



## **Diving**

In order to understand the workplace health and safety requirements for diving and your obligations under the law you must consider and understand relevant legislation and codes of practice.

### What law applies

Rights and obligations, specific regulations, specific codes

### General hazards

Plant, equipment and machinery, noise, hazardous substances, manual handling

### Recreational snorkelling

Managing risks, fitness, supervision, rescue, emergencies, snorkelling, moving vessels

### Recreational (including technical) diving

What is recreational diving, risks of recreational diving, illnesses and conditions

### Occupational diving

What is occupational diving, risks of occupational diving, log keeping

## What law applies

In order to understand the workplace health and safety requirements for diving and your obligations under the law you must consider and understand relevant legislation and codes of practice.

### ***General health and safety obligations***

To understand your obligations and safety requirements you must be familiar with the:

*Workplace Health and Safety Act 1995* which imposes obligations on people at workplaces to ensure workplace health and safety. The *Workplace Health and Safety Act 1995* also helps you to meet your workplace health and safety obligations through:

- The *Workplace Health and Safety Regulation 2008* which describes what must be done to prevent or control certain hazards which cause injury, illness or death
- codes of practice, which are designed to give practical advice about ways to manage exposure to common risks. In particular, the *Risk Management Code of Practice 2007* should be read in conjunction with information on PPE.

Every Queensland employer must have **workers' compensation** insurance. Most employers insure with WorkCover Queensland, while a small number of large organisations have their own insurance. This insurance coverage ensures that employees injured at work receive financial support.

### ***What you must do***

It is a requirement of the *Workplace Health and Safety Act 1995* that risks must be assessed and control measures then implemented and reviewed to prevent or minimise exposure to the risks.

If the *Workplace Health and Safety Regulation 2008* describes how to prevent or minimise a risk at your workplace you **must** do what the regulation says. If there is a code of practice that describes how to prevent or minimise a risk at your workplace you **must** do what the code says or adopt and follow another way that gives the same level of protection against the risk.

If there is no regulation or code of practice about a risk at your workplace you **must** choose an appropriate way to manage exposure to the risk. People must, where there is no regulation or code of practice about a risk, take reasonable precautions and exercise proper diligence against the risk.

See the *Risk Management Code of Practice 2007* for further information.

## ***Specific regulations for diving***

Part 14 of the *Workplace Health and Safety Regulation 2008* places requirements on operators, employers and self-employed people in the recreational diving/snorkelling and occupational diving industries.

For example:

For recreational dive operators, the regulation requires that:

- all people on board a vessel are counted
- dive workers are medically fit to dive
- potential divers receive advice about medical conditions
- dive logs are kept
- divers or snorkellers are appropriately supervised and
- a risk assessment is carried out.

For occupational dive operators, the regulation requires that:

- a risk assessment is conducted
- dive logs are kept
- divers are competent and qualified, and medically fit to dive.

## ***Specific codes of practice for diving***

Codes of practice offer practical advice to employers, self-employed people and workers in the diving industry about how to meet these requirements and make diving a healthier and safer activity.

Codes of practice specific to the diving industry are:

- *Compressed Air Recreational Diving and Recreational Snorkelling Code of Practice 2005*  
This code covers employers, self-employed persons and workers who conduct recreational diving or recreational snorkelling as part of a business or undertaking, other than diving or snorkelling in a swimming pool.
- *Occupational Diving Work Code of Practice 2005*  
This code covers employers, self-employed persons and workers who conduct recreational diving or recreational snorkelling as part of a business or undertaking, other than diving or snorkelling in a swimming pool.
- *Industry Code of Practice for Recreational Technical Diving*  
Occupational diving covered in this code is where a person conducting a business or undertaking, including an employer or self-employed person conducts occupational diving as part of his or her undertaking.

Types of occupational diving covered includes underwater work using compressed air for the purposes of harvesting, construction, object retrieval, photography, science, research and aquaculture.

However, you may adopt other processes and methods that are more suited to your business or work activity as long as they give the same level of protection against a risk.

The regulation and code may not outline every risk at your workplace, so read these guidelines in conjunction with the *Risk Management Code of Practice 2007*.

## **General hazards**

### ***Plant, equipment and machinery***

Plant used in the diving industry includes compressors, scuba tanks, life jackets, masks, snorkels, fins, wetsuits, tenders, motors, rubbish bins and machinery and equipment on board vessels (such as kitchen equipment and appliances).

### ***Noise***

In a diving environment, noise may increase the risk of accidents because it can disguise sounds of approaching danger or warnings. Noise may also affect communication and a person's balance and concentration.

### ***Hazardous substances***

In the diving industry, hazardous substances include:

- acidic or caustic cleaning products
- chlorine
- anhydrous ammonia (a refrigerant)
- flammable substances such as fuels, oils, gases and lubricants.

### **Manual handling**

Manual handling activities can lead to sprains, strains and serious long-term injuries to various parts of the body including backs, shoulders, arms and hands. In the diving industry, common manual tasks include:

- assisting people out of the water
- rescuing divers in difficulty
- working in the kitchen
- moving equipment such as oxygen cylinders and scuba tanks
- holding awkward positions, particularly in small spaces.

## Recreational snorkelling

### Managing the risks

Control measures, assessing the site

### Head counts

Before the boat departs, active counts, example

### Medical fitness

Advise, snorkellers, at risk groups, prepare for panic

### Supervision

Control measures, lookout person, snorkelling guides

### Instruction, advice and equipment

Non-English speakers, equipment checks

### Rescue and emergencies

Emergency plans, rescue and resuscitation, first aid, oxygen, marine stings

### Snorkelling and moving vessels

Prevent injury or death, propeller guards, buoys, lookouts

## ***Managing the risks***

A variety of control measures can be used to manage specific risks associated with snorkelling.

Employers should follow this five-step process, detailed in Section 22 of the *Workplace Health and Safety Act 1995*:

1. **identify** the hazards
2. **assess** the risks that may result because of the hazards
3. **decide** on control measures to prevent or minimise the risks
4. **implement** the control measures
5. **monitor and review** the effectiveness of the control measures.

Conduct a risk assessment of environmental conditions at each snorkelling site.

When assessing the site, consider:

- currents
- weather
- surface conditions
- visibility
- maximum dive depths.

You should manage the risks in relation to:

- individual abilities of snorkellers
- marine jellyfish stings
- ratio of lookout/supervisors to snorkellers.

Modify snorkelling procedures if the assessment shows that normal control measures are not enough to minimise risks to snorkellers.  
Read more about the risk management process.

## **Head counts**

Under the *Workplace Health and Safety Regulation 1997*, anyone who uses a boat to transport people to a recreational snorkelling site must be certain that all people on board are accounted for.

Before the boat **departs for the site**, ensure that:

- every person on board is counted
- a written record of the count is made
- the count is verified
- any changes to the count during the journey by people boarding or leaving the boat, are recorded and verified.

Before the boat **departs the recreational diving site**, ensure that:

- every person on board is counted
- a written record of the count is made
- the count is verified.

Where possible, use active counts (or roll calls) because they are more accurate than a head count (which should be conducted twice). A roll call involves each passenger responding when his/her name is called.

An example of a written record made of count of all persons on board form is available to show how the safety requirements for a head count could be addressed.

## **Medical fitness**

- Advise anyone intending to undertake recreational snorkelling that snorkelling can be a strenuous activity, even in calm conditions; and that if they suffer from certain medical conditions they could face increased health and safety risks if they snorkel.

**For example:** Older people are more likely to suffer from diagnosed and

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undiagnosed medical conditions (such as heart disease and stroke) that may worsen through physical exertion.

- Advise snorkellers in 'at risk' groups (like those with medical conditions or older people) to snorkel in a buddy pair, wear a flotation device and snorkel in an area where they can be supervised.
- Be prepared for panic by some people, especially those who are inexperienced or those who get into difficulty.

A medical declaration form for recreational snorkellers is available to assist you in managing the risk associated with medical conditions.

## Supervision

Under the *Workplace Health and Safety Regulation 1997*, you may conduct recreational snorkelling **only** if you follow these control measures:

- Have at least one person acting as lookout for the snorkelling; **or**
- Conduct the snorkelling with a guide; **and**:
  - the guide is guiding 10 snorkellers or less
  - the guide has conducted a proper assessment of the risks involved in not having a lookout
  - it is reasonable to snorkel without having a lookout.

Use the risk management process to determine the ratio of lookouts/snorkelling supervisors to snorkellers. In determining the number and location of lookouts and snorkelling supervisors, consider:

- the size, type and location of the snorkelling area and control measures already in place to minimise the risks to snorkellers
- environmental conditions that could impact on the safety of snorkellers
- the number of snorkellers in the water
- the ability of snorkellers to easily understand instruction and advice given about snorkelling
- snorkelling ability, fitness and confidence levels of snorkellers
- the skills and abilities of supervisory staff
- the type and effectiveness of equipment at the snorkelling site.

### ***Lookout person***

Where a lookout person is appointed, ensure the person:

- is out of the water and solely engaged in being a lookout
- scans the area under his/her supervision in an effective and efficient way
- rescues a snorkeller (if required) or directs someone who is immediately available and capable to rescue a snorkeller

- is fit enough so that his/her own health and safety are not compromised if there is a need to rescue or assist in a rescue
- gives first aid (if required) including expired air resuscitation, oxygen resuscitation and external cardiac compression, or directs a capable person to provide first aid
- observes snorkellers when they enter and exit the water or are on the surface
- has access to binoculars and polarised sunglasses for better visibility
- continually monitors the position of snorkellers and looks for hazards or changes that could lead to problems, and identifies problems so that snorkelling operations can be adjusted
- wears a brightly coloured shirt, wetsuit or other identifying clothing or equipment so he/she can be recognised easily by snorkellers
- is part of a communication system that is relevant to the snorkelling site and allows for effective communication with snorkellers and other appropriate personnel.

### ***Snorkelling guides and supervisors***

- Ensure that the snorkelling guide is either in the water with the snorkellers or in a vessel close enough to the snorkellers to allow good communication.
- Appoint a snorkelling supervisor to manage the snorkelling operation and remain at the site whilst snorkelling takes place. Guides and supervisors have several responsibilities so they must have certain skills and abilities. For more information, read the *Compressed Air Recreational Diving and Recreational Snorkelling Code of Practice 2005*.

### **Instruction, advice and equipment**

- Before snorkelling, provide instruction and advice to snorkellers in order to reduce the likelihood of snorkelling-related panic and accidents.
- Ensure that advice covers these topics:
  - selecting and using snorkelling equipment
  - the snorkelling environment
  - dealing with certain problems
- Provide demonstrations (where appropriate).
- If a snorkeller does not speak English and an interpreter is not available, provide information and advice in a way that he/she understands. Use visual aids or instruction sheets.
- Do not allow snorkelling to proceed unless the instructor is satisfied that the person can snorkel safely.

### ***For non-English speaking snorkellers***

The Department has produced safety information for scuba diving and snorkelling in many languages including:

- English
- Chinese
- Japanese
- Korean
- Vietnamese
- Spanish
- German
- French
- Italian
- Swedish

These may provide an effective way to provide instructions to non-English speaking divers.

### ***Equipment***

- Check that masks, fins and snorkels are of appropriate size.
- Ensure that all equipment is well maintained, clean and sanitised.

## **Rescue and emergencies**

### ***Emergency plans***

- Ensure that a snorkelling vessel has a written emergency plan.
- Make written emergency plans available to workers who should be familiar with these plans. Include the following situations:
  - first aid
  - rescue
  - evacuation
  - missing persons.

### ***Rescue and resuscitation***

- Develop effective and efficient rescue and resuscitation procedures. When developing these procedures, consider:
  - size, type and location of the snorkelling site
  - appropriateness of rescue procedures to the snorkelling site
  - adequacy of the communication system
  - location of lookouts/rescuers and their skills and fitness levels
  - availability, location and appropriateness of any rescue equipment.

## ***First aid***

- Have a first aid kit available at the dive site. Check that it is stocked with necessary equipment to treat injuries that may occur and can cater for the number of snorkellers present.
- Ensure that a person on the surface at the snorkelling site is currently trained in first aid including expired air resuscitation (EAR), CPR and oxygen administration.

## ***Oxygen***

- Make available an oxygen system capable of providing a spontaneously breathing person with an inspired oxygen concentration of as near as possible to 100%.
- Check oxygen equipment and oxygen levels. The check must be carried out daily by a person trained to conduct the checks correctly.
- Provide sufficient oxygen to supply the injured person, taking into account the location of the dive site and access to medical facilities.

## ***Marine stings***

- Advise snorkellers of the risks of marine jellyfish, where to access first aid and appropriate precautions.
- Where possible, stock the first aid kit to deal with marine stings.

## **Snorkelling and moving vessels**

Take measures to minimise or eliminate the risk of divers being injured or killed by moving vessels.

For example:

- Fit propeller guards.
- Use buoys and markers to separate diving activity from vessels.
- Use flags and night lights to indicate that snorkellers are present.
- Appoint lookouts to maintain watch and form part of the communication system.
- Ensure that workers are familiar with snorkelling sites and able to navigate.
- Implement safe systems of work.

## **Recreational (including technical) diving**

### What is recreational diving?

Resort diving, learning to dive, qualified divers

### What is recreational technical diving?

Includes EANx, EANx rebreathers, mixed gas, mixed gas rebreathers, decompression diving

### Managing the risks

Risk assessment, headcounts, medical fitness, supervision, non-English speaking divers, equipment

### Diving related illnesses and conditions

Flying after diving, barotrauma, nitrogen narcosis

## **What is recreational diving?**

Recreational diving is **any** of the following underwater activities that use compressed air and are conducted for recreation:

- resort diving (such as an introductory scuba/dive experience or educational diving program conducted by a recreational scuba or dive training organisation)
- diving by someone undertaking recreational diving training (learning to dive)
- recreational diving by someone with a qualification in underwater diving.

## **What is recreational technical diving?**

Recreational technical diving is any underwater diving for recreation; other than diving in a swimming pool, using EANx or mixed gas or decompression diving using compressed air or other gases.

### Diving using EANx with SCUBA

EANx qualifications, equipment, pre-dive checks, gas quality

### Diving using EANx rebreathers

Rebreather EANx qualifications, pre-dive checks

### Blending, testing and use of EANx

Gas mixing, filling cylinders

### Diving using mixed gas with SCUBA

Qualifications, equipment for mixed gas diving, pre-dive checks

### Diving using mixed gas rebreathers

Qualifications, equipment, pre-dive checks, blending, testing and storage

### Decompression diving

Diver support station, maximum exposure

## **Diving using EANx with SCUBA**

- EANx diving does not take place unless an EANx dive supervisor is present at the dive site
- Only a certificated EANx scuba diver undertakes recreational scuba diving using EANx unless the diver is undertaking –
- training for the purpose of certification as an EANx scuba diver in accordance with this code
- an introductory dive experience and the diver is accompanied by an EANx dive instructor
- PPO<sub>2</sub> exposure times are not exceeded
- Maximum depth of a dive is based on the PPO<sub>2</sub> for the specific EANx breathing mixture used and does not exceed 1.6 bar PPO<sub>2</sub>
- Before a breathing mixture is used, the diver conducts a gas analysis to verify the oxygen content. The results should be recorded in the EANx dive safety log and on the cylinder

### ***EANx qualifications***

An **EANx dive instructor** should:

- be trained and certificated by a recreational technical diving training organisation to instruct in EANx diving
- be a certificated recreational scuba diving instructor
- have instructed and certificated at least 25 entry-level or higher level divers
- be qualified as an EANx diver
- have completed 20 EANx dives.

An **EANx dive supervisor** should be:

- trained and certificated by a recreational scuba training organisation to supervise diving
- qualified as an EANx diver.

Before a trainee undertakes a course in recreational scuba diving using EANx, the **trainee** should:

- be a certificated recreational scuba diver
- have a minimum of 20 logged scuba dives.

Before a trainee is issued with EANX diving certificate, the trainee should complete a course in EANx and have done two open-water dives using EANx.

### ***Equipment for EANx diving***

The equipment an EANx diver should use includes:

- fins and mask and snorkel (attachable or attached to mask)
- compressed gas cylinder and valve designed specifically for SCUBA
- buoyancy control device fitted with a power inflator device
- regulator fitted with an alternate gas source or a redundant breathing system.

A more complete list of equipment is available in section 2.1.5 of the *Industry Code of Practice for Recreational Technical Diving*.

### ***Pre-dive checks and emergency procedures***

Divers should be advised about:

- the dive plan
- the maximum depth for the breathing gas and loss of breathing gas procedures
- buddy separation procedures
- emergency procedures, including the location of and contact procedures for the nearest recompression facilities
- checking the position and correct operation of their own equipment and that of their buddy's.

### ***Gas quality in gas cylinders***

Employers or self-employed people should ensure that:

- compressed air cylinders are filled, tested, operated and maintained according to
  - the manufacturers' instructions; **and** to
  - AS 3848.2:1999 *Filling of portable gas cylinders - Filling of portable cylinders for self-contained underwater breathing apparatus (SCUBA) and non-underwater self-contained breathing apparatus (SCBA) - Safe procedures*
- water content in the cylinders is monitored and the cylinders are checked and cleaned at regular intervals to prevent or minimise corrosion of the inner surface and to clean out any residues of corrosion

- on any day that compressed air cylinders are being used, samples of the air in the cylinders are "sniff" tested to ensure the air has no objectionable or nauseous odour
- cylinders contain:
  - not more than 5 ppm of carbon monoxide
  - not more than 480 ppm of carbon dioxide or 900 mg/m<sup>3</sup>
  - not more than 0.3 mg/m<sup>3</sup> of oil
  - cylinders are not filled to a pressure that exceeds the lesser of the working pressure ratings of either the valve, yoke or cylinder.

Compressors used to fill compressed gas cylinders should:

- be designed specifically for the purpose of filling compressed gas cylinders used by underwater divers
- be tested for gas quality, and operated and maintained according to manufacturers' instructions
- be positioned so only clean, uncontaminated gas is taken into the compressor
- have filters which are in sound working order to effectively remove contaminants from entering the cylinders. (Water content of the gas reduces the effectiveness and life of the filters).

For more information on diving using EANx with SCUBA, read section 2.1 of the *Code of Practice for Recreational Technical Diving*.

## **Diving using EANx rebreathers**

Employers and self-employed people should ensure that:

- EANx rebreather diving does not take place unless an EANx rebreather dive supervisor is present at the dive site
- only a certificated EANx rebreather diver undertakes recreational diving using EANx rebreathers unless the diver is undertaking training for the purpose of certification as an EANx rebreather diver in accordance with this code
- oxygen partial pressure exposure times are not exceeded
- maximum depth of a dive is based on the PPO<sub>2</sub> for the specific EANx breathing mixture used and does not exceed 1.6 bar PPO<sub>2</sub>
- before a breathing mixture is used, the diver conducts a gas analysis to verify the oxygen content. The results should be recorded in the EANx rebreather dive safety log and on the cylinder.

**Rebreathers should not be used for introductory experiences or resort dives in open water for non-certificated diving.**

### ***Rebreather EANx qualifications***

An **EANx rebreather dive instructor** should:

- be trained and certificated by a recreational technical diving training organisation to instruct in EANx rebreather diving
- be a certificated recreational scuba dive instructor
- have instructed and certificated at least 25 entry-level or higher level divers
- be qualified as a EANx rebreather diver
- have completed 20 dives using a rebreather
- have successfully completed a rebreather instructor's course on the model being used.

An **EANx rebreather dive supervisor** should be:

- trained and certificated by a recreational scuba training organisation to supervise diving
- qualified as an EANx rebreather diver.

Before a **trainee** undertakes a course in recreational diving using a rebreather and EANx, the trainee should:

- be certificated as an EANx diver
- have a minimum of 5 logged EANx dives.

Before being granted certification, the trainee should complete at least one confined water session and four open water dives using the rebreather during training.

### ***Equipment for EANx rebreathers***

The equipment that divers using EANx rebreathers should be fitted out with includes:

- fins, mask and EANx rebreather unit
- buoyancy control device fitted with a power inflator devices
- one submersible depth gauge and one submersible timing device, or one dive computer
- submersible cylinder pressure gauges for each cylinder used
- for divers undergoing training, including in semi-closed circuit rebreathers, a PPO<sub>2</sub> monitor of the inspired gas which can be read by the diver.

A more complete list of equipment can be found in section 2.2.5 of the *Code of Practice for Recreational Technical Diving*.

### ***Pre-dive checks and emergency procedures***

The employer/self-employed person should ensure the divers are advised about:

- the dive plan
- dive objectives
- maximum depth for the breathing gas
- loss of breathing gas procedures
- buddy separation procedures
- safety requirements
- emergency procedures, including the location of and contact procedures for the nearest recompression facilities
- checking the position and correct operation of their own equipment and that of their buddy's.

The employer/self-employed person should ensure manufacturers' recommendations and/or specifications are followed in respect of:

- pre-dive checks and emergency procedures
- carbon dioxide scrubbers.

More information on diving using EANx rebreathing is available in section 2.2 of the *Code of Practice for Recreational Technical Diving*.

## **Blending, testing and use of EANx**

Where EANx is blended, tested, stored or used at the workplace, employers or self-employed people should ensure:

- EANx gas mixing and EANx cylinder filling are carried out by a competent person
- all equipment associated with the filling or use of EANx is used in accordance with manufacturers' recommendations
- all scuba cylinders to be used for the storage of EANx are clearly marked "NITROX"
- prior to using an EANx cylinder, the oxygen content in the cylinder is tested by the diver
- after testing, a tag/decal is completed by the diver and is attached to the cylinder showing –
  - oxygen percentage
  - maximum operating depth of the gas mixture
  - cylinder serial number, in case the tag is separated from the cylinder.

## **Diving using mixed gas with SCUBA**

Employers or self-employed people should ensure:

- mixed gas diving does not take place unless a dive supervisor is present at the dive site
- only a certificated mixed gas scuba diver undertakes recreational scuba diving using mixed gases unless the diver is undertaking training for the purpose of certification as a mixed gas scuba diver in accordance with this code
- oxygen partial pressure exposure times are not exceeded
- maximum depth of a dive does not exceed the depth where:
  - oxygen in the mixture being breathed at any time exceeds a partial pressure of 1.4 bar while diving and 1.6 bar during decompression
  - nitrogen in the mixture being breathed at any time exceeds a partial pressure of 4.0 bar while diving
- minimum depth does not exceed the depth where oxygen in the mixture currently being breathed is less than a partial pressure of 0.16 bar
- before a breathing mixture is used, the diver conducts a gas analysis to verify the oxygen content. The results should be recorded in the mixed gas dive safety log and on the cylinder.

### ***Mixed gas dive qualifications***

A **mixed gas dive instructor** should:

- be trained and certificated by a recreational technical diving training organisation to instruct in mixed gas diving
- be trained and certificated by a recreational technical diving training organisation to instruct in decompression diving
- be a certificated EANx instructor
- have instructed and certificated at least 25 EANx divers
- be qualified as a mixed gas diver
- have completed 15 mixed gas dives.

Before a **trainee** undertakes a course in recreational scuba diving using mixed gas, the trainee should:

- be a certificated EANx scuba diver
- be a certificated decompression diver
- have a minimum of 150 logged dives, of which 50 have been at a depth greater than 30 metres
- have completed a minimum of 30 logged dives within the last 12 months
- have completed a minimum of 30 dives using EANx.

### ***Equipment for mixed gas diving***

Equipment for mixed gas diving includes:

- fins and mask
- compressed gas cylinders and valves designed specifically for SCUBA
- buoyancy control device
- regulators are on all cylinders
- two submersible depth gauges and two submersible timing devices, or two dive computers
- a redundant gas breathing system
- two copies of the dive team's dive plan
- whenever cylinders are manifolded, an isolation valve should be fitted to the manifold
- alternative ascent system.

A more complete listing of equipment can be found in section 3.1.4 of the *Code of Practice for Recreational Technical Diving*.

### ***Pre-dive checks and emergency procedures***

Divers should be advised about:

- the dive plan and gas change over depths
- the sequence and role of each diver
- gas turn around pressures and analysing gas mixtures
- maximum and minimum depths for each breathing gas and run times
- omitted decompression procedures
- analysing their gas mixture
- emergency procedures including:
  - loss of breathing gas procedures
  - buddy separation procedures
  - loss of ascent path procedures
  - the location of and contact procedures for the nearest recompression facilities
- checking the position and correct operation of their own equipment and that of their buddy
- performing for themselves and their buddy an in-water check (leak test) and an in-water regulator location and correct operation check.

More information on mixed gas diving is available in section 3 of the *Code of Practice for Recreational Technical Diving*.

### **Diving using mixed gas rebreathers**

Employers or self-employed people operating mixed gas rebreather diving should ensure that:

- mixed gas rebreather diving does not take place unless a dive supervisor is present at the site

- only a certificated mixed gas rebreather diver undertakes recreational diving using a mixed gas rebreather unless the diver is undertaking training for the purpose of certification as a mixed gas rebreather diver in accordance with this code
- maximum dive depth does not exceed the depth where –
  - oxygen in the mixture being breathed at any time exceeds a partial pressure of 1.4 bar while diving and 1.6 bar whilst on a mandatory decompression stop
  - nitrogen in the mixture being breathed at any time exceeds a partial pressure of 4.0 bar while diving
- oxygen partial pressure exposure times are not exceeded
- before a breathing mixture is used, the diver conducts a gas analysis to verify the oxygen content. The results should be recorded in the mixed gas rebreather dive safety log and on the cylinder
- mixed gas rebreathers should not be used for introductory experiences or resort dives in open water
- mixed gas rebreathers should be used only for divers in open water undergoing training for certification in mixed gas rebreather diving, or for divers who are already certificated to use a mixed gas rebreather.

### ***Mixed gas rebreather dive qualifications***

A **mixed gas rebreather dive instructor** should:

- be trained and certificated by a recreational technical diving training organisation to instruct in mixed gas rebreather diving
- be a certificated EANx instructor
- be qualified as a mixed gas rebreather diver for the model being used
- have completed 50 dives using a mixed gas rebreather and 20 dives with the rebreather model being used for instruction
- have successfully completed a rebreather instructor's course on the model being used.

Before a **trainee** undertakes a course in recreational diving using a rebreather and mixed gas, the trainee should:

- be certificated as an EANx scuba diver
- have a minimum of 100 logged dives, 20 of which must be with EANx
- before being granted certification, have completed at least one confined water session and eight open water dives using the rebreather during training.

Rebreather diving equipment using mixed gases

Equipment required for diving using mixed gas rebreathers includes:

- fins and mask
- mixed gas rebreather unit

- buoyancy control device
- two submersible depth gauges and two submersible timing devices or two dive computers
- cylinder pressure gauges connected to each cylinder used
- a redundant gas breathing system
- quick-release weight system and exposure protection
- a reel where direct ascent to the surface is not possible.

A more complete listing of equipment is available in section 3.2.4 of the *Code of Practice for Recreational Technical Diving*.

### ***Pre-dive checks and emergency procedures***

Divers should be advised about:

- the dive plan
- omitted decompression procedures
- emergency procedures including:
  - loss of breathing gas procedures
  - buddy separation procedures
  - the location of and contact procedures for the nearest recompression facilities
- checking the position and correct operation of their own equipment and that of their buddy.

The manufacturers' recommendations and/or specifications should be followed in respect of:

- pre-dive checks and emergency procedures
- carbon dioxide scrubbers.

### ***Blending, testing and storage of mixed gases***

Employers or self-employed people operating mixed gas rebreather diving should ensure that:

- all gas blending is undertaken by a competent person in the blending of gases to produce underwater breathing mixtures
- all equipment associated with the filling or use of mixed gases is to be used in accordance with manufacturers' recommendations
- all cylinders to be used for the storage of mixed gas are clearly marked as to their contents
- prior to using a mixed gas cylinder, the O<sub>2</sub> content in the cylinder is tested by the diver
- after testing, a tag/decal is attached to the cylinder showing:
  - oxygen percentage

- calculated nitrogen percentage
- calculated helium or other gas percentage
- minimum operating depth of the gas mixture
- maximum operating depth of the gas mixture
- cylinder serial number, in case the tag/decal is separated from the cylinder.

## **Decompression diving**

### ***Diver support station***

Where decompression diving is taking place the employer/self-employed person should ensure there is a diver surface support station.

The following equipment should be available from this station:

- emergency breathing gas positioned for use during decompression
- a device for the purpose of controlling position and maintaining ascent rate during decompression, for example, an ascent line
- a copy of each dive team's dive plan
- a copy of each diver's calculated gas consumption requirements for the dive, showing adequate gas supplies to safely complete the required dive profile without the use of the diver's redundant gas system.

The employer/self-employed person should ensure that at all times divers are in the water that there is on the surface:

- a person trained and competent in the operation of all emergency equipment on the diver surface support station
- a person who is fully aware of the dive plan for each dive team
- if the station is a boat, a person capable of controlling the vessel
- the number of support personnel will be based on the degree of risk, including the maximum number of divers in the water at any time, the prevailing conditions, the location and nature of the dive site and the level of experience of divers
- all divers undertaking decompression diving should be equipped with an alternate ascent system and a redundant gas system by the employer/self-employed person.

### ***Maximum exposure***

Divers are not to be exposed to:

- oxygen in the mixture being breathed at any time in excess of a partial pressure of 1.6 bar

- nitrogen in the mixture being breathed at any time in excess of a partial pressure of 5.0 bar while diving.

Where decompression diving on air to depths of 40 metres or less takes place, the diver should have:

- successfully completed a course in decompression diving; or
- has ten logged decompression dives.

If a diver cannot meet either of these requirements, the diver should be accompanied by a dive supervisor or dive instructor competent in decompression diving on air.

Where decompression diving on air to depths of 40 metres or over takes place, the diver should have successfully completed a course in decompression diving.

More information on decompression diving is available in section 4 of the *Code of Practice for Recreational Technical Diving*.

## **Managing the risks**

### Risk assessments

Control measures, assessing the site, marine stings

### Head counts

Before the boat departs, active counts, example

### Medical fitness

Resort divers, workers conducting a dive, certification

### Supervision

Control measures, lookout person, snorkelling guides

### Instruction to non-English speaking divers

Non-English speakers, divers, snorkellers

### Diving equipment

Problems with aluminium alloy cylinders, dive tables and dive depths

### Training

Before diving, ascent training, assess potential divers

### Rescue and emergencies

Emergency plans, rescue and resuscitation, first aid, oxygen, marine stings

### Log keeping

Dive safety log, diver's log

## Diving and moving vessels

Prevent injury or death, propeller guards, buoys, lookouts

## **Risk assessments**

A variety of control measures can be used to manage specific risks associated with recreational diving. Employers should follow this five-step process, detailed in Section 22 of the *Workplace Health and Safety Act 1995*:

1. **identify** the hazards
2. **assess** the risks that may result because of the hazards
3. **decide** on control measures to prevent or minimise the risks
4. **implement** the control measures
5. **monitor and review** the effectiveness of the control measures.

Conduct a risk assessment of environmental conditions at each dive site. When assessing the site, consider:

- currents
- weather
- surface conditions
- visibility
- maximum dive depths.

Manage risks in relation to:

- diver abilities
- marine jellyfish stings
- ratio of lookouts/supervisors to divers.

Modify diving procedures if the assessment shows that normal control measures are not enough to minimise risks to divers.

An example of a risk assessment for certified divers is provided to show how the health and safety requirements for risk assessment may be addressed.

## **Head counts**

Under the *Workplace Health and Safety Regulation 1997*, anyone who uses a boat to transport people to a recreational diving or recreational technical diving site must be certain that all people on board are accounted for.

Before the boat departs for the site, ensure that:

- every person on board is counted
- a written record of the count is made.
- the count is verified

- any changes to the count during the journey (by people boarding or leaving the boat) are recorded and verified.

Before the boat departs the recreational diving site, ensure that:

- every person on board is counted
- a written record of the count is made
- the count is verified.

Where possible, use active counts (or roll calls) because they are more accurate than a head count (which should be conducted twice). A roll call involves each passenger responding when his/her name is called.

A sample of a written record made of count of all persons on board forms is available to show how the safety requirements for a head count could be addressed.

## **Medical fitness**

A diver **must be medically fit** to dive.

### ***Workers conducting a dive***

- If the diver is a worker (such as a supervisor, instructor or assistant), you must view his/her current certificate of medical fitness to dive. Work carried out by the worker must be within any limits stated in the certificate.
- If the diver is someone conducting a business or doing underwater diving work themselves, he/she must have a current certificate of medical fitness to dive. Work carried out must be within any limits stated in the certificate.

### ***Resort divers***

- Resort divers must be at least 12 years old. Divers less than 18 years old must have consent from a parent or guardian before diving.
- If you conduct a resort dive for someone, you must hold an approved medical declaration for the diver and assess his/her fitness to dive before the resort dive takes place.

### ***Entry level certificate divers***

- Divers must be at least 12 years old. Divers less than 18 years old must have consent from a parent or guardian before diving.

- Ensure that someone training for an entry level recreational diving certificate is certified (by a medical practitioner with experience in diving medicine) as being medically fit for diving.

### ***Certificated divers***

- Before diving, assess the diver's current medical fitness to dive. If you are concerned, seek medical advice or ensure that the diver is accompanied by a dive supervisor/instructor.

A sample medical declaration for resort diving form is available to assist in addressing medical fitness health and safety requirements.

## **Supervision**

### ***General supervision***

Supervision of recreational diving is very important. Those responsible for conducting a dive should:

- Document diving procedures together with the health and safety responsibilities of lookouts, dive supervisors, dive instructors and other workers.
- Clearly allocate responsibilities and ensure that diving procedures are followed by everyone.
- Appoint a lookout person where recreational diving or recreational technical diving is conducted for one or more people.
- Ensure that all diving is coordinated by a **dive supervisor, dive instructor** or others appointed for that purpose.
- Check that entry level certificate divers dive with a buddy.
- Ensure that dive workers do not dive alone without appropriate training and equipment.

### ***Lookout person***

Ensure that the lookout person:

- is out of the water and solely engaged in being a lookout
- scans the area under his/her supervision in an effective and efficient way
- rescues a diver (if required) or directs someone who is immediately available and capable to rescue a dive
- is fit enough so that his/her own health and safety are not compromised if there is a need to rescue or assist in a rescue

- gives first aid (if required) including expired air resuscitation, oxygen resuscitation and external cardiac compression, or directs a capable person to provide first aid
- observes divers when they enter and exit the water or are on the surface
- has access to binoculars and polarised sunglasses for better visibility
- continually monitors the position of divers and looks for hazards or changes that could lead to problems, and identifies problems so that dive operations can be adjusted
- wears a brightly coloured shirt, wetsuit or other identifying clothing or equipment so he/she can be recognised easily by divers
- is part of a communication system that is relevant to the dive site and allows for effective communication with divers and others.

Dive instructor, assistant or supervisor

A **dive instructor** is a person who holds a current qualification from a recreational scuba or dive training organisation, designed to qualify the person as a scuba/dive instructor.

A **certificated assistant** is a person who holds a current qualification from a recreational scuba or dive training organisation, designed to qualify the person to assist a scuba/dive instructor.

A **dive supervisor** is a person who holds a current qualification in diving operations leadership from a recreational scuba or dive training organisation.

When conducting a dive:

- Ensure that all diving is coordinated by a dive supervisor or others appointed for that purpose.
- Ensure that all resort divers are supervised in the water by a dive supervisor or dive instructor.
- Ensure there are no more than eight students in the water with one dive instructor or ten students with a dive instructor and certificated assistant.
- Depending on the ability, fitness and qualification level of divers, have a dive supervisor or dive instructor accompany certificated divers in the water.

## Instruction to non-English speaking divers

- Give information and advice to a non-English speaking diver in a way that he/she understands.
- Do not allow diving to proceed unless the instructor is satisfied that the person can dive safely.

The Department has produced safety information for scuba diving and snorkelling in many languages including:

- English

- Chinese
- Japanese
- *Korean*
- Vietnamese
- Spanish
- German
- French
- Italian
- Swedish

These may provide an effective way to provide instructions to non-English speaking divers.

## **Diving equipment**

### ***Diving equipment***

- Provide divers with diving equipment that is:
  - suitable for the diving being undertaken
  - of a quality that ensures that it performs correctly and effectively
  - checked before the dive to ensure that it is in safe working order
  - cleaned and kept in good repair
  - maintained in accordance with the manufacturer's specifications.
- Ensure that compressed air cylinders are filled, tested, operated and maintained according to manufacturer's instructions and AS 3848.2:1999 *Filling of portable gas cylinders - Filling of portable cylinders for self-contained underwater breathing apparatus (SCUBA) and non-underwater self-contained breathing apparatus (SCBA) - Safe procedures.*
- Check that water content in the cylinders is monitored and that the cylinders are checked and cleaned regularly (to prevent/minimise corrosion of the inner surface and to clean out any residues of corrosion).
- 'Sniff test' samples of air on any day that compressed air cylinders are to be used to check that there is no objectionable or nauseous odour.
- Be certain that cylinders contain:
  - not more than 5ppm of carbon monoxide
  - not more than 480ppm of carbon dioxide or 900 mg/m<sup>3</sup>
  - not more than 0.3mg/m<sup>3</sup> of oil.
- Check that cylinders are not filled to a pressure that exceeds the lesser of the working pressure ratings of the valve, yoke or cylinder.

### ***Problems with aluminium alloy cylinders***

Certain SCUBA cylinders manufactured from certain compositions of aluminium alloy have had explosive failures, sometimes resulting in severe injuries and property damage.

It is recommended that SCUBA cylinders manufactured from aluminium alloy 6351 and other aluminium alloy cylinders 15 years and older, be non-destructively examined **annually** for cracks and flaws in the neck fold and thread areas by competent and suitably equipped persons.

At risk SCUBA cylinders manufactured from aluminium alloy 6351 include:

- Luxfer aluminium alloy cylinders manufactured between 1972 and 1988 (check oldest hydrostatic test date stamped into cylinder).
- Luxfer aluminium alloy cylinder specification DOT SP6498.
- Luxfer aluminium alloy cylinder specification DOT E6498, E7042, E8107, E8364, E8422.
- CIG (Australia) aluminium alloy cylinders manufactured in or before 1990 (check oldest hydrostatic test date stamped into cylinder).

Cylinders found to have unacceptable cracking or flaws during routine inspections must be rejected. The owner should then contact the cylinder manufacturer to lodge a warranty claim.

Dive tables and dive depths

### **Dive tables**

- Plan all dives conservatively and consistently to one set of recognised dive tables.
- Use dive tables and computers only as guides for planning and executing a dive (individual differences in divers, dive profiles and dive site conditions may require a more conservative approach).

### **Dive depths**

- Ensure that recreational diving workers dive within any depth limits stated on their medical certificate.
- Dive workers should not be required to dive deeper than 40m.
- Do not allow resort divers to dive to depths greater than 12m.
- Do not allow entry level divers in training to dive deeper than 18m.
- Advise certificated divers who are diving in excess of 40m that a worker may not be able to rescue them if they get into difficulty.

## **Training**

- Ensure that recreational diving workers are trained in the procedures required at any particular dive site and qualified for the recreational diving work they are undertaking.

- Ensure that dive supervisors have appropriate experience for the area they are supervising.
- Before diving, assess the knowledge, skills and abilities of potential divers at all levels.
- Ensure that a dive instructor does not teach ascent training to more than one class (eight students to one dive instructor or 10 students to one dive instructor and one certified assistant) in any 24 hour period.

# Rescue and emergencies

## *Emergency plans*

- Check that dive vessels have written emergency plans to deal with emergency situations.
- Make written emergency plans available to workers who should be familiar with these plans. Include the following situations:
  - first aid
  - rescue
  - evacuation
  - missing persons.

## *Rescue and resuscitation*

- Develop effective and efficient rescue and resuscitation procedures. When developing these procedures, consider:
  - size, type and location of the dive site
  - appropriateness of rescue procedures to the dive site
  - adequacy of the communication system
  - location of lookouts/rescuers and their skills and fitness levels
  - availability, location and appropriateness of any rescue equipment,

## *First aid*

- Have a first aid kit available at the dive site. Check that it is stocked with necessary equipment to treat injuries that may occur and can cater for the number of divers present.
- Ensure that a person on the surface at the dive site is currently trained in diving first aid, including emergency oxygen administration.

## *Oxygen*

- Make available an oxygen system capable of providing a spontaneously breathing person with an inspired oxygen concentration of as near as possible to 100%.
- Check oxygen equipment and oxygen levels. The check must be carried out daily by a person trained to conduct the checks correctly.
- Provide sufficient oxygen to supply the injured person, taking into account the location of the dive site and access to medical facilities.

## ***Marine stings***

- Advise divers of the risks of marine jellyfish, where to access first aid and appropriate precautions.
- Where possible stock the first aid kit to deal with marine stings.

## ***Panic***

- Minimise the likelihood of panic (which causes increased anxiety and may impair a diver's capacity to think rationally) through effective explanation and training in relation to all relevant aspects of diving.
- Be aware of factors (other than inadequate instruction) that may contribute to panic:
  - equipment problems such as low air and ill-fitting equipment
  - environmental hazards such as cold water, deep diving, marine animals and poor visibility
  - personal factors such as fatigue, medical or physical unfitness, seasickness, alcohol intake, inexperience, excessive general anxiety, phobias, diving accidents, dizziness or disorientation.
- Monitor a diver showing signs of panic. Assist and, if necessary, advise them not to dive.

## **Log keeping**

### ***Dive safety log***

- Keep a written dive safety log, which must contain the required information about all dives undertaken.
- During a dive, monitor the log so that missing diver situations are quickly identified.
- After a dive, have each diver verify his/her return from the dive by signing the dive safety log entry. Ensure that the dive supervisor or appointed person also verifies that the log has been completed and the diver has verified his or her return.
- Keep the dive safety log for at least one year after the dive.
- A blank dive safety log is available for use.

### ***Diver's log***

- Ensure anyone doing an entry level certificate completes a diver's log for their own records.
- Advise all diving workers and certificated divers to complete a diver's log for their own records.

## Diving and moving vessels

Take measures to minimise or eliminate the risk of divers being injured or killed by moving vessels.

For example:

- Fit propeller guards.
- Use buoys and markers to separate diving activity from vessels.
- Use flags and night lights to indicate that divers are present.
- Appoint lookouts to maintain watch and form part of the communication system.
- Ensure that dive workers are familiar with dive sites and able to navigate.
- Implement safe systems of work.

## Diving related illnesses and conditions

Decompression illness can result when excessive nitrogen in the body starts to form bubbles in the blood vessels and tissues as the diver ascends. The bubbles can cause tissue damage and block blood vessels, obstructing blood flow to vital organs.

Symptoms include:

- mental dullness
- fatigue
- pins and needles (prickling and itching)
- pains in the joints and muscles
- numbness
- headache
- weakness
- dizziness and nausea.

Decompression illness can arise after any diving, even when diving has been carried out within the limits of standard decompression tables.

- Be aware of factors that may contribute to decompression illness. These include:
  - depth (generally, the deeper the dive, the greater the risk)
  - poor physical condition (obesity, age)
  - heavy physical exertion before, during or after a dive
  - alcohol or some drugs (taken before or after a dive)
  - previous incidences of decompression illness
  - multiple ascent diving
  - multiple dives over multiple days
  - prolonged dive times
  - cold conditions

- prolonged hot showers after a dive.
- Seek medical advice if a diver displays symptoms.

Flying after diving

- **Advise all divers to wait at least 12 hours before flying** in a pressurised aircraft. The longer the period between diving and flying, the less likely that decompression illness will occur.

## ***Barotrauma***

Barotrauma is injury caused by pressure differences between air-containing cavities of the body (the ears, sinuses, lungs and the face mask cavity) and the environment. An example is a perforated ear drum.

As the greatest pressure changes occur near the surface of the water, the diver is most at risk of barotrauma within the first 10m.

- Follow correct diving precautions. For example: equalise the ears during descent and exhale on ascent.

The Divers Alert Network South East Asia Pacific has information on barotrauma and how to prevent it.

## ***Nitrogen narcosis***

Nitrogen narcosis can result from breathing nitrogen under pressure. It acts like a drug and sometimes affects reasoning, judgement, memory, perception, concentration and coordination. It may also lead to over-confidence, anxiety or panic; or survival instincts and responses may be suppressed.

The risk is significantly increased when diving on air at or beyond 30m.

- Be aware of factors that may contribute to nitrogen narcosis. They include:
  - fatigue or heavy work
  - anxiety or inexperience
  - poor visibility
  - excessive carbon dioxide
  - alcohol or some drugs (including sea sickness medication).
- Be aware of the risk and symptoms of nitrogen narcosis when diving beyond 30m.
- If a diver shows symptoms, immediately ascend to shallower depths taking into account decompression requirements if required.

## Occupational diving

Occupational diving refers to all underwater diving work conducted for purposes other than recreation. A person who dives to harvest, construct, retrieve, photograph or to carry out activities for scientific, research and aquaculture purposes are occupational divers.

### What is construction diving work?

Assemble, construct, demolish, dismantle

### Managing the risks

Control measures, assessing the site

### Medical fitness

Medical certificate, employee, self employed

### Diver competency

Construction diving, employer, self employed,

### Equipment

Standards, gas quality

### Rescue and emergencies

Emergency plans, rescue and resuscitation, first aid, oxygen, marine stings

### Diving illnesses and conditions

Decompression, barotrauma, nitrogen narcosis

### Log keeping

Dive safety log, diver's log

### Diving and moving vessels

Prevent injury or death, propeller guards, buoys, lookouts

## What is construction diving work?

Construction diving work means underwater diving work to assemble, construct, demolish, dismantle, install, clean, inspect, maintain, remove, repair, salvage, sample, search for, photograph, film, video or make a sound recording of certain things:

- a building
- a bridge
- a pile or a structure supported by piles
- a jetty, pontoon, wharf, mooring or slipway
- a navigational aid
- a pipe, cable or tunnel
- scaffolding, whether or not for use with a building

- a drilling rig
- an oil or gas well platform
- a weir or the structure or machinery of a dam or other artificial water storage, other than a swimming pool or aquarium
- a craft or vehicle for use in, on or above water or land.

Construction diving work also includes underwater diving work associated with dredging, reclamation of land or other earthworks.

### ***What is not construction diving work?***

Construction diving work does not include underwater diving work:

- for inspecting, sampling, photographing, filming, videoing or making a sound recording for:
  - the entertainment or publishing industry
  - tourism
  - print or electronic media
  - art
  - genuine scientific research
  - scientific management of natural resources (eg. scientific management of the Great Barrier Reef or fish stocks)
- for inspecting, sampling, photographing, filming, videoing or making a sound recording of:
  - a protected object under the *Queensland Heritage Act 1992*
  - an object to decide its cultural heritage significance under that Act
  - an historic relic or historic shipwreck under the *Historic Shipwrecks Act 1976 (Cwlth)*
- for photographing, filming, videoing or making a sound recording while and for the purpose of conducting recreational diving or recreational technical diving, or training to go recreational diving or recreational technical diving
- for photographing, filming, videoing or making a sound recording of persons doing recreational diving or recreational technical diving if the photographing, filming, videoing or sound recording is to be used for a souvenir
- done in a marina or the ocean for cleaning, inspecting, maintaining or searching for a vessel or mooring solely or mainly used in the tourism industry.

## **Managing the risks**

A variety of control measures can be used to manage specific risks associated with occupational diving. Employers should follow this five-step process, detailed in Section 22 of the *Workplace Health and Safety Act 1995*:

1. **Identify** the hazards.
2. **Assess** the risks that may result because of the hazards.
3. **Decide on control measures** to prevent or minimise the risks.
4. **Implement** the control measures.
5. **Monitor and review** the effectiveness of the control measures.

Conduct a risk assessment of environmental conditions at each dive site.

- When assessing the site, consider:
  - currents
  - weather
  - surface conditions
  - visibility
  - maximum dive depths.
- Modify diving procedures if the assessment shows that normal control measures are not enough to minimise risks to divers.
- Carry out a risk assessment each time there is a significant change to the occupational diving work or the environmental conditions at the site. Keep a written record of the process.
- Ensure that a risk assessment is done by a competent person prior to undertaking occupational diving work.
- Ensure that the record of the risk assessment is read, understood and signed by all divers and relevant workers.
- Keep the record for one year after the last day it is used for the work. Ensure that it can be produced for inspection.

## Medical fitness

**A diver must be medically fit to perform diving work.**

- If the diver is a worker, you must view his/her current certificate of medical fitness to dive. Work carried out by the worker must be within any limits stated in the certificate.
- If the diver is someone conducting a business or doing underwater diving work themselves, he/she must have a current certificate of medical fitness to dive. Work carried out must be within any limits stated in the certificate.

## Diver competency

An occupational diver must provide appropriate proof of competency before performing diving work.

- The employer, self-employed person or person conducting a business or undertaking can accept any of the following as proof of a person's competency:
  - certificates

- certification cards
  - dive safety logs
  - diver's log books
  - statutory declarations.
- Keep the proof of competency for one year after the work is completed.

### ***Construction diving***

A competent person for construction diving must hold an Australian Diver Accreditation Scheme (ADAS) Diving Certificate which is relevant to the work being carried out.

### ***Other occupational diving***

A competent person for other underwater diving work must hold any of the following:

- an ADAS Certificate relevant to the work being carried out
- a AQF Statement of Attainment from a registered training organisation (RTO) that is relevant to the work being carried out
- a AQF Statement of Attainment from an RTO for performing diver rescues **and** through training, qualifications or experience, the person has gained knowledge and skills in the elements of competency and performance criteria in AS2815 Training and certification of occupational divers Parts 1-4 relevant to the work being done
- a certificate from a recreational scuba training organisation proving that the person has successfully completed training in the areas mentioned in AS 4005.2 *Training and certification of recreational divers - Recreational SCUBA dive supervisor* **and** through training, qualifications or experience, the person has gained knowledge and skills in the elements of competency and performance criteria in AS2815 Parts 1-4 (relevant to the work being done)
- at least 15 hours' experience in underwater diving **and** training, qualifications or experience that show that the person has the knowledge and skills to do the work in a safe way (including knowledge of physics, equipment, decompression, communications, work systems, inspection and maintenance, physiology, first aid, legislation and standards)  
**Note:** This option is limited to a person who will do no more than 28 days diving in a period of six months and who is to be personally supervised in the water
- at least 15 hours' experience doing the same type of underwater diving work that is to be carried out **and** training, qualifications or experience that show that the person has the knowledge and skills to do the work in a safe way (including knowledge of physics, equipment, decompression, communications, work systems, inspection and maintenance, physiology, first aid, legislation and standards)  
**Note:** This option expires on 31 October 2008.

For more information, read sections 81 to 86AA of the *Workplace Health and Safety Regulation 1997*. They define different ways in which competency must be demonstrated and explain how to undertake the risk assessment process.

## **Equipment**

Use the appropriate standards when selecting and using equipment for occupational diving.

The appropriate standard for equipment for construction diving work is AS/NZS 2299.1 *Occupational Diving Operations - Standard Operational Practice*.

Appropriate standards for other types of occupational diving work are:

- *AS/NZS 2299.1 - Occupational Diving Operations – Standard Operational Practice*
- *AS/NZS 2299.2 Occupational Diving Operations – Scientific Diving*
- *Pearl Diving Industry Code of Practice - Pearl Producers Association of Western Australia.*

## **Gas quality**

Use section 3.13 of AS/NZS 2299.1 as the appropriate standard for breathing gas quality for occupational diving work.

## **Rescue and emergencies**

### ***Emergency plans***

- Check that dive sites have written emergency plans to deal with emergency situations.
- Make written emergency plans available to workers who should be familiar with these plans. Include the following situations:
  - first aid
  - rescue
  - evacuation
  - missing persons.

### ***Rescue and resuscitation***

- Develop effective and efficient rescue and resuscitation procedures. When developing these procedures, consider:
  - size, type and location of the dive site
  - appropriateness of rescue procedures to the dive site
  - adequacy of the communication system
  - location of lookouts/rescuers and their skills and fitness levels
  - availability, location and appropriateness of any rescue equipment.

### ***First aid***

- Have a first aid kit available at the dive site. Check that it is stocked with necessary equipment to treat injuries that may occur and can cater for the number of divers present.
- Ensure that a person on the surface at the dive site is currently trained in diving first aid, including emergency oxygen administration.

### ***Oxygen***

- Make available an oxygen system capable of providing a spontaneously breathing person with an inspired oxygen concentration of as near as possible to 100 percent.
- Check oxygen equipment and oxygen levels. The check must be carried out daily by a person trained to conduct the checks correctly.
- Provide sufficient oxygen to supply the injured person, taking into account the location of the dive site and access to medical facilities.

## **Diving illnesses and conditions**

### ***Decompression management***

Decompression illness can result when excessive nitrogen in the body starts to form bubbles in the blood vessels and tissues as the diver ascends. The bubbles can cause tissue damage and block blood vessels, obstructing blood flow to vital organs.

Symptoms include:

- mental dullness
- fatigue
- pins and needles (prickling and itching)
- pains in the joints and muscles
- numbness
- headache
- weakness

- dizziness and nausea.

Decompression illness can arise after any diving, even when diving has been carried out within the limits of standard decompression tables.

- Be aware of factors that may contribute to decompression illness. These include:
  - depth (generally, the deeper the dive, the greater the risk)
  - poor physical condition (obesity, age)
  - heavy physical exertion before, during or after a dive
  - alcohol or some drugs (taken before or after a dive)
  - previous incidences of decompression illness
  - multiple ascent diving
  - multiple dives over multiple days
  - prolonged dive times
  - cold conditions
  - prolonged hot showers after a dive.
- Seek medical advice if a diver displays symptoms.
- Use appropriate standards to manage the risk of decompression illness for occupational diving.
- The appropriate standard to manage the risk of decompression illness for construction diving work is AS/NZS 2299.1 *Occupational Diving Operations - Standard Operational Practice - Appendix F*
  - Appropriate standards for other occupational diving work are:
    - AS/NZS 2299.1 - *Occupational Diving Operations – Standard Operational Practice - Appendix F*
    - AS/NZS 2299.2 *Occupational Diving Operations – Scientific Diving.*
- any dive tables approved by a scuba training organisation (where the level of risk is similar to that of recreational diving or recreational technical diving).
- any dive computer when used in accordance with the manufacturer's instructions.

## ***Barotrauma***

Barotrauma is injury caused by pressure differences between air-containing cavities of the body (the ears, sinuses, lungs and the face mask cavity) and the environment. An example is a perforated ear drum.

As the greatest pressure changes occur near the surface of the water, the diver is most at risk of barotrauma within the first 10m.

- Follow correct diving precautions. For example: equalise the ears during descent and exhale on ascent.

## ***Nitrogen narcosis***

Nitrogen narcosis can result from breathing nitrogen under pressure. It acts like a drug and sometimes affects reasoning, judgement, memory, perception, concentration and coordination. It may also lead to over-confidence, anxiety or panic; or survival instincts and responses may be suppressed.

The risk is significantly increased when diving on air at or beyond 30m.

- Be aware of factors that may contribute to nitrogen narcosis. They include:
  - fatigue or heavy work
  - anxiety or inexperience
  - poor visibility
  - excessive carbon dioxide
  - alcohol or some drugs (including sea sickness medication).
- Be aware of the risk and symptoms of nitrogen narcosis when diving beyond 30m.
- If a diver shows symptoms, immediately ascend to shallower depths taking into account decompression requirements if necessary.

## **Log keeping**

### ***Dive safety log***

- Keep a written dive safety log, which must contain the required information about all dives undertaken. These records assist in decompression management.
- After a dive, a diver must verify his/her return from the dive by signing the dive safety log entry for the diver.
- Keep the dive safety log for at least one year after the dive.

### ***Diver's log***

- Occupational divers should keep a diver's log for their own records and should record each dive.

## **Diving and moving vessels**

Take measures to minimise or eliminate the risk of divers being injured or killed by moving vessels.

For example:

- Fit propeller guards.

- Use buoys and markers to separate diving activity from vessels.
- Use flags and night lights to indicate that divers are present.
- Appoint lookouts to maintain watch and form part of the communication system.
- Ensure that workers are familiar with dive sites and able to navigate.
- Implement safe systems of work.