disciplined diver to both plan and then execute the dive as planned.

The technical dive plan should consider:

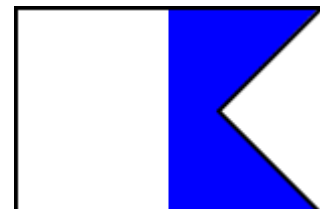
- The 80 metre depth limit
- Manufacturers' equipment specific depth limit recommendations
- The MOD (maximum operating depth) of the gases being used
- END (Equivalent narcotic depth)

When boat dives are taking place, divers should make sure that a responsible person on shore has details of the dive plan and estimated time of return. When diving in the UK the Maritime and Coastguard Agency (MCA) should be contacted by phone / radio call to brief them of your intentions and to confirm that you have returned to shore safely.

Accurate records of diver training, dives and expeditions should be kept at all times.

### **Diving flag**

The international code flag 'A' should always be flown when divers are in the water. For small boats it should be at least 1/2 metre square and should have the means to fully extend it in calm conditions. It should not be flown when travelling to or from a dive site.



### **Diver propulsion vehicles**

A diver propulsion vehicle (DPV) is a very effective and effortless way for the diver to cover a large underwater area. By riding, or being dragged along by the DPV, the diver is provided with greater mobility and range for the dive, as well as breathing a reduced amount of the appropriate breathing mixture due to the reduced effort required for motion. Such a reduction in gas consumption may therefore also allow the diver to spend a longer period of time underwater, subject to the personal decompression requirements.



It is vital that bailout gases are available to avoid this situation. All divers must plan decompression schedules to cover all potential gas failure possibilities and how they can set up spare cylinders in case they need them. These include:-

- Written or pre-programmed decompression schedules for longer bottom time than planned.
- Written or pre-programmed decompression schedules if the diver is unable to use travel or decompression gases in case of a gas loss or equipment failure.
- Spare decompression gas available to the diver in case of a gas loss or equipment failure.
- How the divers would access the spare gas in an emergency (spare cylinders on decompression line or cylinders lowered to divers from diving platform).
- Overall duration of emergency decompression considered relative to the expected water temperature.
- A diver to surface signalling protocol to facilitate requesting gas or assistance in an emergency.

### **Equivalent narcotic depth (Technical diving)**

Equivalent narcotic depth (END) is the depth at which the partial pressure of nitrogen in the gas mixture would be the same if the diver were using air. BSAC recommend a suitable END with regard to the dive conditions and a personal narcotic tolerance. One of the major benefits of diving mixed gas is to have a clear head whilst at the maximum depth. 30 metres is generally accepted as a narcosis level a diver can cope with in an emergency situation. Some divers are happy to increase this depth if the diving conditions are better, such as warmer water, better visibility, etc.

### **Explosives**

It is extremely dangerous to attempt to recover or retain live explosive devices. Immersion in water could render them very unstable, especially if they are consequently dried out, so keep well clear of any such devices you find. If you consider that they are in a dangerous location, inform the Maritime and Coastguard Agency (MCA).

Never:-

- Attempt to bring them to the surface and on no account abandon them in shallow water, or on the beach.
- Undertake the use of underwater explosives for carrying out underwater work without a recognised course of training.
- Dive near sites where underwater explosives are being used since the shock waves can be fatal.

### **Fitness to dive**

Diving uses as much energy as moderate to heavy work. Before resuming diving, after a lay off, you are advised to regain physical fitness, practice basic underwater skills in the pool or sheltered water training area and complete a series of 'work up' dives before diving to depth. Ensure all divers are both physically and psychologically fit for the dives they plan to undertake.

### **Flares**

Orange smoke and red handheld / parachute flares should be carried by all dive boats in order to attract attention when in difficulties at sea. Similar flares, in waterproof containers, are available for divers to carry in the event of them becoming lost at sea. Orange / red flares should not be used for signalling purposes in a non-emergency situation. Gun type flare launchers require a firearms certificate for use within the UK.

Divers are cautioned against taking such devices abroad, as they are likely to cause concern to travel security personnel.

### **Flying and diving**

Flying or travelling to altitude after diving can give rise to decompression illness. Flying or travelling to altitude before diving, may increase the risk of decompression illness on a subsequent dive. It is therefore recommended that divers use the BSAC 88 decompression tables (Levels 1-4) or other appropriate dive planning tool to determine whether the proposed dive / journey combination is acceptable.

(See [BSAC 88 decompression tables / Altitude](#))

### **Gas analysing (Technical diving)**

When nitrox and / or mixed gases are being used, all gases must be analysed prior to the dive.

All cylinders must be clearly marked with their oxygen and helium percentages and MOD (Maximum operating depth).

The partial pressures of oxygen (PO<sub>2</sub>) should not exceed 1.4 bar for the dive phase and primary gases. For suitably qualified divers, the partial pressure of oxygen must not exceed 1.6 bar for any chosen decompression gas mixture. For divers not holding appropriate qualifications, the PO<sub>2</sub> of 1.4 bar should not be exceeded for any gas mixes including decompression gases.

BSAC recommend a suitable equivalent narcotic depth (END) with regard to the dive conditions and a personal narcotic tolerance.

When gas mixes involving helium are used in technical diving, wherever practicable, the helium content of the mix should also be analysed by an appropriate instrument (e.g. helium analyser) as a confirmation of the precise mix.

### **Gas mixtures (Technical diving)**

Technical divers should only use gas mixes for which they hold a recognised qualification.

Appropriate safeguards should be put in place to avoid premature gas loss and to ensure that the respective maximum operating depths of all open circuit gases carried are observed.

All divers are strongly advised not to use an hypoxic gas unless the depth requires it to reduce the PO<sub>2</sub> to a breathable value.

### **Gas requirements**

All divers should carry the gas they need to complete the dive safely. They should also have a plan to access bailout cylinders in case of a gas failure. (See [Air \(gas\) reserve](#)).

For technical divers using open circuit equipment this includes bottom gas, travel gas and decompression gas. They should also have a plan to access bailout cylinders in case of a gas failure. Reserve requirements for travel (descent & ascent) and primary gas should be calculated on the rule of thirds.

Reserve gas for decompression is normally calculated as double the amount of gas required for the planned decompression schedule.

### **Hyperventilation**

Hyperventilation, before a snorkel dive, should be avoided at all costs, as it has the effect of flushing out carbon dioxide from the respiratory system. Build up of carbon dioxide, rather than lack of oxygen, creates the desire to breathe and, by getting rid of carbon dioxide in this way, snorkellers are more likely to suffer a 'blackout' through hypoxia (shortage of oxygen).

### **Ice diving**

See [No Clear Surface](#).

### **Incidents**

See [Accidents / Incidents](#).

### **Insurance**

Membership of BSAC automatically gives worldwide public liability insurance cover of up to £10,000,000 when the member is engaged in diving or diving related activities. This cover is available to all BSAC members regardless of where they are domiciled except for members resident in North America, and cover applies as soon as membership is confirmed / renewed. This is considered to be the earlier of when the Branch issues a temporary membership receipt to that member, or when the membership details are included on BSAC's membership database at BSAC headquarters.

Cover also includes any qualified diving guests of the insured, prior to becoming a full member, whilst participating in the activities of any branch to which the policy applies, as well as any intended member undergoing preliminary training. Both of these extensions are naturally subject to certain time limits, and further details on the policy can be obtained from BSAC headquarters.

Cover is not restricted to only BSAC organised events or when the member is diving with other BSAC members. The general rule is that if the member is also a member of another

diving association and is participating in a dive organised by this other association, then that association's own public liability insurance policy should respond. If mixtures of individuals from various organisations are diving with an independent organiser then the BSAC policy will respond to that BSAC member.

Organised social events such as shows, barbecues, bonfire parties and other fund raising events are covered, but any unusual activity should be discussed with BSAC HQ to ensure a relevant risk assessment is in place.

The policy does not, however, cover personal or branch diving equipment or boats, and it is a constitutional rule of BSAC that all boats used for branch diving, whether privately owned or not, must be insured for Third Party risks with a minimum indemnity limit as recommended by BSAC, currently at £2,000,000. If water skiing is included in branch activities, additional cover is also required.

It is important to note that incidents should be reported to BSAC using the BSAC Reporting System, and further details on this system, and the insurance policy itself can be obtained by contacting Diving Resources at BSAC headquarters or through the BSAC website.

### **Legislation**

With the exception of requirements relating to cylinders (see [Cylinders](#)) and the law which protects historic wreck sites, there are no laws or government regulations in the UK about the way in which the sport of diving must be conducted.

However, if you dive for money or reward, even using recreational techniques and equipment, you are considered to be a professional diver and are subject to the requirements of the Diving at Work Regulations - 1997. These regulations require a diving medical issued by a medical examiner approved by the Health and Safety Executive (HSE) and impose detailed safety requirements on all diving operations.

Amateur divers must be aware that any job of work carried out for anything other than essential expenses e.g. petrol or air costs, would be considered subject to the requirements of the regulations. It does not matter whether the money or gifts are presented to the divers or their branch, this would still be seen by the HSE as diving at work. Even jobs of work undertaken for true expenses are seen by professional divers as 'stealing their work' and will often be a source of aggravation.

The regulations recognise that different techniques are used by the different sectors of the diving industry, and there are five separate Approved Codes of Practice (ACoP) covering Offshore diving, Inshore diving, Scientific and Archaeological diving, Recreational diving and Media diving.

Divers working professionally have to comply with the requirements of the relevant Code of Practice. Those teaching sport diving professionally must comply with the 'Recreational diving' ACoP.

Appropriate BSAC qualifications have been approved by the HSE for activities covered by this Code.

### **Medical examination**

Divers should ensure they are fit and healthy to dive and diver training or diving must not be undertaken until the diver has completed an annual medical self-declaration form on renewal of membership. If the diver has no underlying medical condition that would potentially prevent them from diving safely, they may sign the form and a copy should be retained in branch records. If a member has an underlying medical condition or query, telephone contact should be made with a medical referee for further advice. (Forms and medical referee list available from BSAC HQ or can be downloaded from the BSAC website). Branch Diving Officers should ask for proof of current self-declaration status when members transfer to them from another branch.

If any member has been the subject of a decompression accident they must not commence diving again until medical clearance has been obtained from a UK Sports Diving Medical Committee approved referee.

Some countries have local regulations that may require a medical examination so it is worth checking before travelling and diving abroad.

Potential new members who are undergoing the 'Try Dive' or other introductory course should be asked to sign a disclaimer, which states they have not suffered from diseases or conditions which would make aqualung diving hazardous. An example disclaimer can be

obtained from the BSAC website at  
[http://www.bsac.com/trydive\\_poolsafety](http://www.bsac.com/trydive_poolsafety)

### **Mixed gases (Technical diving)**

The terminology 'mixed gases' can encompass many types of gases a diver could breathe during a dive. However, it is generally accepted that the main gas used is tri-mix. Tri-mix contains oxygen, helium and nitrogen in various percentages. The amount of oxygen in the mix is reduced the deeper the dive. This is to reduce the effects of high partial pressures of oxygen and to ensure the diver does not suffer from oxygen toxicity. The nitrogen percentage is also lowered to reduce the effect of nitrogen narcosis. Once the percentages of the oxygen and nitrogen have been calculated the balance gas added is helium.

Tri-mix containing less than 17% oxygen, i.e. a hypoxic mix should not be breathed on the surface or in shallow water. Divers using mixtures unable to support life at the surface are required to carry additional travel & decompression mixes and switch mixes at the appropriate depth. All divers should be aware that mixed gas diving, with its greater depths, increases the element of risk. It is important that divers are not only suitably trained and qualified but gain depth experience and dive fitness in a progressive way.

### **Multiple dives (Technical diving)**

Technical divers should always track their oxygen uptake. When conducting multi-day diving, it is essential to ensure that the NOAA (National Oceanic and Atmospheric Administration) oxygen exposure limits for both the short term (central nervous system) and long term (pulmonary toxicity) implications are observed. BSAC recommendation is one deep dive in a 24-hour period.

### **Neutral buoyancy**

Neutral buoyancy is achieved when the diver is able to remain in either a static position in the water when using a rebreather or rises or falls about a static position as a result of breathing in and out when using open circuit equipment. Comfortable diving means the achievement of neutral buoyancy, if required, at any stage of the dive. Correct weighting is critical to gaining neutral buoyancy easily; the diver should carry just enough weight to hold a 6m decompression stop with a nearly empty cylinder.

Where a drysuit is being worn the NDC strongly recommend that, as far as comfortably possible, the drysuit is used to maintain neutral buoyancy underwater.

### **Night diving**

Night diving, especially in tidal waters, requires very careful planning. Each diver should have a working torch otherwise the dive should be terminated. Each diver should carry a backup torch or some other means of identifying their position if their main torch fails. An efficient system of marking the point of exit must be employed. Care must be taken with diver to diver signals to ensure that the torch is not shone directly into the diver's eyes.

### **Nitrogen narcosis**

As the partial pressure of nitrogen in a diver's breathing gas increases with depth it begins to have a narcotic effect on the diver. Nitrogen narcosis decreases a person's ability to cope with emergencies, slows down reaction and realisation time and increases the risk of an accident.

(See [Equivalent narcotic depth](#))

### **Nitrox**

The use of nitrox (nitrogen / oxygen mixtures where the oxygen content is greater than that of air) as a breathing gas can provide a safety benefit in terms of a reduced risk of decompression illness, or enable longer dive times / shorter decompression stop requirements with no added risk. The use of nitrox has certain disadvantages which require training and suitable equipment to minimise the risk.

Properly trained and qualified BSAC members are permitted to use nitrox on branch dives, with the approval of the Dive Manager. BSAC provides a range of courses and qualifications in nitrox diving.

BSAC recommends a maximum partial pressure for oxygen exposure when diving of 1.4 bar. For divers with additional appropriate qualifications a maximum partial pressure of oxygen for decompression of 1.6 bar is recommended. This figure will determine the maximum operating depth for any nitrox mixture. Failure to observe the maximum operating depth for any gas mixture may have fatal consequences due to the onset of oxygen toxicity. (See [Cylinders \(Nitrox and mixed gas\)](#) / [Gas analysing \(Technical diving\)](#))

### **No clear surface**

(Cave diving, ice diving, diving inside wrecks).

Members wishing to dive in caves should contact the appropriate cave diving organisations, as this is very specialised diving, in terms of technique and equipment, and is not covered in BSAC diver training.

Diving under ice should only be undertaken with a surface party of at least two. This allows one to tender the divers, while the other is free, if required for any other reason, including an emergency. One of the divers must be securely roped to the surface, if diving in pairs, and contact between them should be by means of a buddy line.

Wrecks should not be penetrated without proper training and equipment.

(See [Wreck diving](#))

### **Odd numbers**

It is very strongly recommended that diving in 'odd numbers' be avoided, as the 'odd man out', to some extent, is without a buddy. Threesomes are not uncommon in incident reports.

(See [Buddy diving](#))

### **Oxygen**

The administration of 100% pure oxygen following a decompression accident is recognised as an effective FIRST AID TREATMENT and may result in much less serious injuries. It SHOULD NEVER be regarded as a substitute for recompression, which is the only effective treatment in such cases. Members who have taken part in appropriate training courses and who have appropriate equipment, are recommended to use oxygen to treat divers showing symptoms of decompression illness, while they are waiting for recompression treatment.

Always consider the role of the rebreather in first aid following a DCI incident within the diving party. A rebreather allows prolonged oxygen enriched air to be made available to the conscious casualty. However, the use of the rebreather should be considered a back-up measure. The first preference would be dedicated oxygen administration equipment using an oronasal mask; then the rebreather (high oxygen content but via a mouthpiece) and finally using nitrox (lower oxygen content and via a mouthpiece).

The only time oxygen should not be given is when the casualty is actually showing signs or symptoms of oxygen toxicity.

### **Oxygen partial pressure**

When mixed gases and nitrox are being used the partial pressure of oxygen (PO<sub>2</sub>) should not exceed 1.4 bar for each mix used for either travel (descent and ascent) or bottom phases.

For divers holding an appropriate qualification a PO<sub>2</sub> of 1.6 bar may be used for decompression purposes down to a maximum of 9m. All divers who do not hold a suitable qualification should not exceed a PO<sub>2</sub> of 1.4 bar for any chosen gas mix.

### **Pairing divers**

The best option is to pair divers who are using the same type of dive equipment and who plan similar decompression schedules.

If pairing divers who are using different breathing gases or if pairing an open circuit diver with a rebreather diver, both divers must carry out the same decompression schedule to ensure they remain together at all times. This means that both divers should follow the most conservative schedule.

As with all diving, a thorough buddy check should take place prior to the dive.

### **Patent foramen ovale**

During pregnancy the right and left sides of the foetal heart are connected. The hole between the right and left sides is known as the foramen ovale. Normally this should heal over after birth, separating the venous and arterial blood supplies passing through the heart. However in a proportion of the population (perhaps 25%) this hole does not close up completely, resulting in a patent foramen ovale (PFO). The consequence for divers is that having a PFO can increase the risk of decompression illness. This occurs as a result of bubbles in the venous circulation (which would normally be filtered out in the lungs) shunting across to the arterial circulation, where they continue to expand in size.

### **Pots and markers**

Dive well away from fishermen's buoys, pots and pot markers, unless there are special circumstances.

### **Pregnancy**

Medical evidence as to the safety of diving whilst pregnant is not conclusive. However there is evidence that deep diving may cause harm to the foetus. Certainly decompression illness and its subsequent treatment could be harmful to the foetus. Consequently if a woman is pregnant, or is trying to become pregnant, she is strongly advised not to dive.

Women who decide they wish to continue to dive whilst pregnant, or trying to become pregnant, should only undertake shallow dives, ideally less than 10m and no deeper than 20m, and remain well inside no-stop times. Even at shallow depths there remains a risk of pulmonary barotrauma which could require recompression treatment and cause harm to the foetus.

If a woman discovers she is pregnant and has been diving during the pregnancy, she is advised to discuss her case with a BSAC medical referee. The scientific evidence is not clear cut and ultrasound studies, together with other indications, may be useful to allay fears and help in the decision as to how the pregnancy should be managed.

### **Propeller guards**

A propeller guard, fitted to an outboard motor, gives a degree of protection from injuries to divers. Before fitting a propeller guard, take note of the manufacturer's recommendations and instructions, as it is possible to cause stress to the gear box and low end of the engine. Some loss of power may result from fitting a propeller guard.

### **Qualifying dives**

Open water qualifying dives should be made under the guidance of a branch instructor or approved Dive Leader. Each dive should increase the diver's experience of differing underwater conditions and, where appropriate, follow the format laid out within the training scheme.

### **Rebreathers**

This section examines key areas specific to diving with rebreathers:-

#### **Rebreathers - Ascent**

A rebreather diver should ascend slowly to allow proper venting of the breathing loop and to avoid becoming positively buoyant.

#### **Rebreathers - Boats**

Increased care must be taken when manoeuvring a boat in the vicinity of rebreather divers as they may produce no, or very few, obvious bubbles. Boathandlers should be aware that a rebreather diver may surface unexpectedly, especially just after the initial descent. The boathandler should therefore patrol the dive site at a safe distance to enable an unplanned ascent by the rebreather diver.

The rebreather diver should deploy a delayed SMB before surfacing unless they are returning up a fixed datum.

The suitability of a boat as a diving platform and also the stowage possibilities for the rebreather to ensure adequate protection of rebreather units (e.g. hoses and cylinder valves) should be considered.

#### **Rebreathers - Breathing**

It is recommended that rebreather divers make a conscious effort to breathe freely and normally. Many open circuit divers skip breathe, whether consciously or unconsciously. This practice will lead to carbon dioxide retention and is highly dangerous when applied to rebreathers.

Pre-dive breathing checks should be conducted prior to entering the water.

#### **Rebreathers - Bubble check**

As early in the descent as possible, but preferably no deeper than 6m, a bubble check should be performed to identify potential leakage.

#### **Rebreathers - Buddy diving**

It is important to ensure the rebreather diver is partnered with a buddy who can assist them in the event of a problem. Therefore, BSAC recommends that, in order of preference, the buddy of a rebreather diver should be:

To 40 m maximum:-

- Another rebreather diver using the same type of rebreather (i.e., CCR with CCR or SCR with SCR)
- Another rebreather diver using a different type of rebreather (i.e., SCR / CCR mix)
- An open circuit diver.

From 40 m to 80 m:-

Within this depth range rebreather dives will involve the use of gas mixes including helium and hence the above order of preference is modified to:-

- Another rebreather diver with an appropriate mixed gas qualification using the same type of rebreather.
- Another rebreather diver with an appropriate mixed gas qualification using a different type of rebreather.
- An open circuit diver. Note: If diving below 50m the open circuit diver will also require an appropriate mixed gas qualification.

If the buddy is not to be a rebreather qualified diver then:-

- The buddy of a rebreather diver (whether SCR or CCR) should be, as a minimum, a qualified Sports Diver with their DO's consent.
- For dives to greater than 35m, the buddy should be either a minimum of Dive Leader or a qualified Sport Diver holding an appropriate deep diving certification from a recognised training agency,
- For dives to greater than 50m the buddy should hold an appropriate mixed gas qualification from a recognised training agency.
- The DO (or DM acting on behalf of DO) should ensure that the diver who will buddy a rebreather diver is:-
  - Experienced under the current diving conditions (i.e. depth, site and weather).
  - Capable of recognising the conditions of hyperoxia, hypoxia and hypercapnia.
  - Capable of performing a rescue (CBL and surface support) on the rebreather diver in the case of an emergency.
  - The buddy of a rebreather diver should be diving using a gas mix appropriate to the intended depth and be suitably equipped.
- The buddy of any rebreather diver should carry an independent bailout (i.e. redundant) breathing system. The capacity of this independent system (e.g. pony or twin set) should suit the dive profile of the dive being undertaken.
- The buddy should carry a DSMB (or SMB as appropriate) and at least one other surface detection aid.
- The buddy check procedure should be modified to accommodate the rebreather layout and any controls the buddy may need to operate.

#### **Rebreathers - CO<sub>2</sub> absorbent material**

It is imperative that for all rebreather diving the manufacturer's recommendations regarding both the type of absorbent material(s) and its effective duration are followed. Absorbent material should be stored and disposed of according to the manufacturer's instructions.

It's important to note that long car journeys, bumpy boat trips, airplane flights and anywhere where there is vibration can have an effect on the packing of the absorbent material, possibly causing settling or 'channelling'. Both of these effects can adversely affect the performance of the absorbent material. This impact can be minimised by packing of the absorbent material as late as is practicable before the dive commences.

### **Rebreathers - Decompression**

The available entry-level training for rebreather diving incorporates limited decompression using nitrox as the breathing gas in rebreathers. Normoxic and full mixed gas rebreather training courses, available from recognized training agencies, provide qualifications involving more extended decompression diving. BSAC recommends that when using a rebreather for dives involving decompression, the maximum planned decompression requirement should not exceed that permitted by the unit manufacturer and / or the training agency certification held by the rebreather diver. For the decompression phase of the dive, the actual  $PO_2$  must not exceed 1.6 bar.

### **Rebreathers - Equipment standard**

Each model of rebreather is designed by its manufacturer to operate under a specific set of conditions and using specific gas mixes. These conditions may differ, not just from manufacturer to manufacturer, but also from model to model. Rebreather divers should ensure that they fully understand and observe the performance limits of their particular equipment. There is a growing range of independently produced modifications for rebreathers. Before applying any such modifications to their rebreathers, divers should understand that any such modification extends the equipment beyond the design parameters envisioned by the manufacturer. Any such modification is therefore entirely at the risk of the user who needs to satisfy himself that the modification is not detrimental to the performance of the equipment. As part of the buddy check, the buddy of the rebreather diver should clearly understand the implications of the particular configuration of rebreather being used.

### **Rebreathers - Hygiene**

Rebreather divers should always disinfect the breathing loop in accordance with the manufacturer's recommendations.

### **Rebreathers - Maintaining breathing loop volume**

BSAC firmly believes that all rebreathers should be designed and manufactured as standard with an automatic means of maintaining an adequate breathing loop volume during the descent, to minimise the task loading to the rebreather diver. The manual addition of gas to maintain the breathing loop volume is required when an automatic diluent addition valve is not fitted, is isolated or fails. When an automatic diluent addition valve is not fitted, a slow descent is recommended so that gas addition and buoyancy control can be managed without excessive task loading. The  $PO_2$  in the breathing loop should be monitored to avoid excessive values during descent.

### **Rebreathers – Oxygen monitoring**

BSAC firmly believes that all rebreathers should be designed and manufactured with a facility for monitoring the oxygen within the breathing loop as standard. Furthermore, BSAC strongly recommends that rebreathers should not be used without an effective and efficient, real time  $PO_2$  and / or  $FO_2$  monitoring system that enables the diver to know their precise content of oxygen in the loop at all times. Where such a system is fitted to a rebreather, the reading should be checked regularly and appropriate action taken if it is not at the expected value. Closed circuit rebreather divers should always use a diluent gas that has a  $PO_2$  equal to or lower than their maximum selected set-point to facilitate effective diluent flushes.

### **Rebreathers - Oxygen cells**

Oxygen cells fitted to rebreathers should be changed at the interval recommended by the manufacturer.

### **Rebreathers - Pre-dive checks**

Pre-dive checks should be conducted in accordance with unit specific training, including pre-breathing the unit prior to entering the water.

### **Rebreathers - Rebreather diver rescue**

Rebreather divers should ensure that their buddy understands the operation of their rebreather. The provision of adequate buoyancy to recover the casualty to / support the casualty at the surface, in the event of a rescue, should be emphasised. This may involve the need to close off the rebreather mouthpiece to counter the negative buoyancy incurred by loss of gas from the breathing loop.

### **Rebreathers - Rebreather training**

Divers wishing to use rebreathers should complete a training course provided by a recognised training agency. BSAC has introduced training courses for both SCR and CCR rebreathers. The training course should be specific to the particular rebreather that they wish to use and should be recognised by the manufacturer of that equipment. Divers wishing to extend their use of rebreathers to include gas mixes other than nitrox should complete a further unit specific training course, provided by a recognised training agency, covering the use of such gas mixes. BSAC has introduced mixed gas rebreather courses.

For diving within BSAC, qualified rebreather divers should register a copy of their highest rebreather qualification (entry level initially and, if subsequently upgraded, for mixed gas also) with BSAC headquarters.

Recognition will be sent in the form of a BSAC qualification record book certificate.

### **Semi-closed rebreathers (SCR)**

#### **SCR - Ascent**

A slow controlled ascent is important to avoid a drop in the partial pressure of oxygen ( $PO_2$ ) in the breathing loop to hypoxic levels. It is therefore recommended that, whenever possible, ascents are made via a shot line or some other fixed datum. A SCR diver should flush the breathing loop before commencing an ascent, to ensure that the  $FO_2$  is at a maximum and try to maintain this  $FO_2$  during the ascent profile.

#### **SCR - Flow rate**

When using an SCR the flow rate and gas mix recommended by the manufacturer for the planned dive should always be used.

The flow rate should be tested prior to every dive to ensure it is within the manufacturer's prescribed limits.

#### **SCR - Surface swims**

If a semi-closed circuit rebreather diver has to make a surface swim, BSAC strongly recommends that, in order to avoid the potential of hypoxia, the swim is completed using an open circuit regulator. If the gas within the bailout cylinder is planned to be used for a surface swim, then the pre-dive gas planning should take this into account when selecting the bailout cylinder.

### **Closed circuit rebreathers (CCR)**

#### **CCR - Batteries**

Any batteries in a rebreather should be changed or charged at the recommended intervals.

Where batteries are rotated the new or fully charged battery should be powering the slave monitor wherever there is redundancy of control systems incorporated in the rebreather. This means that if the master battery fails there will always be an effective battery to power the control system.

#### **CCR - Partial pressure of oxygen ( $PO_2$ ) / Set-Point**

BSAC recommends the following maximum partial pressures of oxygen / set-points for the breathing mix for CCR diving:

1.4 / 1.3 bar PO<sub>2</sub> set-point during the dive  
1.6 / 1.5 bar PO<sub>2</sub> set-point during decompression.

When diving using gas mixes other than nitrox, the depth exposure and decompression obligations can result in significant exposure to high partial pressures of oxygen and its attendant CNS toxicity. For such diving use of a partial pressure / set-point lower than 1.4 bar / 1.3 bar should be considered.

### **Rebreathers in BSAC training**

A BSAC publication titled "Rebreathers in BSAC Training" outlines the recommendations for the use of rebreathers in branch diver training and for BSAC events such as Skill Development Courses and Instructor Training Events. This publication is available from BSAC HQ or can be downloaded from the BSAC web site <http://www.bsac.com/rebreathers>

### **Re-entry decompression**

If a diver misses planned decompression stops, no attempt should be made to enter the water again in order to complete them. In this situation the diver is increasing the risk of decompression illness and merely placing a possible casualty in a hostile environment.

### **Repeat dives**

An appropriate planning tool should be used whenever planning and performing repeat dives. Where two or more dives are being made the same day, it is good practice to carry out the deepest dive first. You should also take care if you are involved in several days of diving deeper than 30m. It is probable that excess nitrogen will be accumulated over this period, and apparently 'innocent' dives, carried out near the end of the period of diving, can cause decompression illness. It is therefore recommended that any dive series involving consecutive days diving to 30m+ is limited to three days, after which a 24 hour break should be taken.

(See [BSAC 88 decompression tables](#) / [Dive computers](#))

### **Rescue breathing and cardiac compression**

When rescue breathing on land, the rate of ventilations should be judged by monitoring the rise and fall of the casualty's chest and the sound of the casualty's exhalations. To give a rescue breath take 1 second to inflate, and then watch for the chest to deflate.

When in water, the rate should be a minimum of 2 breaths/15 sec.

When demonstrating or practising rescue breathing in the water, a proper seal (usually nose), should be made. A simulated seal is not sufficient to give the sense of realism required, and does not guarantee a successful acquisition of technique. The use of a manikin is strongly recommended when practising rescue breathing on land.

Cardiac compressions should never be practised on a conscious breathing subject; a manikin should always be used. Cardiac compressions should be at a rate of 100 compressions/min. When both techniques are being used a sequence of 30 cardiac compressions followed by 2 rescue breaths should be used.

### **Ropes**

Divers should take great care with the use of ropes underwater, especially using reels as distance lines from shot lines. Reels for SMB use should have a quick release system such as a bayonet fitting snap lock and divers should be taught how to use them. When divers do get into difficulties on ascent it is often the best course of action to ditch the reel so that both hands are free to deal with the situation. When using a reel and line as a bottom distance line, BSAC recommends that a reel and line which sinks is used and that when deploying line, hold the reel and line away from the body and especially the legs. It should also be recovered from in front of you. Never let a bight of line develop in front of you; slow down and wind in. Divers should always carry an adequate knife, especially when dealing with ropes.

### **Separated divers**

If divers become separated underwater, a brief attempt (approx. 30 seconds) to re-locate should be made, after which the divers should surface. If the dive is subsequently recommenced appropriate decompression planning must first be carried out.

## **Sharing**

See [Assisted ascents](#).

## **Signals**

Divers should be completely familiar with the standard code of visual signals and should give them accurately and clearly. All signals should be acknowledged. The 'Come and get me' signal by a diver at the surface is to be used only for distress, and not as a 'Pick me up' signal.

## **Skills practice**

The essence of safe diving lays in the skill and competence of the diver; the more complex a dive the more important this is. A good level of skills can only be maintained and improved with constant practice.

## **Solo diving**

There are occasions, e.g. in nil visibility or when working underwater, when the 'buddy' system is ineffective. On these occasions a solo dive may be required, with the diver being securely roped and in constant rope communication with a surface 'tender', who should be a diver themselves.

The rope must be securely fastened to a suitable object on the surface. Communicating signals must be fully understood and a fully kitted, roped, 'stand-by' diver must be immediately available to dive in the event of an emergency.

## **Stand-by divers**

On the majority of dives your stand-by diver is your buddy. A stand-by diver is usually only required when a solo dive, using a rope tender, is in operation.

## **Surface detection aids**

Surface marker buoys (SMBs) should be used in significantly moving water, when operating well off shore, in areas with heavy surface traffic and where local regulations require it. There may be times, other than these stated, when their use might be deemed prudent by the Dive Manager. It is essential that correct training is given to new members in their use, as for any unfamiliar equipment. In some situations e.g. wreck sites with slack water, they are unnecessary and can actually be a hazard to the diver.

It is also recommended that divers carry at least one additional surface detection aid. This could be a signalling flag, stainless steel signalling mirror, personal flares, surface dye, torch, strobe, emergency position indicating radio beacon (EPIRB), whistle or audible signalling device.

## **Tangle nets / Gill nets**

Indiscriminate fishing, particularly on wreck sites, with difficult-to-see monofilament netting, is a real hazard around the British coast. Experiments have shown that the average diver's knife is very ineffective should the diver become entangled. A line cutter or a curved blade 'dinghy' knife, with a blunt end, are probably the most effective for this purpose and need to be worn on the arm. A knife with a sharp point could lead to a diver stabbing himself when in difficulties. Small shears or scissors are recommended as an effective tool for cutting netting. Once caught in netting, it is advisable to partially inflate your BC, so you rise inside the net, putting it under tension and making it easier to cut. The positive buoyancy will also help to 'tear' you away. If your buddy is free of the netting it may be easier for him to cut you away from the bulk of the netting but still enmeshed, and complete the job at the surface.

## **Tides**

The success of any sea dive depends on accurate, local, tidal predictions for the dive site you wish to visit. Admiralty charts give accurate large scale predictions and should be used in conjunction with the relevant local tide tables. Tidal Stream Atlases are also useful and are available for the UK and many other sea areas throughout the world.

## **Training and qualification (Technical diving)**

All divers who wish to undertake technical diving activities must have completed a technical training course with one of the BSAC recognised agencies:-

- British Sub Aqua Club (BSAC)

- Technical Diving International (TDI)
- International Association of Nitrox and Technical Divers (IANTD)
- International Technical Diving Association (ITDA)
- American Nitrox Divers International (ANDI)
- Professional SCUBA Association International (PSAI)

All divers wishing to participate in technical diving should hold a minimum qualification of Sport Diver and a relevant nitrox certification.

### **Trimix**

Trimix is a mixture of three gases, oxygen, helium and nitrogen in various percentages. (See [Mixed gases](#))

### **VHF radio**

VHF radios are a valuable aid to safety at sea and, together with suitable waterproof housings, are frequently used in small boats.

Radio installations should be covered by a Ship's Radio Licence and, under normal circumstances, should only be used by, or under the supervision of, someone who holds an appropriate Certificate of Competence.

It is an offence to use Marine VHF radio from the land, (unless it is a registered land station) so your shore party is not allowed to use one.

### **Weather**

Acquiring an accurate weather forecast for your dive site can save a lot of unnecessary travelling expense and can mean the difference between a controlled successful dive and a risky experience.

BBC TV news bulletins are always followed by a UK forecast with easy to understand symbols. Some daily newspapers carry a good forecast with weather map, and the Maritime and Coastguard Agency always has an up to date forecast.

MCA stations transmit on VHF radio local inshore waters forecasts for 24 and 48 hours and a +3 day extended UK forecast at 4 hourly intervals. These forecasts are updated twice a day and are broadcast at set times published in nautical almanacs. These forecasts are always announced on Channel 16 VHF. Jersey Radio has a similar service for the Channel Isles.

RAF stations have a meteorological station and are usually very helpful.

The Shipping Forecast on Radio 4 is another very useful source

The Meteorological Office (Met Office) provides a telephone message and fax back service:

its helpline is 0845 300 0300. Shipping and inshore forecasts for the UK can also be accessed via the Meteorological Office web site (<http://www.metoffice.gov.uk/weather/marine>)

### **Weightbelts / Integrated weight systems**

Weightbelts or integrated weight systems, when used, should always be fitted with a reliable quick release and fitted so that they will always fall clear of other equipment when released. You should be practised in releasing your weights and should also make sure that your buddy is well briefed and fully familiar with your release mechanism. If the buckle is of the same type as on the cylinder harness, it is wise to wear it so that it operates in the opposite direction, to avoid confusion.

### **Wreck diving**

Wreck diving is one of the most popular forms of diving and requires extra safety precautions if divers venture inside the wreck. Many steel wrecks are in a dangerous state of decay, and loose overhead objects or steel plates are a real hazard. Never venture deep inside a wreck without ensuring your route to clear water is certain, and use a reel and line secured to the outside of the wreck to mark your return route. Avoid excessive finning inside a wreck as sediment stirred up is very slow to settle, due to lack of tidal flow. Additional care should be taken if considering the penetration of a wreck to ensure that the hoses are not snagged in confined spaces or damaged by sharp edges.

Always allow an adequate reserve of gas at the end of your dive and never run down your gas supply by attempting to remove an artefact. Never try to lift heavy objects from wrecks using your BC and / or drysuit.

Underwater ordnance can be very unstable and should not be recovered. It is a criminal offence to be in possession of explosives without the relevant licenses.

(See [Diver's Code of Conduct](#))

## **THE DIVER'S CODE OF CONDUCT**

More and more people are taking to the water; some for recreation; some to earn their living. This code is designed to ensure that divers do not come into conflict with other water users and sets out some guidelines which should be observed alongside the regulations relating to Marine Nature Reserves.

### **Before leaving home**

Contact the nearest BSAC Branch or the dive operator local to the dive site for their advice. Seek advice from them about the local conditions and regulations. If appropriate, have the correct chart and tide tables for the area to be dived.

### **On the beach, river bank or lakeside**

1. Obtain permission before diving in a harbour or estuary or in private water. Thank those responsible before you leave. Pay harbour dues.
2. Try to avoid overcrowding one site, consider other people on the beach.
3. Park sensibly. Avoid obstructing narrow approach roads. Keep off verges. Pay parking fees and use proper car parks.
4. Don't spread yourselves and your equipment since you may upset other people. Keep launching ramps and slipways clear.
5. Please keep the peace. Don't operate a compressor within earshot of other people - or late at night.
6. Pick up litter. Close gates. Be careful about fires. Avoid any damage to land or crops.
7. Obey special instructions such as National Trust rules, local bye-laws and regulations about camping and caravanning.
8. Remember divers in wet or drysuits are conspicuous and bad behaviour could ban us from beaches.

### **In and on the water**

1. Mark your dive boats so that your Club can be identified easily.
2. Ask the harbour-master or local officials where to launch your boat - and do as they say. Tell the Coastguard, or a responsible person, where you are going and tell them when you are back.
3. Stay away from buoys, pots, and pot markers. Ask local fishermen where not to dive. Avoid driving through rafts of seabirds or seal colonies etc.
4. Remember ships have not got brakes, so avoid diving in fairways or areas of heavy surface traffic and observe the 'International Regulations for the Prevention of Collisions at Sea'.
5. Always fly the diving flag when diving, but not when on the way to, or from, the dive site. Never leave a boat unattended.
6. Do not come in to bathing beaches under power. Use any special approach lanes. Do not disturb any seal or bird colonies with your boats. Watch your boat's wash in crowded anchorages.
7. Whenever possible, divers should use a surface marker buoy.

### **On conservation**

1. Never use a speargun.
2. Shellfish, such as crabs and lobsters, take several years to grow to maturity; over-collecting in an area soon depletes stocks. Observe local Byelaws and restrictions on the collection of animal and plant specimens. However BSAC recommends that you do not collect shellfish, but if you must collect, only take mature fish or shellfish and then only what you need for yourself. Never take a berried female (a female with eggs), this is stock for future years. Never sell your catch or clean it in public or on the beach and do not display your trophies.
3. Ascertain and comply with seasonal access restrictions established to protect seabirds and seals from disturbance. During the seabird breeding season (1st March-1st August) reduce noise and speed near seabird breeding sites. Do not approach seal breeding or haul-out sites. Do not approach dolphins or porpoises in the water.

4. Be conservation conscious. Avoid damage to weeds and the sea bed. Do not bring up sea-fans, corals, starfish or sea urchins - in one moment you can destroy years of growth.
5. Take photographs and notes - not specimens.

#### **On wrecks**

1. Do not dive on a designated wreck site without a licence. Protected wrecks are indicated on Admiralty charts and marked by buoys, or warning notices on the shore nearby.
2. Military wrecks should not be disturbed or items removed from them. This includes the debris field. The debris field is the trail of wreckage that comes away from the main body of the wreck during the sinking process. This trail can consist of parts of the ship, the cargo and the personal possessions of the crew.
3. Do not lift anything that may be of archaeological importance.
4. If you do discover what might be an historic wreck do not talk about it, but contact the Receiver of Wreck (023 8032 9474), who will advise you about your next steps. If your find is important you may apply for it to be designated a protected wreck site. You can then build up a well-qualified team with the right qualifications to investigate your site with the assistance of a qualified archaeologist.
5. If you do lift any material from the sea-bed, it is a legal requirement to report it to the Receiver of Wreck as soon as reasonably possible; even if you own the wreck that the material has come from.
6. Avoid the temptation to take souvenirs. Go wreck diving to enjoy the scenery and life, or get involved in projects. If you must take something, try photographs or measurements, and records of marine life.
7. Know and understand wreck law. If you remove material from wreck, which you then sell for profit, you are diving for reward, which is outside the scope of sport diving and you must conduct your dives in strict accordance with HSE regulations. A sound knowledge of wreck law will prevent you breaking the law, perhaps even ending up with a criminal record where no crime was intended.

Members are reminded that in the light of this policy following any conviction of any BSAC member for an offence in relation to wreck the member will be liable to have his or her membership withdrawn for bringing BSAC into disrepute.

### **Don't let divers down - keep to the diver's code**

The Divers Code of Conduct that is set out immediately above was developed by BSAC many years ago, and is still relevant to all divers today. However environmental issues are of greater concern to all water users today than ever before, particularly when this Code was developed, and so BSAC will be actively developing its environmental presence by the development of the following policies:-

- To provide education in environmental awareness, understanding and enjoyment.
- To promote Branch participation in environmental schemes and events.
- Highlight current environmental issues, and work with other environmentalists in order to provide a united approach to deal with these issues.
- To further develop and update the Divers Code of Conduct.

#### **Policies of BSAC**

##### **Environmental**

To make a sustained and positive impact to the freshwater and marine environment.

##### **Respect our wrecks**

Do not dive on a designated protected site, and do not lift anything that appears to be of historical interest.

##### **Welfare of the vulnerable**

Guidance to protect juvenile and vulnerable members of BSAC.

Copies of all of these policies are available from BSAC Headquarters.

For further details and information please contact  
Diving Resources Department at BSAC Headquarters:

Tel: 44 (0) 151 350 6200  
Fax: 44 (0) 151 350 6215

Website [www.bsac.com](http://www.bsac.com)

E-mail contacts:  
[technical@bsac.com](mailto:technical@bsac.com)  
[membership@bsac.com](mailto:membership@bsac.com)

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