

**SINGAPORE STANDARD**

# **Code of practice for scientific diving**



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The organisations in which the experts of the Working Group are involved are:

*Commercial Diving Association (Singapore)*  
*DHI Water and Environment (S) Pte Ltd*  
*Nanyang Technological University*  
*National Institute of Education*  
*National Parks Board*  
*National University of Singapore*  
*Seagrass Watch*  
*Singapore Underwater Federation*  
*Workplace Safety and Health Council*

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## Foreword

This Singapore Standard was prepared by the Working Group on Scientific Diving appointed by the Technical Committee on Workplace Safety and Health under the direction of the General Engineering and Safety Standards Committee.

Scientific diving is a tool for scientific research and teaching. This standard provides a set of requirements to promote uniformity of practice in relation to occupational safety and health for employees, students and contractors conducting scientific diving.

This standard is based on AS/NZS 2299.2:2002 "Occupational diving operations – Part 2: Scientific diving", Standards Australia Limited. It is copied by SPRING Singapore with the permission of Standards Australia under Licence 1608-c020-2.

The hand signal illustrations in Annex C are provided by PADI and are used with PADI's permission. © PADI 2014.

In preparing this standard, reference was also made to the following publications:

1. AS 1210 Pressure vessels
2. AS 1885 Measurement of occupational health and safety performance
3. AS 1885.1 Measurement of occupational health and safety performance. Part 1: Describing and reporting occupational injuries and disease (known as the National Standard for workplace injury and disease recording)
4. AS 2030 Gas cylinders
5. AS 2030.1 Gas cylinders. Part 1: General requirements
6. AS 2815 Training and certification of occupational divers
7. AS 2815.1 Training and certification of occupational divers. Part 1: Occupational SCUBA diver – Standard
8. AS 2815.3 Training and certification of occupational divers. Part 3: Air diving to 50 m
9. AS 2815.4 Training and certification of occupational divers. Part 4: Bell diving
10. AS 3848 Filling of portable gas cylinders
11. AS 3848.2 Filling of portable gas cylinders. Part 2: Filling of portable cylinders for self-contained underwater breathing apparatus (SCUBA) and non-underwater self-contained breathing apparatus (SCUBA) – Safe procedures
12. AS 4484 Gas cylinders for industrial, scientific, medical and refrigerant use – Labelling and colour coding
13. AS/NZS 1337 Personal eye protection
14. AS/NZS 2299 Occupational diving operations
15. AS/NZS 2299.1 Occupational diving operations. Part 1: Standard operational practice
16. AS/NZS 2815.2 Training and certification of occupational divers. Part 2: Surface supplied diving to 30 m
17. ISO 2230 Rubber products – Guidelines for storage
18. SS 511 Code of practice for diving at work
19. American Academy of Underwater Sciences Dive Standards
20. Canadian Forces Dive Manual

21. Code of Practice on WSH Risk Management
22. Commonwealth of Australia. National Measurement Act 1960
23. Dive Safety Standards for Research Diving (National University of Singapore, 2010)
24. International Maritime Organization. International Regulations for Preventing Collisions at Sea (1972)
25. National Code of Practice for Recreational, Sport and Technical Diving by the Singapore Underwater Federation, 2007
26. National Occupational Health and Safety Commission. National standard for plant NOHSC 1010
27. New Zealand Government. Health and Safety in Employment Regulations 1995
28. Recreational Diving Safety Manual for Hong Kong 2009
29. Technical Advisory for Inland/Inshore Commercial Diving Safety and Health
30. The University of Sydney SCUBA Diving Operations Manual
31. UNESCO Technical Papers in Marine Science 53, Code of Practice for Scientific Diving (1990). Eds. N.C. Flemming and M.D. Max
32. Workplace Safety and Health Act and its subsidiary regulations

Acknowledgement is made for the use of information from the above publications.

Attention is drawn to the possibility that some of the elements of this Singapore Standard may be the subject of patent rights. Enterprise Singapore shall not be held responsible for identifying any or all of such patent rights.

**NOTE**

1. *Singapore Standards (SSs) and Technical References (TRs) are reviewed periodically to keep abreast of technical changes, technological developments and industry practices. The changes are documented through the issue of either amendments or revisions.*
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## Code of practice for scientific diving

### 0 Introduction

#### 0.1 Objective

The objective of this Standard is to provide the scientific diving industry with a set of minimum requirements to provide uniformity of practice in relation to the health and safety of those people engaged in underwater operations for the purpose of scientific diving.

#### 0.2 Application

This Standard applies to persons directly involved in scientific diving operations, organisations employing those persons and industries supplying equipment for use in connection with scientific diving operations. This Standard has been developed for diving activities using air or oxygen-nitrogen mixtures where the oxygen concentration is in the range of 20% to 22%. Although this Standard may be used for guidance for diving activities using oxygen-nitrogen mixtures with higher or lower concentrations, additional training and procedures will be necessary. Similarly, this Standard may be used for guidance for diving activities in liquids other than water and for breathing apparatus such as rebreather units with the appropriate additional training and procedures. This standard cannot encompass every eventuality, and emphasis is placed on minimising risk by conducting thorough risk assessments for all diving activities.

### 1 Scope

**1.1** This Standard specifies the requirements for underwater diving operations performed at a place of work for the purpose of professional scientific research, natural resources management, environmental management or scientific research as an educational activity. This Standard applies to diving in water to depths not exceeding 30 m, where breathing gas is supplied through self-contained underwater breathing apparatus (SCUBA). It does not apply to:

- (a) diving to depths greater than 30 m;
- (b) diving with pure oxygen;
- (c) decompression diving;
- (d) recreational diving;
- (e) other forms of commercial diving;
- (f) cave or wreck diving; and
- (g) diving covered by Singapore Standard SS 511.

NOTE – Without limiting the scope of this Standard, there may be diving tasks or situations that require a scientific diver to operate under other diving standards. For example, for use of Surface Supply Breathing Apparatus (SSBA), refer to SS 511 Code of practice for diving at work.

**1.2** This Standard includes requirements and recommendations for personnel, procedures and the equipment and breathing medium supply utilised, together with appendices containing:

- (a) competency levels for scientific divers;
- (b) contents of a diving operations manual;

- (c) hand signals;
- (d) emergency response plan.

## **2 Normative references**

The following referenced documents are indispensable for the application of this standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

SS 511 Code of practice for diving at work

International Regulations for Preventing Collisions at Sea

Workplace Safety and Health Act