



Occupational safety code for diving operations





Legal Notice for Standards

Canadian Standards Association (operating as "CSA Group") develops standards through a consensus standards development process approved by the Standards Council of Canada. This process brings together volunteers representing varied viewpoints and interests to achieve consensus and develop a standard. Although CSA Group administers the process and establishes rules to promote fairness in achieving consensus, it does not independently test, evaluate, or verify the content of standards.

Disclaimer and exclusion of liability

This document is provided without any representations, warranties, or conditions of any kind, express or implied, including, without limitation, implied warranties or conditions concerning this document's fitness for a particular purpose or use, its merchantability, or its non-infringement of any third party's intellectual property rights. CSA Group does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA Group makes no representations or warranties regarding this document's compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA GROUP, ITS VOLUNTEERS, MEMBERS, SUBSIDIARIES, OR AFFILIATED COMPANIES, OR THEIR EMPLOYEES, DIRECTORS, OR OFFICERS, BE LIABLE FOR ANY DIRECT, INDIRECT, OR INCIDENTAL DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES, HOWSOEVER CAUSED, INCLUDING BUT NOT LIMITED TO SPECIAL OR CONSEQUENTIAL DAMAGES, LOST REVENUE, BUSINESS INTERRUPTION, LOST OR DAMAGED DATA, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), OR ANY OTHER THEORY OF LIABILITY, ARISING OUT OF OR RESULTING FROM ACCESS TO OR POSSESSION OR USE OF THIS DOCUMENT, EVEN IF CSA GROUP HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA Group is not undertaking to render professional or other services for or on behalf of any person or entity or to perform any duty owed by any person or entity to another person or entity. The information in this document is directed to those who have the appropriate degree of experience to use and apply its contents, and CSA Group accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA Group is a private not-for-profit company that publishes voluntary standards and related documents. CSA Group has no power, nor does it undertake, to enforce compliance with the contents of the standards or other documents it publishes.

Intellectual property rights and ownership

As between CSA Group and the users of this document (whether it be in printed or electronic form), CSA Group is the owner, or the authorized licensee, of all works contained herein that are protected by copyright, all trade-marks (except as otherwise noted to the contrary), and all inventions and trade secrets that may be contained in this document, whether or not such inventions and trade secrets are protected by patents and applications for patents. Without limitation, the unauthorized use, modification, copying, or disclosure of this document may violate laws that protect CSA Group's and/or others' intellectual property and may give rise to a right in CSA Group and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by licence or by law, CSA Group reserves all intellectual property rights in this document.

Patent rights

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. CSA Group shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

Authorized use of this document

This document is being provided by CSA Group for informational and non-commercial use only. The user of this document is authorized to do only the following:

If this document is in electronic form:

- load this document onto a computer for the sole purpose of reviewing it;
- search and browse this document; and
- print this document if it is in PDF format.

Limited copies of this document in print or paper form may be distributed only to persons who are authorized by CSA Group to have such copies, and only if this Legal Notice appears on each such copy.

In addition, users may not and may not permit others to

- alter this document in any way or remove this Legal Notice from the attached standard;
- sell this document without authorization from CSA Group; or
- make an electronic copy of this document.

If you do not agree with any of the terms and conditions contained in this Legal Notice, you may not load or use this document or make any copies of the contents hereof, and if you do make such copies, you are required to destroy them immediately. Use of this document constitutes your acceptance of the terms and conditions of this Legal Notice.



Standards Update Service

CSA Z275.2:20 February 2020

Title: Occupational safety code for diving operations

To register for e-mail notification about any updates to this publication

- go to store.csagroup.org
- click on Product Updates

The List ID that you will need to register for updates to this publication is 2427724.

If you require assistance, please e-mail techsupport@csagroup.org or call 416-747-2233.

Visit CSA Group's policy on privacy at www.csagroup.org/legal to find out how we protect your personal information.

Canadian Standards Association (operating as "CSA Group"), under whose auspices this National Standard has been produced, was chartered in 1919 and accredited by the Standards Council of Canada to the National Standards system in 1973. It is a not-for-profit, nonstatutory, voluntary membership association engaged in standards development and certification activities.

CSA Group standards reflect a national consensus of producers and users — including manufacturers, consumers, retailers, unions and professional organizations, and governmental agencies. The standards are used widely by industry and commerce and often adopted by municipal, provincial, and federal governments in their regulations, particularly in the fields of health, safety, building and construction, and the environment.

Individuals, companies, and associations across Canada indicate their support for CSA Group's standards development by volunteering their time and skills to Committee work and supporting CSA Group's objectives through sustaining memberships. The more than 7000 committee volunteers and the 2000 sustaining memberships together form CSA Group's total membership from which its Directors are chosen. Sustaining memberships represent a major source of income for CSA Group's standards development activities.

CSA Group offers certification and testing services in support of and as an extension to its standards development activities. To ensure the integrity of its certification process, CSA Group regularly and continually audits and inspects products that bear the CSA Group Mark.

In addition to its head office and laboratory complex in Toronto, CSA Group has regional branch offices in major centres across Canada and inspection and testing agencies in eight countries. Since 1919, CSA Group has developed the necessary expertise to meet its corporate mission: CSA Group is an independent service organization whose mission is to provide an open and effective forum for activities facilitating the exchange of goods and services through the use of standards, certification and related services to meet national and international needs.

For further information on CSA Group services, write to CSA Group 178 Rexdale Boulevard Toronto, Ontario, M9W 1R3 Canada A National Standard of Canada is a standard developed by a Standards Council of Canada (SCC) accredited Standards Development Organization, in compliance with requirements and guidance set out by SCC. More information on National Standards of Canada can be found at www.scc.ca.

SCC is a Crown corporation within the portfolio of Innovation, Science and Economic Development (ISED) Canada. With the goal of enhancing Canada's economic competitiveness and social wellbeing, SCC leads and facilitates the development and use of national and international standards. SCC also coordinates Canadian participation in standards development, and identifies strategies to advance Canadian standardization efforts.

Accreditation services are provided by SCC to various customers, including product certifiers, testing laboratories, and standards development organizations. A list of SCC programs and accredited bodies is publicly available at www.scc.ca.

Standards Council of Canada 600-55 Metcalfe Street Ottawa, Ontario, K1P 6L5 Canada





Cette Norme Nationale du Canada est disponible en versions française et anglaise.

Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users to judge its suitability for their particular purpose.

[®]A trademark of the Canadian Standards Association, operating as "CSA Group"

National Standard of Canada

CSA Z275.2:20 Occupational safety code for diving operations



*A trademark of the Canadian Standards Association, operating as "CSA Group"



Published in February 2020 by CSA Group A not-for-profit private sector organization 178 Rexdale Boulevard, Toronto, Ontario, Canada M9W 1R3

To purchase standards and related publications, visit our Online Store at store.csagroup.org or call toll-free 1-800-463-6727 or 416-747-4044.

ICS 97.220.40 ISBN 978-1-4883-2633-2

© 2020 Canadian Standards Association All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.

This is a preview. Click here to purchase the full publication.

6

Contents

Technical Committee on Occupational Diving and Hyperbaric Environments		
Subcommittee on Diving Operations 11		
Preface 15		
1 Scope 17 1.1 General 17 1.2 Limitations 17 1.3 Terminology 17 1.4 Units of measurement 18		
2 Reference publications 18		
3 Definitions 20		
4 General requirements 26		
4.1 Qualification of diving personnel 26		
4.1.1 Medical qualification <i>26</i>		
4.1.2 Training qualifications 27		
4.2 Diving records 28		
•		
4.2.1 Diver's personal logbook 28		
4.2.2 Daily record 29		
4.3 General dive procedures 29		
4.3.1 Planning of diving operation 29		
4.3.2 Supervision <i>29</i>		
4.3.3 Understanding of duties 29		
4.3.4 Transportation to the water surface 30		
4.3.5 Recovery of an unconscious diver 30		
4.3.6 Inspection of equipment in preparation for the dive 30		
4.3.7 Standby diver 31		
4.3.8 Adherence to planned procedures 31		
4.3.9 Identification of work site 31		
4.4 Diving hazards 31		
4.4.1 General <i>31</i>		
4.4.2 Floating equipment 31		
4.4.3 Approach to intakes/water-control structures and penetration 31		
4.4.4 Hazardous mechanisms — general 32		
4.4.5 Use of explosives 32		
4.5 Emergency services and contingency planning 33		
4.5.1 General duty <i>33</i>		
4.5.2 Medical standby 33		
4.5.2 Medical standby 33 4.5.3 Backup hyperbaric facilities 33		
4.5.4 Emergency procedure — termination of dive 33		
4.6 Breathing mixtures 33		

General

33

4.6.1

4.6.2	Bailout systems 33
4.6.3	Bailout quantities 33
4.6.4	Purity standards 34
4.6.5	Non-standard gases 34
4.7	Compressed breathing air composition and purity 34
4.7.1	Air composition 34
4.7.2	Air purity 35
4.8	Sampling and analysis of compressed breathing air or gas mixture 35
4.8.1	General 35
4.8.2	Sampling 35
4.8.3	Analysis 36
4.9	Purity of oxygen, nitrogen, and helium 38
4.10	Purity and sampling of gas mixtures 39
F Doo	ampures in a present was and tables 40
	ompression procedures and tables 40 General 40
5.1	
5.2	Hyperbaric chambers (non-saturation) 40
5.2.1	General 40
5.2.2	On-site requirement 40
5.2.3	Access and location 40
5.2.4	Communication 40
5.2.5	Firefighting 40
5.2.6	First aid 41
5.2.7	External chamber check 41
5.2.8	Internal chamber check 42
5.2.9	Control panel 43
5.3	Hyperbaric chamber operator 43
5.4	Schedule of diving operations 44
5.5	Pressure-related illness 44
5.6	Air transportation of distressed diver 44
5.7	Diving after treatment for a pressure-related illness 44
5.8	Diving supervisor's responsibilities 44
6 Gen	eral equipment requirements 44
6.1	Diving equipment 44
6.1.1	Design, performance, and maintenance of equipment 44
6.1.2	Alternative energy sources 45
6.2	Gauges and metering equipment 45
6.2.1	Checking of gauges and metering equipment 45
6.2.2	Submersible depth gauges 46
6.3	Compressed breathing air system requirements 46
6.3.1	General 46
6.3.2	Air intakes 47
6.3.3	Compressor requirements 47
6.3.4	Air purification elements and purifier moisture monitoring 47
6.3.5	Compressor operator 48
6.3.6	Compressor maintenance cleaning solvents 48
6.4	Oxygen installations 49
6.4.1	Hoses 49

6.4.2	Flow velocity 49
6.4.3	Valves 49
6.4.4	Oxygen storage area 49
6.5	Design and testing of pressure vessels 49
6.6	Compressed breathing air pipelines 50
6.7	Lifeline systems 51
6.8	Communications 51
6.9	Additional diver's equipment requirements 52
6.10	Surface diving base equipment 52
6.11	Diver launch and recovery 53
6.12	Diving stages 53
6.13	Wet bells 54
6.14	Remotely operated vehicles ROVs and diving operations 54
6.15	Alarms 55
	BA diving 55
7.1	General 55
7.2	Maximum depth 56
7.3	Emergencies 56
7.4	Communications 56
7.5	Minimum crew 56
7.6	Diving team roles 57
7.7	Standby diver 58
7.8	Diving equipment 58
7.8.1	Divers 58
7.8.2	Standby SCUBA equipment 58
7.9	Sledding 58
7.9.1	General 58
7.9.2	Boat captain or pilot 58
8 Surf	ace-supplied diving 59
8.1	General requirements 59
8.1.1	General 59
8.1.2	Work restrictions 59
8.1.3	Surface-supplied offshore gas and oil diving 59
8.2	Crew 60
8.2.1	Minimum crew 60
8.2.2	Diver's tender 60
8.2.3	Standby diver 60
8.3	Equipment requirements 60
8.3.1	General 60
8.3.2	Air lines 60
8.3.3	Bailout system 61
8.3.4	Non-return valves 61
8.3.5	Diving recovery harness 61
8.3.6	Umbilicals 61
8.3.7	Diving support equipment 62
8.3.8	Dive control 62
8.3.9	Communications 63

8.3.10	Testing and compliance declaration of diving recovery harness 63		
8.3.11	Diver heating system 63		
8.4	Liveboating 65		
8.4.1	General 65		
8.4.2	Boat captain 65		
9 Deep	o diving 65		
9.1	Scope <i>65</i>		
9.2	Offshore diving 66		
9.3	Surface-supplied mixed-gas (SSMG) diving 66		
9.3.1	Application 66		
9.3.2	Use of breathing mixtures 66		
9.3.3	SSMG diving for operations other than offshore gas and oil operations 67		
9.3.4	SSMG diving for offshore gas and oil operations 69		
9.4	Submersible compression chamber (SCC)/saturation diving systems 69		
9.4.1	General 69		
9.4.2	Types of saturation diving systems 70		
9.4.3	General system safety 70		
9.4.4	SCC/saturation system components 71		
9.4.5	Submersible compression chambers (SCCs) 72		
9.4.6	SCC/Saturation breathing mixtures 74		
9.4.7	SCC/Saturation breathing gas heating 74		
9.4.8	Reserve gas supplies 74		
9.4.9	Emergency gas supplies 74		
9.4.10	Diving team restrictions and working hours for saturation diving 75		
9.4.11	Crew 76		
9.5	Hyperbaric evacuation unit (HEU) and life support package (LSP) 77		
9.5.1	Availability of an HEU and an LSP 77		
9.5.2	Hyperbaric evacuation 77		
10 One-atmosphere diving 78			
10.1	Atmospheric diving suits (ADS) 79		
10.2	Design requirements 79		
10.3	Required equipment 79		
10.4	Backup (standby) vehicles 80		
10.5	Life-support system 80		
10.6	ADS handling systems 80		
10.7	Risk assessment and contingency plan 80		
10.8	Crew (minimum crew size) 81		
11 Div	ing in contaminated environments 81		
11.1	Application 81		
11.2	Qualification 81		
11.3	Identification and planning 81		
11.4	SCUBA diving 82		
11.5	Surface-supplied diving 82		
11.6	Contaminated water diving (CWD) categories 82		
11.7	Minimum standards of protection for personnel 82		
11.8	Minimum crew 83		

```
11.9
        Thermal hazards
                           83
11.10
        Decompression
                          83
11.11
        Equipment
                     83
        Work and support areas
11.12
                                  84
11.13
        Medical requirements and emergency procedures
                                                           84
11.13.1 General
                  84
11.13.2 Preventive measures
11.13.3 Emergencies
11.13.4 Treatment and surveillance
                                     85
12 Nitrox diving
                    86
12.1
        General
                  86
12.2
        Safety considerations
                                86
12.3
        Risk assessment
12.4
        Oxygen toxicity
                          86
12.5
        Maximum ppO<sub>2</sub>
12.6
        Safe handling of gases
                                86
12.7
        Sampling
                    87
12.8
        Nitrox storage area
12.8.1
        Storage area
                       87
12.8.2
        Nitrox storage cylinders
        Air to be mixed or used with nitrox
12.9
12.10
        Gas supplies for surface-supplied diving
12.11
        Surface-supplied standby diver gas supply
12.12
        Bail-out bottle contents for surface-supplied diving
                                                            87
12.13
        Bail-out bottle contents for SCUBA diving
12.14
        Cleaning
                   88
        Equipment general
12.15
                             88
12.15.1 General
                  88
12.15.2 Analyzers
                    88
12.15.3 Oils, lubricants, and reactive substances
                                                 88
12.15.4 Compressors and filtration systems
12.15.5 Labelling of nitrox cylinders
12.15.6 Firefighting equipment
Annex A (informative) — Guidelines for selection, installation, maintenance, and cleaning of
                        compressor/purification-type breathing air systems
Annex B (informative) — Recommended analytical procedures for the analysis of compressed breathing
                        air
                              117
Annex C (informative) — Sample collection for compressed breathing air analysis
Annex D (informative) — Moisture content in compressed breathing air at typical user pressures
                                                                                               124
Annex E (informative) — Medical assessment of divers
Annex F (informative) — Diver's medical assessment forms
Annex G (informative) — Example of diving log
Annex H (informative) — Example of diving log (deep diving)
Annex I (informative) — Example hazardous substance data sheet
                                                                   146
Annex J (informative) — Guidelines for penetration diving
Annex K (informative) — Diver rescue procedures
Annex L (informative) — Listing of regulatory authorities for occupational diving operations
                                                                                           151
```