

Australian/New Zealand Standard™

Training and certification of occupational divers

Part 6: Restricted occupational SCUBA diver



AS/NZS 2815.6:2013

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Australian Council of Trade Unions
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Australian Diving Contractors Association
Australian Marine Sciences Association
Australian Medical Association
CSIRO Marine and Atmospheric Research
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Part 6: Restricted occupational SCUBA diver

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee SF-017, Occupational Diving, as a new Part to the AS and AS/NZS 2815 series.

The Standard is Part 6 of a series of Standards on the training and certification of underwater divers, where the requirements of regulatory authorities and industry demand a prescribed degree of training and competence to ensure an adequate degree of safety, performance and economy.

The objective of this Standard is to provide regulatory authorities, training providers and trainees with the content of a training course for imparting minimum levels of competency to trainee restricted occupational SCUBA divers, and assessment procedures.

This Standard is particularly related to (but not restricted to) the training of personnel who will be engaged in underwater operations as described in AS/NZS 2299.2, *Occupational diving operations*, Part 2: *Scientific diving*.

This Standard also provides guidance and allows for certified divers to undertake EAN training as a standalone addition to restricted occupational diver training which was previously undertaken.

The task training set out in the units of this Standard will provide the trainee with a general appreciation of the techniques and problems involved in carrying out the specified underwater work. For the diver to be considered a competent underwater worker, it will generally be necessary for further specialist training to be undertaken.

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Australian/New Zealand Standard**Training and certification of occupational divers****Part 6: Restricted occupational SCUBA diver**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies the training activities and competencies required for the training and certification of divers to work safely and competently at a limited range of underwater tasks as members of an occupational diving team using self-contained underwater breathing apparatus (SCUBA) (see Notes).

The qualification in this Standard is intended to be the minimum qualification for occupational SCUBA diving but is not intended to equip occupational divers who may be engaged in more demanding tasks and environments, such as within the construction industry, military, police or emergency services (see Notes).

Environmental working conditions for restricted occupational SCUBA divers should be limited to reasonably controlled environments that involve direct access to the surface, no planned decompression and minimal risk of underwater entrapment or unplanned decompression.

Requirements and guidance for providers of restricted occupational SCUBA diver training are given in Section 4.

NOTES:

- 1 Many occupational diving operations will require additional underwater work skills to those listed in this Standard. Training and certification for occupational SCUBA divers who can undertake a wider range of underwater tasks is covered in AS 2815.1.
- 2 Attention is drawn to the requirements of AS/NZS 2299.1, AS/NZS 2299.2 and of regulatory authorities which may limit the depths and times of diving with no compression chamber facilities.
- 3 For the purposes of this Standard, only open-circuit scuba is considered either using air or enriched air nitrox. This Standard is not intended to train divers in the use of closed circuit or rebreather diving systems.
- 4 This Standard is not intended to train divers for surface supply diving, construction diving or diving in hazardous diving conditions. Hazardous diving conditions include the following:
 - (a) Risk of entanglement – diving in and around nets and cages, multiple ropes and lines, tree branches, man-made underwater structures such as shipwrecks, sunken vehicles, or other sunken material.
 - (b) Diving in an overhead environment, without vertical access to the surface.
 - (c) Highly limited or zero visibility.
 - (d) Work near outflow or inflow to pipes.
 - (e) Diving in currents or fast flowing creeks, rivers and drains.
 - (f) Diving associated with setting of weights or moorings or use of lifting devices for anything other than fish or shellfish.
 - (g) Work in high boat traffic areas such as navigation channels, entries to marinas, operational ports.
 - (h) Use of plant powered from the surface.

- (i) Decompression diving.
 - (j) Diving deeper than 30 metres.
- 5 This Standard may be used to train divers working in occupations such as—
- (a) aquarium diving;
 - (b) archaeological investigations;
 - (c) scientific research; and
 - (d) natural resource management.

1.2 APPLICATION

1.2.1 General

This Standard comprises requirements and guidance for use by the trainee diver, supervisor, employer, training establishment or certification agency. Specifically, it is intended to—

- (a) prescribe to a trainee the level of competency that a qualified diver is expected to achieve;
- (b) provide a basis for a supervisor or employer to evaluate the current competence of divers;
- (c) provide minimum requirements for a school or training establishment in the development of a course of training;
- (d) be used by certification agencies to assess training provided to trainee divers; and
- (e) be used to assess and certify diver training establishments delivering the training.

1.2.2 Certification

Persons requiring certification to this Standard shall meet all elements of competency and performance criteria specified in Sections 2 and 3 of this Standard for the particular level of certification being sought.

NOTE: See also AS/NZS 2299.1 for requirements for certification bodies.

A diver trained in accordance with this Standard may receive certification through—

- (a) the relevant regulatory authority; or
- (b) an occupational diver training establishment that is a registered training organization (RTO) such as the Australian Diver Accreditation Scheme (ADAS).

Training establishments delivering the training course specified in this Standard may be eligible for approval as an Australian Diver Accreditation Scheme (ADAS) accredited training establishment. Trainees deemed competent and recommended by that establishment would then be eligible for certification under ADAS.

1.3 NORMATIVE REFERENCES

The following are the normative documents referenced in this Standard.

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS

2030 Gas cylinders

2030.1 Part 1: General requirements

3848 Filling of portable gas cylinders

3848.2 Part 2: Filling of portable gas cylinders for self-contained underwater breathing apparatus (SCUBA) and non-underwater self-contained breathing apparatus (SCBA)—Safe procedures

AS/NZS

2299 Occupational diving operations

2299.1 Part 1: Standard operational practice

2299.2 Part 2: Scientific diving

2815 Training and certification of occupational divers

2815.5 Part 5: Dive supervisor

Universal Dive Techtronics, Canada (UDT)

DCIEM Diving Manual

1.4 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.4.1 Dive coordinator

A person who supervises diving and coordinates any dive conducted in accordance with AS/NZS 2299.2 and is responsible for dive team safety.

1.4.2 Dive supervisor

A person certified to AS/NZS 2815.5 to supervise occupational diving operations.

1.4.3 Element of competency

A discretely identifiable action or knowledge that can be demonstrated or assessed.

1.4.4 Enriched air nitrox (EAN)

A breathable mixture of nitrogen and oxygen with more than 21% oxygen content, which may contain trace gases at levels no higher than breathable air.

NOTE: This is also referred to as EANx, NITROX and Nitrox.

1.4.5 Open water

Any large body of water that is subject to currents, swell or waves and that can be used for instruction of diving.

1.4.6 Performance criteria

Evaluative statements that specify the required level of performance for the element of competency.

1.4.7 Quick release

A device or mechanism that can be immediately released from the secured position by the single operation of one hand.

1.4.8 Regulatory authority

A Minister of the Crown, a government department or other public authority having power to issue regulations, orders or other instructions having the force of law in respect of any subject covered by this Standard.

1.4.9 Reserve gas supply

A redundant breathing gas supply carried by a diver contained within an independent cylinder. Gas contained within the bladder of a buoyancy compensator is not a reserve gas supply.

1.4.10 Restricted occupational SCUBA diver

An individual who has satisfactorily completed a training course conducted in accordance with this Standard.

1.4.11 Occupational SCUBA diving instructor

An individual certified by a recognized certifying organization to train and assess the participants in the appropriate SCUBA diving course and recommend the issue of the same level of certification. (See Clause 4.3 for instructor requirements.)

NOTE: The terms 'instructor' and 'trainer' are synonymous.

1.4.12 Shall

Indicates that a statement is mandatory.

1.4.13 Should

Indicates a recommendation.

1.4.14 Trainee

The individual who is subject to the training and assessment described within this Standard.

NOTE: The terms 'trainee' and 'student' are synonymous.

1.4.15 Unit of competency

A broad aspect of the knowledge or ability the trainee needs to acquire before being considered competent.

1.5 PURPOSE

The purpose of this Standard is to describe the organizational and syllabus requirements to train underwater workers to operate safely and competently using self-contained underwater breathing apparatus in accordance with the applicable Part of the AS/NZS 2299 series.

The following important aspects are stressed:

- (a) *Competence* The range of diving tasks covered by this Standard is limited. Accordingly, divers who wish to undertake tasks outside the scope of this Standard should gain further training and accreditation. This should be in accordance with other Parts of the AS and AS/NZS 2815 series, wherever possible.
NOTE: Some regulatory authorities require that persons carrying out diving work be in possession of an appropriate certificate of competency issued by the regulatory authority.
- (b) *Safety and health* The safety and health of the diver and the development of safe working practices needs to be integrated into all aspects of the training course.
- (c) *Team training* The training, particularly in practical diving and underwater work, should be directed towards developing individual competence and helping the trainee to think and act as a member of a team.
- (d) *Record keeping* Record keeping is required for both the diver (i.e. in a logbook) as well as the training establishment (see AS/NZS 2299.1).

1.6 TRAINEE APPLICATION CRITERIA

Prior to the commencement of training, the trainee shall fulfil the following criteria:

- (a) Be in possession of a valid certificate of medical fitness to dive (see AS/NZS 2299.1) issued, after examination, by a doctor trained and experienced in underwater medicine in accordance with the requirements in AS/NZS 2299.1. If the trainee's health has changed significantly since the medical certificate was issued, the trainee shall seek an appropriate medical review.
- (b) Be 18 years of age.
- (c) Be a competent swimmer.

NOTE: Competence should be demonstrated by the trainee completing a 200 m swim on the surface using mask, fins and snorkel while wearing SCUBA equipment and neutrally buoyant within eight minutes and by the trainee treading water for 10 min while fully clothed (i.e. wearing a long sleeved shirt and long pants).

- (d) Hold a recreational diver certificate and have a minimum of 10 logged dives since certification with a minimum of 5 h of dive time.
- (e) Be able to—
 - (i) add, subtract, multiply and divide whole numbers, decimals and common fractions;
 - (ii) calculate percentages; and
 - (iii) transpose and solve simple formulas, e.g. gas laws.
- (f) Be able to understand written and verbal communications, and be able to communicate easily with other persons.

NOTE: This is particularly important where trainees or instructors are of differing nationalities.

Prior to commencement of practical components of the training course, the trainee shall have satisfactorily completed first aid training including cardiopulmonary resuscitation and oxygen administration and hold certification for this from a training organization registered under the Australian Quality Training Framework or New Zealand Qualifications Authority.

NOTE: The above requirements are met by most general first aid courses leading to certification, incorporating or supplemented by an oxygen administration course.

SECTION 2 TRAINING COURSE CONTENT

Clauses 3.1 to 3.11 set out the units of competency, elements of competency and performance criteria to be achieved during the training course.

Clause 3.12 sets out the unit of competence, elements of competency and performance criteria for a diver wishing to undertake diving using EAN equipment and procedures. Unlike Clauses 3.1 to 3.11, Clause 3.12 need not be completed as part of the initial training, however, Clause 3.12 shall be completed by all trainees prior to undertaking any diving using EAN equipment and procedures.

The elements of competency describe what the trainees need to be able to do on completion of training. Before being issued a certificate of competence, the trainee shall have achieved the performance criteria and the required bottom times. The elements of competency can be classified broadly into two groups as follows:

- (a) Elements that enable the trainee to dive and work safely.
- (b) Elements that develop in the trainee an appreciation of, or acquaintance with, a piece of equipment or a procedure.

Where EAN training is being undertaken in conjunction with air training, the training dives identified in Clause 3.9.4 may be used to fulfil the EAN training dive requirements identified in Clause 3.12.3 if those dives are undertaken using EAN and EAN procedures.

EAN dives shall not be undertaken by any student, until that student has completed the relevant EAN safety related competencies within this Standard.

The elements of competency are covered in units of competency. The restricted occupational SCUBA diver shall meet the requirements of the elements of competency and performance criteria that make up each of the units of competency. The units of competency are shown in the following table:

Unit of competency	Clause reference
Role of the restricted occupational SCUBA diver	3.1
Anatomy, physiology and diving physics	3.2
Health and safety in diving operations	3.3
Diving first aid	3.4
Effective working relationships	3.5
Emergency procedures	3.6
SCUBA equipment	3.7
Pre-dive preparations	3.8
Underwater deployment	3.9
Post-dive procedures	3.10
Diving work tasks	3.11
Using enriched air nitrox (EAN)	3.12

NOTES:

- 1 Details of the curriculum and criteria for assessment may be subject to approval by the relevant regulatory authority.
- 2 The list of units does not provide the training plan, see Section 4.

SECTION 3 UNITS OF COMPETENCY

3.1 ROLE OF THE RESTRICTED OCCUPATIONAL SCUBA DIVER

3.1.1 General

The purpose of this unit of competency is to enable the trainee to describe underwater work, available occupational diving qualifications, the basic principles of competency-based training and how it applies to diving and the roles of restricted occupational SCUBA divers and government bodies associated with diving.

The elements of competency are to—

- (a) describe underwater work and associated industries;
- (b) describe available qualifications for the occupational diver; and
- (c) describe, in broad terms, the roles of the restricted occupational SCUBA diver and government bodies associated with diving.

3.1.2 Performance criteria for elements of competency

The competency of the trainee with respect to the elements shall be assessed using the criteria set out in Table 1. The general assessment method and conditions of assessment shall be as set out in Clause 4.2.

TABLE 1
ROLE OF THE RESTRICTED OCCUPATIONAL SCUBA DIVER

Element of competency	Performance criteria
1.1 Describe underwater work and associated industries	(a) Describe the main types of work carried out underwater (b) Describe the industries associated with the various types of underwater work (c) Describe, in broad terms, some of the problems associated with underwater work
1.2 Describe available qualifications for the occupational diver	(a) List available qualifications for the occupational diver (b) Describe pathways to different qualifications within the diving industry (c) Describe the basic principles of competency-based training and how this is applied to current diving qualifications (d) State which countries offer reciprocal recognition of Australian/New Zealand qualifications
1.3 Describe, in broad terms, the roles of the restricted occupational SCUBA diver and government bodies associated with diving	(a) List institutions, industry and government agencies associated with restricted occupational SCUBA diving (b) Describe the diving purpose and function of those institutions, industry and government agencies

3.2 ANATOMY, PHYSIOLOGY AND DIVING PHYSICS

3.2.1 General

The purpose of this unit of competency is to enable the trainee to explain the physical interaction of the human body with the underwater environment and to perform the necessary calculations relating to gas supply and buoyancy.

The elements of competency are to—

- (a) describe the main anatomical structures and physiological systems of the human body, particularly the respiratory, circulatory and central nervous systems;
- (b) use common units of measurement for pressure, volume and temperature;
- (c) describe the relationship between pressure, volume and temperature of gases;
- (d) explain the effects of pressure, volume and temperature changes on the diver and their implications;
- (e) explain partial pressure and solubility of gases and their effect on the diver;
- (f) use decompression tables to calculate safe diving profiles;
- (g) explain the principle of buoyancy and its effect on the diver and submerged objects; and
- (h) explain the behaviour of light and sound under water and their effect on the diver.

3.2.2 Performance criteria for elements of competency

The competency of the trainee with respect to the elements shall be assessed using the criteria set out in Table 2. The general assessment method and conditions of assessment shall be as set out in Clause 4.2.

TABLE 2
ANATOMY, PHYSIOLOGY AND DIVING PHYSICS

Element of competency	Performance criteria
2.1 Describe the main anatomical structures and physiological systems of the human body, particularly the respiratory, circulatory and central nervous systems	(a) Describe the structure and principal functions of: (i) Musculoskeletal systems (ii) Central and peripheral nervous system (iii) Cardiovascular system (iv) Ears (v) Sinuses (vi) Vestibular organs (vii) Respiratory system (viii) Gastrointestinal system (ix) Endocrine and immune systems (b) Describe the physiological effects of changes in breathing gas composition and pressures
2.2 Use common units of measurement for pressure, volume and temperature	(a) List common units of measurement for pressure, volume and temperature (b) List sources of conversion tables (c) Convert pressures, volumes and temperatures from one unit to another

(continued)

TABLE 2 (continued)

Element of competency	Performance criteria
2.3 Describe the relationship between pressure, volume and temperature of gases	(a) Define the following terms: (i) Atmospheric pressure (ii) Hydrostatic pressure (iii) Absolute pressure (iv) Ambient pressure (v) Gauge pressure (b) Describe the relationship between pressure and volume (Boyle's Law) (c) Calculate volume changes with changing depths and pressures (d) Describe the relationship between pressure and temperature (Charles' Law) (e) Calculate pressure changes with changes in temperature
2.4 Explain the effects of pressure, volume and temperature changes on the diver and their implications	(a) List gas spaces in the human body (b) Define the term barotrauma (c) List some typical barotrauma injuries (d) Explain how temperature change applies to cylinder pressures (e) Describe the factors affecting heat loss under water and its effect on the diver
2.5 Explain partial pressure and solubility of gases and their effect on the diver	(a) Explain the terms: (i) Partial pressure (ii) Diffusion (iii) Saturation (iv) Desaturation (v) Equilibrium (b) Explain the principles of partial pressure of gases (Dalton's Law) (c) Calculate partial pressure of gases at different depths (d) Explain the principles of solubility of gases (Henry's Law) (e) Explain the need for decompression as it relates to partial pressure and solubility of gases (f) Explain inert gas narcosis
2.6 Use decompression tables to calculate safe diving profiles	(a) Explain the purpose and use of decompression tables and dive computers and list the limitations of each (b) Use decompression tables (including DCIEM) to demonstrate the appropriate use of: (i) Depth increments (ii) Time increments (iii) Stop times (iv) Ascent rates (v) Total decompression time (vi) Bottom time (vii) Total dive time (viii) Surface interval

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