

Stichting Werken onder Overdruk



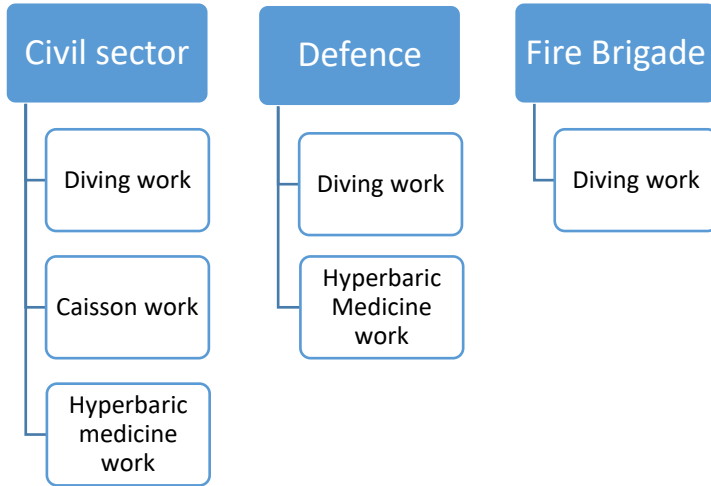
WORKING CONDITIONS CATALOGUE
Working under Hyperbaric Conditions
Diving Work
SCUBA Category A1

Document code CAT 001.5 | UK



Preface

The Foundation Working under Hyperbaric Conditions (SWOD) represents the three areas of work; diving work, caisson work and hyperbaric medicine work within the three subsectors of Defence, Fire Brigade and Civil sector in the field of Working Conditions.



This version of the Working Conditions Catalogue Working under Hyperbaric Conditions inclusive WOD-SOE and Information notes diving were approved on 30 January 2023 by the SWOD Central Committee of Experts and are in force from 1 August 2023 onwards.

Disclaimer

Although the Working Conditions Catalogue has been made with the greatest possible care, the Foundation Working under Hyperbaric Conditions, nor the website manager, nor the author assume no liability for any incorrect information, the possible causes and the possible consequences thereof.

If any questions arise concerning the accuracy of the requirements in the Working Conditions Catalogue, please refer to the Dutch version of the document, which is the official version.

Project group Working Conditions Catalogue Working under Hyperbaric Conditions

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Index

1.	Terms / abbreviations and description	5
2	Introduction.....	8
2.1	Scope of the Working Conditions Catalogue Working under Hyperbaric Conditions.....	8
3	Parties Working Conditions Catalogue working under Hyperbaric Conditions	9
4	Frequently asked Questions and Answers	11
4.1	Who is this Working Conditions Catalogue for?	11
4.2	What is a Working Condition Catalogue?	11
4.3	What is the purpose of the Working Conditions Catalogue?.....	11
4.4	What changes as a result of the Working Conditions Catalogue for Working under Hyperbaric Conditions?	11
4.5	What can and must employees do with the Working Conditions Catalogue?	11
4.6	Is it compulsory to comply with the Working Condition Catalogue?.....	12
5	Working Conditions catalogue Working under hyperbaric conditions.....	13
5.1	Working conditions catalogue documents.....	13
5.2	Amendments 2023	14
5.3	Base material.....	14
5.4	Validity Working Conditions Catalogue.....	14
5.5	The management	15
6	Documents which from part of the Working Conditions Catalogue	16
6.1	Working under Hyperbaric Conditions System- and Maintenance requirements- WOD-SOE	16
6.1.1	Purpose WOD-SOE	16
6.1.2	2023 update	16
6.2	Information Notes diving	17
6.2.1	Purpose Information notes	17
6.2.2	Approved Information notes until 2023.....	17
7.	Diving Project Plan and risk inventory and evaluation.....	18
7.1	Inventory and evaluation of risks	18
7.2	Diving Project Plan.....	18
7.2.1	Documents and activities prior diving operations commence.....	18
7.2.2	Interaction between client and diving company.....	19
7.2.3	Documents and procedures at start and during diving operations	19
8	Working conditions catalogue diving work SCUBA Category A1	21
	Explanation of use	21

8.1	Duties, responsibilities and requirements	22
8.2	Equipment	27
8.3	Personnel.....	29
8.4	Medical.....	33
8.5	Work planning	36
8.6	Emergency Procedures and Contingencies	44
9	References Working Conditions Catalogue Diving work.....	46
9.1	Law	46
9.1.1	Working Condition Legislation / Working Conditions Act (AW).....	46
9.1.2	Working Conditions Decree (AB).....	46
9.1.3	Working Conditions Decree and Self-employed persons (ZZP-ers)	47
9.1.4	Working Conditions Regulations (AR)	47
9.1.5	Working times legislation.....	48
9.1.6	Working times in the mining sector	48
9.1.7	Decree medical devices.....	48
9.1.8	In-house Emergency Service organisation (BHV)	48
9.1.9	Law on professions in the individual Health Care (Act BIG).....	48
9.2	Document Working under Hyperbaric Condition System- and Maintenance Requirements.	49
9.3	Information notes.....	49
9.4	SWOD Examination guideline.....	49
9.5	Infectious diseases.....	49
9.6	A European Code of Good Practice for Hyperbaric Oxygen Therapy Annex 7.....	49
9.7	Diving Work Guidelines / Standards.....	49
9.8	Delta P	51

1. TERMS / ABBREVIATIONS AND DESCRIPTION

Term / abbreviation	Description
AB	Working Conditions Decree.
AR	Working Conditions Regulations.
ATB	Working Hours Decree.
ATW	Working Hours Act.
AW	Working Conditions Act.
ADC	Association of Diving Contractors.
ADCI	The International Association of Offshore Diving Contractors.
BHV	In-house Emergency Service organization.
Caisson	A structural construction which by means of excavation of the soil at the underside is moved to a deeper level or by means of immersion in open water is placed on the bottom. (Ref. WOD-SOE)
Caisson work	Performing work in a space under a pressure of at least 10 ⁴ Pa above atmospheric pressure and wholly or partially is surrounded by a liquid including the stay in and the transportation to and from that space. (Ref. AB article 6.13)
CCvD	Central Committee of Experts.
Client	A client is a person who, or a company that, issues an order to a contractor. In the case of diving operations in the context of public order and safety, the client means the owner / manager of the diving site.
DMAC	Diving Medical Advisory Committee.
DP	Dynamic Positioning.
Diving work	Performing work in a liquid or in a dry diving bell including the stay in this liquid or in this dry diving bell, whereby for breathing use is made of a gas under a higher pressure than atmospheric pressure. (Ref. AB article 6.13)
Diving work Category A	Diving with SCUBA (Self Contained Underwater Breathing Apparatus). (Ref. AR article 6.5, paragraph 3 and Annex XVI c)
Diving work Category B	Diving with SSE (Surface Supply Equipment) air supply from the surface. (Ref. AR article 6.5, paragraph 3 and Annex XVI c)
Diving work Category C	Diving with a dry diving bell and/or saturation diving. (Ref. AR article 6.5, paragraph 3 and Annex XVI c)
Diving Company	Employer who makes his employees perform diving work.
Diving Project Plan (DPP)	Consists of documentation and information for the safe and efficient performance of diving operations. Documentation present on the diving project includes: Work instruction, RI&E, Work plan and Project RI&E.
EHBO	First Aid.
Habitat	A mobile work chamber underwater with open access underwater which can only be entered by means of diving. (Ref. WOD-SOE)
Manual	Care system, quality assurance manual.
HES	Hyperbaric Evacuation System.
Hyperbaric treatment chamber (2 or more compartments)	A permanently installed compression chamber in a hospital or medical institute, intended for treatment of patients under hyperbaric conditions in accordance with a treatment protocol prescribed by a physician. (Ref. WOD-SOE)

Term / abbreviation	Description
Hyperbaric treatment chamber (1 compartment)	A treatment chamber (mono place) which does not comply with the WOD-SOE requirements as there is only one compartment present. As a result of this there is no direct access possible to a patient during treatment.
Hyperbaric facility	A building with a hyperbaric treatment chamber, control panel, patients - , personnel - , breathing gas- and emergency facilities
Hyperbaric medicine	Treatment of patients in a hyperbaric treatment chamber with oxygen under hyperbaric conditions supervised by a qualified physician for treatment indications which have been evidence based substantiated or indications based on research findings in accordance with MEC Guidelines.
IMCA	International Marine Contractors Association
IMO	International Maritime Organization
LMRA	Last Minute Risk Analysis. The LMRA is carried out at the workplace prior to the work being executed to check whether pre-estimated risks and measures correspond to the situation at the workplace and whether they need to be changed. (management of change)
Management of Change (MOC)	This contains the process that must take place to modify an existing approved Dive Project Plan. An MOC procedure is used to ensure that health- and safety- and environmental risks are carefully evaluated and controlled before significant changes are made. MOC can also be during the dive.
MaTR133 (HSE UK)	Reference document of Health & Safety Executive. (United Kingdom)
MEC	Medical Ethical Committee.
MSC	Marine Safety Committee (IMO).
NADO	Netherlands Association of Diving Companies.
NDC	Netherlands Diving Centre (till 2014).
NEN-EN	European standard which is accepted as a Dutch standard .
NIPV	Netherlands Institute for Public Safety.
NLA	Netherlands Labour Authority.
Other work under hyperbaric conditions	Performing of other work than diving or caisson work in a space under a pressure of at least 10 ⁴ Pa above atmospheric pressure, including the stay in that space. (Ref. AB article 6.13)
Project RI&E	An RI&E conducted for a specific project by a diving company, client and relevant expert person(s). Project RI&E is additional to the RI&E.
RI&E	Risk Assessment and Evaluation. Every company with employees must have a health and safety service or health and safety expert identify whether and how the work may be dangerous or unhealthy for employees. This must be recorded in writing. This RI&E must also include a Plan of Action (PVA). This describes the measures an employer will take to address the identified risks.
RIVM	National Institute for Public Health and the Environment.
ROV	Remotely Operated Vehicle.
SCUBA	Self Contained Underwater Breathing Apparatus.

Term / abbreviation	Description
SCUBA with Surface Air Supply (OLV)	SCUBA with for each diver also a separate high pressure air supply from the surface. This is not a substitute for SSE diving.
SSE	Surface Supplied Equipment.
SWOD	Foundation Working under Hyperbaric Conditions.
VCA	Safety, Health and Environment Checklist Contractors.
Work instruction	(Diving) instruction, (diving) regulation, and/or (diving) manual as prescribed in Working Conditions Decree article 6.15 paragraph 1 a. See section 8.1 obligations, responsibilities and requirements point 1.1.1 of the Working Conditions Catalogue.
Work plan	Plan prepared specifically for the diving operations to be performed with specific tasks and risks. Work plan is supplementary to the work instruction. See section 8.1 obligations, responsibilities and requirements point 1.1.3 of the Working Conditions Catalogue.
Wet BIG	Law on Professions in the individual Health Care.
WOD-SOE	Working under Hyperbaric Conditions System- and Maintenance requirements.

2 INTRODUCTION

This document Diving Work SCUBA Category A1 of the Working Conditions Catalogue Working under Hyperbaric Conditions applies to all employers and employees involved in diving activities carried out with SCUBA Category A1.

This Working Conditions Catalogue identifies risks which may occur when carrying out work under hyperbaric conditions. For all these risks, it is indicated which minimum control measures an employer and employee shall take to manage these risks.

This document also lists documents that are part of the Working Conditions Catalogue Working under Hyperbaric Conditions namely Working under Hyperbaric Conditions System- and Maintenance requirements (WOD-SOE) and a number of Information notes diving. Moreover, there is a section describing the Diving Project Plan and inventory and evaluation of risks.

The Working Conditions Catalogue Working under Hyperbaric Conditions consists of 4 documents. They are:

- SCUBA Category A1
- SCUBA Other
- SSE
- Dry diving bell / saturation

2.1 SCOPE OF THE WORKING CONDITIONS CATALOGUE WORKING UNDER HYPERBARIC CONDITIONS

The Working Conditions Catalogue Working under Hyperbaric Conditions is according to the Working Conditions Act applicable:

1. On Dutch territory.
2. Within the boundary of the exclusive economic zone of the Netherlands. The boundaries coincide with:
 - a. the boundary of the territorial sea of the Netherlands, referred to in Article 1, first paragraph, of the Dutch territorial sea boundaries; and
 - b. the boundaries of the part of the continental shelf allocated to the Netherlands.
3. On sea going ships registered in the Netherlands.

This also applies to permanently installed platforms and FPSOs operating within the boundaries of the exclusive economic zone of the Netherlands.

3 PARTIES WORKING CONDITIONS CATALOGUE WORKING UNDER HYPERBARIC CONDITIONS

	CNV	CNV Vakmensen
 Ministerie van Defensie	Defensie	Ministerie van Defensie
	NADO	Nederlandse Associatie van Duikondernemingen
	Nautilus /FNV	Nautilus International
 ndc nationaal duikcentrum netherlands diving centre	NDC	Voormalig Nationaal Duikcentrum (tot 2014)
 CvD CS	CvD CS	College van Deskundigen Civiele Sector (na 2014)
 Nederlandse Vereniging Beroepsduikers	NVB	Nederlandse Vereniging van Beroepsduikers
 NEDERLANDSE VERENIGING VAN Dierentuinen	NVD	Nederlandse Vereniging van Dierentuinen
 POLITIE	Politie	

CAISSON

Caissonsector



NVvHG

Nederlandse Vereniging voor Hyperbare
Geneeskunde



NIPV

Nederlands Instituut Publieke Veiligheid



Brandweer Nederland

4 FREQUENTLY ASKED QUESTIONS AND ANSWERS

4.1 WHO IS THIS WORKING CONDITIONS CATALOGUE FOR?

The Working Conditions Catalogue is specifically intended for employers and employees in the Sector Working under Hyperbaric Conditions, but also for the clients mentioned in the risk group: **Duties, responsibilities and requirements.**

Working under Hyperbaric Conditions definitions and applicability:

- **Diving work:** performing work in a liquid or in a dry diving bell including the stay in this liquid or in this dry diving bell, whereby for breathing use is made of a gas under a higher pressure than atmospheric pressure.
- **Caisson work:** performing work in a space under a pressure of at least 10^4 Pa above atmospheric pressure and wholly or partially is surrounded by a liquid including the stay in and the transportation to and from that space.
- **Hyperbaric medicine work:** performing work in a hyperbaric treatment chamber under a pressure of at least 10^4 Pa above atmospheric pressure.
- **Other work under hyperbaric conditions:** performing of other work than diving or caisson work in a space under a pressure of at least 10^4 Pa above atmospheric pressure, including the stay in that space.

4.2 WHAT IS A WORKING CONDITION CATALOGUE?

A Working Condition Catalogue contains agreements regarding controlling of (specific) Health and Safety risks at sector-, branch - or company level. Social partners (employers and employees) agree together which way the requirements in the Working Conditions Act and legislation can be met. They provide practical solutions to meet the target requirements of the government. They choose themselves the form, content and distribution of the catalogue. In that way it is custom-made. The Working Conditions Catalogue replaces the statutory Working Conditions Policy Rules.

4.3 WHAT IS THE PURPOSE OF THE WORKING CONDITIONS CATALOGUE?

The main purpose of this Working Conditions Catalogue is to provide employers and employees an as practicable as possible tool to improve working conditions at the work location.

4.4 WHAT CHANGES AS A RESULT OF THE WORKING CONDITIONS CATALOGUE FOR WORKING UNDER HYPERBARIC CONDITIONS?

The working conditions policy does not change very much. The employer remains responsible for ensuring good working conditions, which at least meet the requirements of the Working Conditions Act and legislation. The employee is obliged during his activities at the work location, in accordance with his training and instructions given by the employer, to take care, to his best ability, of his own health and safety and that of other persons involved.

This Working Conditions Catalogue contains solutions / measures to reduce risks.

4.5 WHAT CAN AND MUST EMPLOYEES DO WITH THE WORKING CONDITIONS CATALOGUE?

In the Catalogue the protection level for the risks have been defined. Employees can with the help of the Working Conditions Catalogue check themselves if the work location complies. On the other hand employees are also obliged to comply with the requirements in the Working Condition Catalogue. "I did not know!" no longer applies.

4.6 IS IT COMPULSORY TO COMPLY WITH THE WORKING CONDITION CATALOGUE?

The Netherlands Labour Authority (NAL) inspects companies for compliance with the law and legislation, taking into account the solutions in the Working Conditions Catalogue. If you deviate from these solutions, you have to reach a level of health and safety which is at least as high as when you would have followed the Working Conditions Catalogue. The NLA will check this.

5 WORKING CONDITIONS CATALOGUE WORKING UNDER HYPERBARIC CONDITIONS

5.1 WORKING CONDITIONS CATALOGUE DOCUMENTS

As of 1 January, 2007, the Working Conditions Legislation has undergone a significant change. The most important change as of 1 January 2007 was a further increase of the responsibility of employers and employees by having the standards drawn up by private parties.

The former National Diving Centre (NDC) has at that time managed the process to develop the Working Conditions Catalogue for the field of activity working under hyperbaric conditions.

In 2010 the Working Condition Catalogue Working under Hyperbaric Conditions part: Diving work and part: Caisson work and other work under hyperbaric conditions was approved by the former Labour Inspectorate (Netherlands Labour Authority) and came into force for the field of activity.

Since that time the Working Conditions Catalogue for working under hyperbaric conditions is available on the website <https://www.arbocataloguswoo.nl/en/>.

2014 update

Since the Working Conditions Catalogue fits seamlessly into the objectives of the Foundation Working under Hyperbaric Conditions (SWOD) the Working Conditions Catalogue management was transferred to SWOD in 2012.

Mid 2013 a SWOD Project group started with the update of the Working Conditions Catalogue Working under Hyperbaric Conditions and creating the document Working under Hyperbaric Conditions System- and Maintenance requirements (WOD-SOE) which forms part of the Working Conditions Catalogue. In spring 2014 this version of the Working Conditions Catalogue and the WOD-SOE was approved by the former Inspection SZW (Netherlands Labour Authority), whereupon this revised version came into force.

The official publication in the Government Gazette took place on 18 August 2014, Government Gazette 23207.

2018 update

End 2015 the SWOD Project group started again with a new update of the Working Conditions Catalogue Working under Hyperbaric condition for diving work and caisson work and also of the document Working under Hyperbaric Conditions System- and Maintenance requirements (WOD-SOE). On 20 March 2018 these versions were approved by the SWOD Central Committee of Experts (CCvD), following which these revised versions are in force from 1st October 2018.

2020 update

In 2018 a start was made with another update of the Working Conditions Catalogue Diving work and WOD-SOE and two new Information notes diving were developed These were approved by the SWOD Central Committee of Experts (CCvD) on 23rd June 2020 and are in force from 1st October 2020.

2023 update

Another update of the Working Conditions Catalogue diving work and WOD-SOE was started in 2020 and a third Information note diving was also created. These were approved by the SWOD Central Committee of Experts (CCvD) on 30 January 2023.

5.2 AMENDMENTS 2023

Working conditions Catalogue Working under Hyperbaric Conditions

The amendments in the 2023 update are amongst others:

- Correction of the use of the terms Work instruction, Work plan, RI&E and Project RI&E;
- In Reference the legislation that is being complied with;
- Replacement of the medical examination requirements with the Examination guideline Working under Hyperbaric Conditions: Diving work;
- The following additions:
 - Two new topics namely: Infectious diseases and falling in the water and drowning;
 - A section about being under the influence of medicines, alcohol and/or mind-altering substances;
 - Requirements when a compression chamber must be present;
 - For SCUBA a section: Use of SCUBA with OLV at construction works;
 - The use of the guidelines in the Information notes Pressure differences (Delta P), Working with high pressure jetting gun, Working at contaminated locations.

5.3 BASE MATERIAL

The control measures in the Working Conditions Catalogue are amongst others based on:

- Current Working Conditions Act, Working Conditions Decree, Working Conditions Regulations, the former Working Conditions Policy Rules and the former Assessment Guideline governing the Maintenance of Systems for Diving and Caisson Equipment (BRL D&C);
- IMO regarding vessels with a (DP) Dynamic Positioning System used for diving work;
- IMO regarding provisions for saving saturation divers in case these have to be evacuated from a vessel under hyperbaric conditions;
- Industry guidelines regarding diving work such as published by IMCA;
- Medical guidelines regarding diving work published by DMAC;

5.4 VALIDITY WORKING CONDITIONS CATALOGUE

The current Working Conditions Catalogue Working under Hyperbaric Conditions part: Diving work and the part: Caisson work and other work under hyperbaric conditions, WOD-SOE and Information notes diving are in force from 1 August 2023.

The employers and employees have agreed when drawing up the first Working Conditions Catalogue that the Working Conditions Catalogue will be evaluated after periods of 3 years. They can then see whether major changes have occurred regarding the work, or rules or working methods. And that may be a reason to adjust the contents of the Working Conditions Catalogue accordingly.

The employers and employees may jointly also decide that an interim update is necessary, such as on account of investigation results and recommendations after accidents during work under hyperbaric conditions. In addition the knowledge and technique evolve constantly, which also may lead to an update of the Working Conditions Catalogue.

Comments / remarks documents

In case you have points of improvements or recommendations regarding the Working Conditions Catalogue, WOD-SOE and Information notes diving you are requested to inform SWOD. During the next update these points can be discussed and be incorporated.

5.5 THE MANAGEMENT

The Working Conditions Catalogue is managed by SWOD Central Committee of Experts (CCvD). The CCvD consists of representatives of the Fire Brigade, Civil sector and Defence. Jointly they will follow the developments in the field of activity working under hyperbaric conditions and when required update the Working Conditions Catalogue and have it approved by the Netherlands Labour Authority (NLA) when appropriate.

6 DOCUMENTS WHICH FROM PART OF THE WORKING CONDITIONS CATALOGUE

6.1 WORKING UNDER HYPERBARIC CONDITIONS SYSTEM- AND MAINTENANCE REQUIREMENTS- WOD-SOE

6.1.1 Purpose WOD-SOE

The WOD-SOE is an integral part of the Working Conditions Catalogue Working under Hyperbaric Conditions and consists amongst others of:

- Maintenance system requirement (Chapter 3)
- Minimum system requirements (Chapter 4)
- Detail sheets which include minimum requirements for equipment when new and when in use (Chapter 5)

The System- and Maintenance requirements in the WOD-SOE have been established by the input of a wide group of experts from various sectors of the diving- and caisson industry, hyperbaric medicine, authorities and employers- and employee organisations. The "Assessment Guideline governing the Maintenance of Systems for Diving and Caisson Equipment, version 01 d.d.31 March 2006 (BRL D&C) has served as a basis of the WOD-SOE. Where applicable the requirements have been updated to the current technical and scientific developments.

In the Working Conditions Decree (Article 6.15 paragraph 1 sub b) is defined that when carrying out work under hyperbaric conditions sound equipment which is in a good condition shall be provided to the employees. In order to comply with the above mentioned article the equipment which is used during work under hyperbaric conditions must as a minimum comply with the System- and Maintenance requirements (WOD-SOE).

By complying with the requirements in the WOD-SOE, you as employer have taken measures that the employees are provided with sound material and that this material is in good condition. Working with sound material which is in a good condition together with requirements regarding personnel and risk management constitute the conditions which contribute to the safety of working under hyperbaric conditions.

Netherlands Labour Authority (NLA) will when carrying out their inspection task also use the WOD-SOE as part of the legislation and regulations applicable for working under hyperbaric conditions and on the basis of these documents inspect and in case it is necessary enforce the law.

The WOD-SOE can be found at <https://www.arbocataloguswo.nl/en/> and can be downloaded as a PDF document.

6.1.2 2023 update

The changes in the 2023 update are amongst others:

- Cancellation of the requirement for Surface Air Supply (OLV) in addition to a SCUBA diving system that it be used only in SCUBA related diving operations by public authorities.
- The following additions / modifications:
 - Terms and Definitions: Breathing gas, Breathing air and Netherlands Labour Authority (NLA) and use of SCUBA with OLV;
 - Maintenance System Requirements: Inspection after exceptional circumstances and presence of written / digital evidence in the workplace;

- Minimum System Requirements: Inspection requirements when a system is put into service for the first time and after installation at a new location and additional breathing air supply requirements for a compression chamber;
- Detail sheets: 1.1 Filter and oil change, 3.5 Additional description, product and testing requirements.

6.2 INFORMATION NOTES DIVING

6.2.1 Purpose Information notes

The Information notes are an integral part of the Working Conditions Catalogue Working under Hyperbaric Conditions.

The purpose of these Information notes is to create awareness of possible risks present when diving. By highlighting the risks and providing guidance on methods to assess and best manage these risks, the risks can be reduced or even eliminated.

Information notes supplement the "Risks and Minimum Control Measures" listed in the Working Conditions Catalogue.

The Information notes can be found at <https://www.arbocataloguswo.nl/en/> and can be downloaded as a PDF document.

6.2.2 Approved Information notes until 2023

No.	Subject	Approved by SWOD CCvD
1	Information note No. 1 Risks and Control measures pressure differences (Delta P)	June 2020
2	Information note No. 2 Risks and Control measures working with high pressure jetting gun	June 2020
3	Information note No. 3 Risks and Control measures working at contaminated locations	July 2022

7. DIVING PROJECT PLAN AND RISK INVENTORY AND EVALUATION

A Diving Project Plan must be in place before diving operations commence.

The Diving Project Plan must be based on the risk inventory and evaluation for the diving operations to be carried out. In this way this gives implementation to the Working Conditions Act, Working Conditions Policy Article 3 and Inventory and Evaluation of Risks Article 5.

7.1 INVENTORY AND EVALUATION OF RISKS

Section 8 of the Working Conditions Catalogue lists the following topics with risks and minimum control measures to be taken into account as a minimum when identifying and assessing the risks of the work to be carried out:

8.1 Duties, responsibilities and requirements;

8.2 Equipment;

8.3 Personnel;

8.4 Medical;

8.5 Work planning (This is not an exhaustive list of all hazards or all measures needed to control risks.

There may also be specific hazards known to the client);

8.6 Emergency procedures and contingencies.

7.2 DIVING PROJECT PLAN

This must at least consist of:

1. Documents that must be present and activities that must take place prior the diving operations commence;
2. Interaction and activities / responsibilities client and diving company;
3. Documents and procedures at the start and during diving operations.

The diving supervisor(s) must be familiar with the Diving Project Plan.

7.2.1 Documents and activities prior diving operations commence

Diving Project Plan	Company documentation	<ul style="list-style-type: none"> - Work instruction - RI&E
	Work preparation	<ul style="list-style-type: none"> - Work plan - Project RI&E
	Prior commencement and during work operations	<ul style="list-style-type: none"> - Last Minute Risk Analysis (LMRA) - Management of Change procedure (MOC)

7.2.2 Interaction between client and diving company

Example client and diving company activities and responsibilities

Fase	Client		Diving company	
1	Suitable diving company for the work to be carried out		Company documentation Work instruction (Diving manual/ handbook) + RI&E	Section 8.1 No. 1.1.1 No. 1.1.2
2	Information to contractor/ diving company Participation in execution of Project RI&E (depending on complexity of work) Agreement with Work plan Health and Safety plan	Section 8.1 No. 1.2	Work preparation Project RI&E Work plan + Breathing gas stock + Equipment requirements + Personnel requirements + Medical	Section 8.1 No. 1.1.3 Section 8.1 No. 1.3.5 Section 8.2 Section 8.3 Section 8.4
3	Safe situation on the work site and simultaneous activities	Section 8.1 No. 1.2	Prior commencement diving Personnel familiarity with diving system, work plan, operations and precautions Suitability of diving equipment and diver personal equipment LMRA + Management of Change (MOC)	Section 8.1 No. 1.3.1, 1.3.2, 1.4.1, 1.5.1, 1.6.1 Section 8.2 Section 8.5 No. 5.1
4	Warning of change situation at work site	Section 8.1 No. 1.2	Execution diving operations	Section 8.5 No. 5.1

7.2.3 Documents and procedures at start and during diving operations

The following is an example and depending on the operations and Project RI&E may need to be adapted/ extended.

Example of measures during diving operations:

Step	Actors	Action
1	Diving Company Diving Supervisor Site Supervisor Client	1A/ Project RI&E and Work plan: → carry out and agree with all involved parties
		1B/ Management of Change procedure: → adjust Work plan and carry out Project RI&E
Work location		
2	Diving supervisor	LMRA prior starting the work e.g.: <ul style="list-style-type: none"> ✓ Weather situation and forecast ✓ Water flow rate ✓ Other activities in the area ✓ Safe work location ✓ Suitable Work Equipment and breathing gas ✓ Personnel certified and experienced ✓ Communication and emergency communication ✓ Emergency facilities to rescue diver ✓ Precautions high pressure jetting gun ✓ Project equipment in accordance Work plan
		• Results LMRA: <div style="display: flex; align-items: center;"> v <div> <p>Workconditions in accordance with Work plan</p> <p>→ continue with step 3</p> </div> </div>
		<div style="display: flex; align-items: center;"> x <div> <p>Workconditions NOT in accordance with Work plan</p> <p>→ go back to step 1B</p> </div> </div>
3	Diving supervisor	Discussion Work plan and control measures diving operations with divers and other personnel
4	Diving supervisor Site Supervisor	Work permit (written approval) for diving operations (When applicable)
5	Diving supervisor Site Supervisor	When applicable at Delta P follow Lock out Tag out procedure and control
6	Diving supervisor Site Supervisor	Install safety provisions according to the Work plan
7	Diving supervisor	When applicable isolate diver from Differential Pressure Danger Zone (DPDZ)
8	Diving supervisor	Discuss dive plan diver with the diving team
9	Diver	Execution Work plan:
		<div style="display: flex; align-items: center;"> v <div> <p>No deviations from Work plan during diving activities</p> <p>→ continue with step 10</p> </div> </div>
		<div style="display: flex; align-items: center;"> x <div> <p>Deviations from Work plan during diving activities</p> <p>→ go back to step 1B</p> </div> </div>
10	Diving supervisor	Control during operations above- and underwater
11	Diving supervisor	When request for extra work → go back to step 1B
12	Diving supervisor	Job completed: Cancel Work permit / written approval for diving activities
13	Diving supervisor Site Supervisor	Resume diving activities after leaving dive site → go back to step 2

8 WORKING CONDITIONS CATALOGUE DIVING WORK SCUBA CATEGORY A1

EXPLANATION OF USE

Actor / Subject

The Actor / subject column shows the subdivision of the risks described. The project group Working Conditions Catalogue Working under hyperbaric conditions has chosen the subdivision used by IMCA in its document "International Code of Practice for Offshore Diving".

Risks

The Risks column covers all risks relating to a particular actor / subject. Each risk is presented in as brief a description as possible.

Minimum control measure

The minimum control measures described in the Working Conditions Catalogue are the minimum measures an employer and employee must take to manage the corresponding risk. An employer is always free to take additional (or more far-reaching) measures.

8.1 DUTIES, RESPONSIBILITIES AND REQUIREMENTS

No.	Actor / Subject	Risks	Minimum control measure	Reference
1.1	Employer			
1.1.1	Work instruction	Work instruction not in line with the law and legislation and industry standard	Version control, list of changes, evaluation and maintenance (custodian / secretary).	
		Work instruction incomplete (unsound work instruction)	Minimum contents: <ul style="list-style-type: none"> Responsibilities and authorities; Equipment and maintenance; Diving procedures, including; emergency procedures (See also: Emergency Procedures and Contingencies); The Standby diver deployment and preparedness / the level the standby diver needs to be dressed; Facilities and procedures for situations which deviate from commonly occurring work situations; Guidelines for decompression; Reporting accidents and medical assistance; Composition and use of the First Aid equipment; Team composition (size, qualifications and tasks and authorities). Cleaning / disinfection procedures 	AB article 6.15 paragraph 1a (sound work instruction) IMO resolution A. 692(17) Guidelines and Specifications for Hyperbaric Evacuation Systems RIVM guidelines
1.1.2	Work situation	Insufficient assurance of a safe work situation	<ul style="list-style-type: none"> Availability of a RI&E (See also WORKPLANNING Risks and Minimum control measures); Providing a safe and suitable work location; Recording of tasks and responsibilities of third parties. 	AW: article 5, Inventory and evaluation of risks AB Chapter 3 Organisation of workplaces AW Chapter 10 Preventing Hazards to third parties IMO-MS/Circ 645 Code of Safety for Diving Systems, AW: article 19

No.	Actor / Subject	Risks	Minimum control measure	Reference
		Personnel unable to perform their duties due to being under the influence of drugs, alcohol and/or mind-altering substances.	<ul style="list-style-type: none"> Instructions / requirements regarding medication, alcohol and mind-altering substance use must be in place. 	
		Unreported pregnancy to employer.	<ul style="list-style-type: none"> Include obligation to report pregnancy in work instructions. Educate diving staff on the risk and prohibition of working under hyperbaric condition during pregnancy. 	<p>AB Chapter 5 Section 3 Pregnant and breast-feeding employees</p> <p>AB 6.29 Work prohibitions for working under excess pressure</p> <p>AB 1.41 Risk assessment and evaluation</p>
1.1.3	Contents work plan	Work plan is incomplete	<p>Minimum contents of work plan:</p> <ul style="list-style-type: none"> Project specific Tasks, Responsibilities and Authorities; Project RI&E. 	AB article 4.50 Work plan
1.1.4	Infectious Diseases	Illness, death, infection other persons.	<p>In accordance with RI&E</p> <ul style="list-style-type: none"> Inform employees regarding the risks of infectious diseases; . Provide information and instructions on what precautions to take; ; Provide materials for employees to protect and disinfect themselves; Establish disinfection protocols for materials, workplaces and living spaces; Take quarantine measures for sick workers; Require workers to report if he/she has been in contact with infected persons; Vaccinate workers before he/she is sent to a site with infectious diseases. 	<p>AB Chapter 5 Hazardous substances and biological agents.</p> <p>NIPV Infectious diseases: prevention is better than cure.</p> <p>RIVM guidelines</p>
1.1.5	Physical load	Physical load	Inventory of heavy material, provision of information / advice.	AB Chapter 5, Section 1. Physical load

No.	Actor / Subject	Risks	Minimum control measure	Reference
1.1.6	Compression chamber	Injury	At the place where diving work is performed in water at a depth of more than 15 m or in any other liquid at a pressure higher than $1.5 \cdot 10^5$ Pa above atmospheric pressure, a suitable compression chamber, equipped with a personnel- and medicine lock, must be provided.	AB article 6.18 Compression chamber diving work
			A compression chamber should also be provided if the travel time between the dive site and the nearest treatment facility with compression chamber exceeds 2 hours.	AB article 6.18 Compression chamber diving work
1.2	Clients / third parties			
1.2.1	Information to the contractor / diving company	Providing incomplete information to the contractor / diving company	Formal recording of tasks, responsibilities and authorities of all parties concerned, for example by means of a work permit system to avoid endangering the contractor / diving company.	AW: article 19 Multiple employers
			Inform the contractor / diving company prior making a Project RI&E and Workplan by the diving company about: 1. Contaminated soil and water and any hazardous substances and biological agents present and their concentration; 2. Hazards at the work location, both above water and underwater including obstructions; 3. Possible danger from pressure differences (Delta P) and locations; 4. Other work taking place at and near the work location that may pose a hazard to diving personnel; 5. Immediate notification of any changes.	AB article 2.28 Safety and Health plan AW article 10 Preventing hazards to third parties Information note No. 1 Risks and Control measures pressure differences (Delta P) Information note No. 3 Risks and Control measures working at contaminated locations

No.	Actor / Subject	Risks	Minimum control measure	Reference
1.3	Diving Supervisor			
1.3.1	Familiarity work instruction and work plan	Insufficient familiar with the Work instruction and the work plan	Diving Supervisor shall be given sufficient time to become familiar with the work instruction and work plan.	AW article 8 Information and training AW article 11 General obligations of employees
1.3.2	Familiarity diving system	Insufficient familiar with the diving system	Diving Supervisor shall be given sufficient time to become familiar with the hyperbaric system / diving system being used.	AW article 8 Information and training AW article 11 General obligations of employees
1.3.3	Personnel	Not suitable / trained / examined	The diving supervisor is checking whether the diving team is suitable for the tasks the diving team is planned to execute and or the diving team is in possession of the correct and valid (diving) certificates and a valid medical examination.	AB article 6.14 Suitability AB article 6.16 Diving work
1.3.4	Breathing gas	Insufficient quantity of breathing gas during diving	In case of emergency the diver shall be able to make use of such a quantity of reserve breathing gas which will allow him to abort the dive and to complete it in a safe manner. Hereby use can be made of a checklist, check by the diving supervisor, reserve pressure warning system (active or passive depending on the circumstances) and a dive planning / dive worktime calculation. Working in accordance with the WOD-SOE.	AB article 6.15 Safety measures paragraph 1b Sound materials WOD-SOE Minimum system requirement
		Incorrect breathing gas	Prior the dive the diving supervisor shall ensure that the correct breathing gas is used (See also DUTIES, RESPONSIBILITIES AND REQUIREMENTS item 1.1.5).	AB article 6.15 Safety measures paragraph 1b Sound materials

No.	Actor / Subject	Risks	Minimum control measure	Reference
1.4	Divers			
1.4.1	Familiarity work plan	Insufficient familiar with the work plan	Divers must be sufficiently instructed. Proper instruction (for example start work meeting / kick-off) and formal recording of tasks and responsibilities.	AW article 8 Information and training AB article 6.15 Safety measures paragraph 1a Proper written work instructions
1.5	Diving assistant (Tender)			
1.5.1	Familiarity work activities	Insufficient familiar with the work activities under hyperbaric conditions and the associated tasks and responsibilities	Proper instruction (for example start work meeting / kick-off) and formal recording of roles and responsibilities.	AW article 8 Information and training AB article 6.15 Safety measures paragraph 1a Proper written work instructions
1.6	Other supporting personnel			
1.6.1	Familiarity work activities	Insufficient familiar with the work activities under hyperbaric conditions and their associated tasks and responsibilities	Proper instruction (for example start work meeting / kick-off) and formal recording of roles and responsibilities.	AW article 8 Information and training AB article 6.15 Safety measures paragraph 1a Proper written work instructions

8.2 EQUIPMENT

No.	Actor / Subject	Risks	Minimum control measure	Reference
2.1	Equipment general and Personal Protective Equipment	Damaged	Equipment management, checking by diver and diving supervisor, working in accordance with WOD-SOE.	AB Chapter 8 Personal protective equipment and health and safety signs
		Not inspected	Checking by or under the responsibility of the diving supervisor, working in accordance with WOD-SOE.	AW article 8 Information and training paragraph 3
		Unsound	Checking by or under the responsibility of the diving supervisor, working in accordance with WOD-SOE.	
		Prepared incorrectly and or not working	Checking by or under the responsibility of the diving supervisor, working in accordance with WOD-SOE.	<ul style="list-style-type: none"> WOD-SOE Maintenance system requirements Detail sheets Minimum system requirements
		Non-compliance with the minimum system requirements	Working in accordance with WOD-SOE.	IMO
2.2	Breathing gas	Wrong breathing gas quality	Periodic inspecting installation and before use inspection of examination / testing report, working in accordance with WOD-SOE.	WOD-SOE Detail sheets
2.3	Transportation of a (wounded) diver to and from the diving work location	Incurring injury, damage diving equipment or delay	The availability of a suitable device allowing the diver to safely enter and exit the liquid in which the diving work is carried out The availability of a means to bring in case of an emergency a wounded or unconscious diver on deck and/or ashore. Working in accordance WOD-SOE.	AB article 4.7 Measures for unintended events WOD-SOE Minimum system requirements

No.	Actor / Subject	Risks	Minimum control measure	Reference
2.4	Thread connection of valve on diving bottles	Incurring damage and injury of personnel, possibly with fatalities, as a result of use of different types of thread on the bottle and the valve, as a result of which the valve by the pressure in the bottle may eject with great force out of the bottle. This can take place during maintenance and inspection of diving bottles	Check that the thread of the bottle is exactly the same type as the thread of the valve.	<p>AB article 7.3. Suitability of work equipment</p> <p>AB article 7.4. Soundness of work equipment and unintended events</p> <p>NEN-EN 144-1</p> <p>IMCA D 064 (IMCA Publication 462)</p>

8.3 PERSONNEL

No.	Actor / Subject	Risks	Minimum control measure	Reference
3.1	Qualification and competence			
3.1.1	Diving assistant (Tender) Category A1	Incompetent diving assistant	The diving supervisor checks that the diving assistant he/she has assigned: <ul style="list-style-type: none"> • is physically capable of assisting with emergency procedures; • has knowledge of the routing in the building / zoo; • has a job description and he/she is familiar with it; • is instructed and practised in how to act during emergency procedures; • is available during diving operations; • is present when diving operations are discussed before work starts. 	AW article 11 General obligations of employees AW article 8 Information and training,
3.1.2	Diver	Not qualified and/or incompetent diving personnel	Training, practice, competence verification and checking of certificates. The diver must indicate that he is trained and competent for the work to be carried out.	AW article 11 General obligations of employees AW article 8 Information and training, AB: article 6.14 Suitability AB 6.16 Diving work AR: Chapter 6 and Appendix XVI c
		Lack of practical experience or specific practical experience	The number of divers used with no or restricted practical experience shall be considered during the work preparation phase.	
3.1.3	Standby diver	Too late ready to assist a diver in distress	<ol style="list-style-type: none"> 1. A standby diver must be present at the diving location. 2. The standby diver must be immediately ready and completely dressed, except for his mask or diving helmet, if diving work is carried out under the following conditions: <ul style="list-style-type: none"> • With current / tidal conditions above 0,5 	AB: article 6.16 Diving work AR: Chapter 6 and Appendix XVIc

No.	Actor / Subject	Risks	Minimum control measure	Reference
			<p>meter per second;</p> <ul style="list-style-type: none"> • When diving is carried out under hazardous conditions; • In case of high probability the diver will get stuck to something; • In any other situation when the diving supervisor is of the opinion there is a need that a diver requires immediate assistance. <p>3. In all other situations the standby diver must be immediately available, the diving equipment be ready, tested and ready for immediate use.</p>	
3.1.4	Diving Supervisor	Not qualified and/or incompetent diving personnel	Training, practice, competence verification and checking of certificates by the employer and notification by the employee.	<p>AW article 11 General obligations of employees</p> <p>AW article 8 Information and training</p> <p>AB article 6.14 Suitability</p> <p>AB article 6.16 Diving work</p> <p>AR: Chapter 6 and Appendix XVI c</p>
3.1.5	Diving medical attendant	Not qualified and/or incompetent diving medical attendant	<p>1. Training, practice, competence verification and checking of certificates and notification by the employee.</p> <p>2. For diving work in: Category A1, A2, B0 and B1 the diving medical attendant shall as a minimum be in possession of a certificate Restricted Diving Medical Attendant (First aid Diving work, level WSCS-WOD-B-B1).</p> <p>To decide if the available medical care is adequate or available quickly enough shall be established by means of a Project RI&E.</p>	<p>AW article 11 General obligations of employees</p> <p>AB: article 6.15 paragraph 1c (diving medical attendant)</p> <p>AR: Chapter 6 and Appendix XVI d</p> <p>AW article 8 Information and training</p>

No.	Actor / Subject	Risks	Minimum control measure	Reference
		Not available for attending hyperbaric treatment in the compression chamber	<p>Any dives made by the diving medical attendant must not impair his availability as diving medical attendant.</p> <p>Only if the diving team is allowed to consist of two persons (Category A1, pursuant to Working conditions catalogue section 3.2) can the diving medical attendant act as team leader and standby diver.</p>	AB article 6.16 Diving work paragraph 4
3.1.6	Diving physician	Not qualified and/or incompetent diving physician	<p>A diving physician B or a diving physician A shall be in possession of a valid certificate which is applicable for the work he is going to perform, taking in consideration:</p> <p>A diving physician A is only allowed to carry out periodical (renewal) examination of professional divers.</p> <p>A diving physician B is allowed to:</p> <ol style="list-style-type: none"> 1. Perform the initial occupational health medical examination of persons required to carry out diving work; 2. Perform periodical (renewal) examination of professional divers; 3. Perform the occupational health medical examination of persons required to carry out diving work after the detection of a diver illness, such as decompression sickness, air embolism or disorders referred to as contra-indication (see table in 4.2) or after a diving-related accident; 4. To provide diving medical support; 5. To act as diving medical advisor. 	<p>AB: article 6.14 a paragraph 1 and paragraph 2</p> <p>AB: article 6.14b</p> <p>AB: article 6.15 paragraph 2</p> <p>AR: Chapter 6 and Appendix XVIa</p>
3.2	Number of personnel / team size	Too small team to get a diver in distress out of a liquid and/or to mobilise in an adequate manner external assistance	<p>Minimum team size during diving is at all times in accordance with AB article 6.16 paragraph 1 (at least one diver, one standby diver and one diving supervisor).</p> <p>If diving in the diving work Category A2 + A3 or Category B0 - B4 no use may be made of the deviation which is defined in AB article 6.16 paragraph 4.</p> <p>If diving in the diving work category A1 and use is made of the deviation included in AB art 6.16 paragraph 4, the team must be increased with at least one supporting team member (diving assistant) (See also section 3.1.1).</p>	AB article 6.16 Diving work paragraph 4

No.	Actor / Subject	Risks	Minimum control measure	Reference
		Too small team to be able to execute the work in a safe manner	<p>Team size is determined by the nature of the work, diving method and handling of potential emergency situations.</p> <p>Under the circumstances mentioned below there is a potential risk that the divers will get into difficulties, such as meant in AB article 6.16 paragraph 4:</p> <ul style="list-style-type: none"> • Standby diver cannot put on diving equipment by himself; • Poor visibility, namely: at less than 1 meter persons or objects are not clearly visible; • Impossibility to free ascend; • Presence of obstructions; • Entering hollow spaces; • Educating and training of divers with exception of the situation whereby at least two certified divers with diving equipment are in the water. 	AB article 6.16 Diving work paragraph 4
3.3	Working periods / times	Exhaustion and loss of concentration	Working in accordance with the ATW	ATW DMAC D 20
3.4	Safety training	Insufficient knowledge and experience with regard to safe working	Sufficiently participating in safety trainings and practicing emergency procedures (See: EMERGENCY PROCEDURES AND CONTINGENCIES) associated with the work.	<p>AW article 8 Information and training</p> <p>AB article 4.7 Measures for unintended events</p> <p>VCA BHV EHBO, etc.</p>

8.4 MEDICAL

No.	Actor / Subject	Risks	Minimum control measure	Reference
4.1	Medical equipment	Incorrect composition of medical equipment	<p>1. Oxygen kit is a necessary element of the first aid equipment. The quantity of available oxygen must be sufficient for the travel time to the nearest recompression facility (See EMERGENCY PROCEDURES AND CONTINGENCIES point 6.3.1) or the time it takes till arrival of professional medical assistance.</p> <p>Restricted Medical Attendant B1 (level WSCS-WOD-B-B1) minimum medical equipment:</p> <ul style="list-style-type: none"> • Oxygen kit; • First aid kit as defined by the company medical department or complies with the "Orange Cross" guidelines for companies. 	<p>AB article 6.15 Safety measures paragraph 1d adequate First aid equipment</p> <p>AB article 4.7. Measures for unintended events</p>
4.2	Medical examination / checks	Use of medication, alcohol use and use of hallucinogenic drugs	<p>1. Employers' regulations /requirements regarding medicine, alcohol and mind-altering substance use (see also section 1.1.2).</p> <p>2. The diver must declare when he uses these substances.</p>	<p>AW: article 11</p> <p>AB: article 9.5</p> <p>IMCA D 061 section 13 and Appendix 4</p>
		Physical condition	Notification by the diver.	<p>AW: article 11</p> <p>AB: article 9.5</p>
		Mental condition	Notification by diver.	<p>AW: article 11</p> <p>AB: article 9.5</p>
		No diver medical	<p>1. Check diver logbook + notification by the diver.</p> <p>2. The examination prior commencement working under hyperbaric conditions shall be carried out by a Diving Physician B in a sufficiently equipped centre to carry all aspects of the examination. Periodical renewal examinations, every twelve months, may also be carried out by a Diving Physician A.</p> <p>Following a diver illness such as decompression sickness, air embolism or a disorder mentioned as absolute contra-indication the medical examination</p>	<p>AW: article 11</p> <p>AB: article 6.14</p> <p>AR: Appendix XVI a, which forms part of article 6.5 paragraph</p>

No.	Actor / Subject	Risks	Minimum control measure	Reference
			<p>shall take place by a physician with a certificate Diving Physician B.</p> <p>Regarding to the medical examination for persons carrying out diving work, caisson work and other work under hyperbaric conditions the following applies: A person who is required to carry out diving work, caisson work and other work under hyperbaric conditions:</p> <ul style="list-style-type: none"> • Shall without restrictions be able to carry out his work under hyperbaric conditions, under physical heavy circumstances be able to swim / walk, communicate and be able to cope with the responsibility psychologically; • May not endanger himself or another member of the team by a medical disorder during working under hyperbaric conditions such as loss of consciousness, loss of orientation or panic attack; • May not have a disorder which as a result of working under hyperbaric conditions may worsen; • May not have a disorder which may cause the development of a diver illness such as decompression illness or barotrauma. <p>3. Examination in accordance with: Examination guideline Occupational health examination Working under Hyperbaric Conditions Diving work Document code: CAT 003.1</p>	<p>1e</p> <p>Updated advice on 'Diving medical fitness divers COVID 19' Ref SWOD 2022/833/PGDZ.</p> <p>Examination guideline Occupational health examination Working under Hyperbaric Conditions Diving work Document code: CAT 003.1</p>
4.3	Liaison with a suitable diving physician	No diving physician available	Agreement / contract with diving physician in which availability of the diving physician is recorded.	AB: article 6.15 paragraph 2
		Non-functioning means of communication	Appropriate means of communication in relation to the work location (inclusive back-up).	
4.4	Medical and Physiological considerations			
4.4.1	Diver checks	Failure to observe changes in the health status of the diver	Monitoring the health status of the diver. Possible ways are: video (ROV), voice communication and line signals. The Project RI&E will indicate which method(s) must be used.	

No.	Actor / Subject	Risks	Minimum control measure	Reference
4.4.2	Flying after diving	Contract a decompression sickness during flying after diving	Planning air travel in accordance with the requirements in the decompression tables being used.	
4.4.3	Diving medical risks	Primary diver sickness, secondary diver sickness, other disorders and decompression sickness	Diving medical aspects of diving as described in the textbook diving medical attendance for the relevant category of diving work, briefing, presence of a diving medical attendant and medical evacuation plan, contact means and options with diving physician, presence of a First Aid kit.	AR: Appendix XVI a, c and d
		Decompression sickness	Checking diver logbook + notification by diver (possibly recreational diving and diving at third parties) and use of decompression tables, presence of a decompression chamber in accordance with AB: article 6.18.	AW: article 11 General obligations of employees

8.5 WORK PLANNING

No.	Actor / Subject	Risks	Minimum control measure	Reference
5.1	Risk Management Process	Not described or new risks which are not managed	<ul style="list-style-type: none"> Periodic re-evaluation of the available RI&E; Execution of a Project RI&E for the diving project; The execution of a Last Minute Risk Assessment (LMRA) at the worksite by the diving supervisor and personnel prior to the diving operation taking place, in case of changed circumstances and after an incident, where by the work was stopped and near miss (Think hereby about “management of change”). 	AW: article. 5 Risk assessment and evaluation
			Last Minute Risk Analysis (LMRA) check of the actual situation at the workplace and possible deviations from the Project RI&E: 1. Work in the area that affects safety during diving work. 2. Divers / diving team suitable / available for the work to be carried out. 3. Diving equipment and work equipment are suitable for the work to be carried out. 4. Sufficient breathing gas present and correct composition. 5. Safety and emergency equipment and arrangements in place, present and functional.	AW: article. 5 Risk assessment and evaluation
5.2	Operational and Safety Aspects			
5.2.1	Falling in the water and drowning risk	Drowning risk	Depending on the situation use of: <ul style="list-style-type: none"> Life jacket; Guardrails /railings; secure with a line / fall protection; rescue equipment; other suitable means. 	Article 3.16. Preventing danger of falling
5.2.2	Diving depth	Not capable to remain at the desired water depth	A provision to allow the diver to remain at the desired water depth.	
		Diving method / category / equipment unsuitable for the diving depth and or diving work	Comply with the limits in AR Appendix XVIc. Working in accordance the WOD-SOE (See ALSO DUTIES, RESPONSIBILITIES AND REQUIREMENTS point 1.1.5 and 1.1.6).	AR: Appendix XVI c WOD-SOE minimum system requirements

No.	Actor / Subject	Risks	Minimum control measure	Reference
		Use of incorrect decompression table	Establish the diving depth. Facilities in accordance with the WOD-SOE.	WOD-SOE minimum system requirements
5.2.3	Discharges	Contaminated water (thermal and/or chemical), uncontrolled "blowing away" of the diver	Closing of discharge or keep a safe distance, in case of pollution and dangers of pressure differences (DELTA P). (See WORK PLANNING item 5.3.2.	Information note No. 1 Risks and Control measures pressure differences (Delta P) Information note No. 3 Risks and Control measures working at contaminated locations

<p>5.2.4</p>	<p>Dangers of differential pressure (Delta P)</p> <p>Amongst others, but not limited to: Dams, Dikes, Locks, Weirs / Barriers, Water reservoirs, Swimming pools and Drains</p> <p>Ships, pipelines and other hollow constructions</p> <p>Hydroelectric power stations, Desalination plants and intakes of other plants</p>	<p>Divers, diving supervisors and other personnel involved are not able to recognize and/or are unaware of the presence of the hazards</p>	<p>Remove any pressure difference or ensure that it cannot occur.</p> <p>Performing and recording of a Project RI&E with a project manager and client familiar with the relevant location and drawing up a work plan. (See also WORK PLANNING 5.1 Risk Management Process)</p> <p>Before commencing the work: Check with the project manager and the client, familiar with the location concerned, whether all safety measures laid down in the work plan have been taken and record this.</p> <p>In case of changes of the work plan or work situation: Carry out again the Project RI&E with the project manager and the client and record this in an amended work plan. (Management of change).</p> <p>Avoid the risk of getting stuck or trapped. Do not allow a diver to approach from the upstream side with a visible or invisible flow due to pressure difference. Only approach from the downstream side if possible.</p> <p>Discuss with the diving team and other personnel involved the risk for any potential hazard at the site.</p> <p>Performing a Last Minute Risk Analysis (LMRA).</p> <p>Discuss the emergency scenarios and the actions to be taken should unexpected events occur.</p> <p>Provide all personnel involved with the necessary information to ensure the work is carried out safely.</p> <p>If the failure of a (temporary) construction is part of the risk, the integrity of the (temporary) construction must be part of the Project RI&E.</p> <p>Use the reference table "annex F" in the HSE document RR 761 to see if foreseeable circumstances may take place whereby the extent of a pressure difference danger zone may increase or the estimated forces may exceed the accepted values.</p> <p>Use the guidelines in the Diving Information note No 1 Risks and control measures of</p>	<p>AW: article. 5 Risk assessment and evaluation</p> <p>AW article 8 Information and training</p> <p>Information note No. 1 Risks and Control measures pressure differences (Delta P)</p> <p>UK Health & Safety Executive (UKHSE) Diving Information Sheet No. 13 Differential pressure hazards in diving</p> <p>UKHSE research report: RR761 - Differential pressure hazards in diving</p> <p>Association of Diving Contractors International (ADCI) video on the dangers of differential pressure: http://videos.adci-int.org/dangers-of-delta-p</p> <p>http://videos.adci-int.org/expand</p>
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No.	Actor / Subject	Risks	Minimum control measure	Reference
			Pressure Differentials (Delta P).	ed-approach-to-calculating-the-effects-of-differential-pressure-delta-p-on-working-divers
		Entrapment of the diver and / or standby diver and possible injury or death	<p>Ask yourself if you need to dive or if there are alternatives.</p> <p>Check whether control measures are effective before the diver enters the water.</p> <p>Use SSE to perform this work or other diving method after making a Project RI&E.</p> <p>Use pre-installed means to prevent suction due to pressure differences.</p> <p>Prevent a diver from can come in the danger zone by using a cage and/or limiting the diving umbilical or signal line length.</p> <p>Use where possible extra or double fitted gates or valves.</p> <p>Do not allow the diver to work on a seal which must prevent an outflow at that moment.</p> <p>Take control measures when pipes with pressure differences are made open.</p>	<p>Video produced by the Ontario Ministry of Labour, this video talks about the hazards of Delta P around dams (Courtesy Ontario Ministry of Labour. 2011) https://www.youtube.com/watch?v=7yEmC-z-dRU .</p> <p>ADC- GP -001 https://www.imca-int.com/briefing/975/diving-from-on-or-in-close-proximity-to-merchant-vessels-protocol-for-isolating-machinery-systems-new-industry-guidance-published/</p> <p>ADC-GP-02 Identification, Assessment and control of differential pressure hazards.</p>

No.	Actor / Subject	Risks	Minimum control measure	Reference
5.2.5	Diving near ROV operations	Accidental contact with the ROV	Direct contact between diving supervisor and ROV supervisor. ROV video picture available to the diving supervisor. Thruster guards fitted to ROV thrusters.	IMCA D 054 IMCA D 045 IMCA R 004
5.2.6	Safe use of electricity	Incur electrical shock	Approach a specialist for minimum control measure.	IMCA D 045 IMCA R 004
5.2.7	Lift bag	Uncontrolled ascent of the "load" whereby the diver is dragged along with it	Measures to prevent uncontrolled ascent, for example by anchoring the load, an automatic dump. Working in accordance WOD-SOE.	IMCA D016 WOD-SOE Detail sheets
		Following ascent again uncontrolled descent of the load	Preferably make use of a closed lift bag.	IMCA D016
5.2.8	Underwater obstructions	Getting entangled	If possible and necessary removal, exploratory dive. Include in the Work plan. Consult available data regarding the diving location.	
		Damage to diving equipment	If possible and necessary removal, exploratory dive. Include in the Work plan. Consult available data regarding the diving location.	
5.2.9	Lifting and scaffolding	Diver / diving equipment is struck by falling / moving objects and/or become trapped	Scaffolding and lifting on platforms and work locations near diving work not simultaneously to take place. Physical separation of scaffolding, lifting- and diving work such that falling/ moving objects under no circumstances can hit/ trap a diver / diving equipment.	
5.2.10	Diving in the vicinity of pipelines	Injury as a result of overpressure reactions (for example during testing or damage)	During testing divers have to be away from of the pipeline. When working on damaged pipelines, pressure reduction.	Information note No. 1 Risks and Control measures pressure differences (Delta P)
		Injuries caused by heat	Keep sufficient distance.	
		Diving in contaminated water (leakage of the contents)	See WORK PLANNING 5.3.2.	Information note No. 3 Risks and Control measures working at contaminated locations

No.	Actor / Subject	Risks	Minimum control measure	Reference
5.2.11	Diving on depressurised or empty pipelines, hoses and subsea constructions	Getting trapped by negative pressure	If possible use a diffuser. Availability of pressure equalising measures (for example an emergency valve to quickly remove the negative pressure).	
5.2.12	(Chain) hoists	Brake system failure resulting in uncontrolled load movement, with the risk of injury to the diver	Maintenance based on underwater use.	IMCA D 028
5.3	Considerations air, weather and sea conditions			
5.3.1	Underwater visibility	Poor visibility, insufficient overview of the work location	Conform work instruction.	
5.3.2	Air-, water- and soil pollution	Adverse health effects	<p>Inspection in advance, work plan, Project RI&E and clothing precautions, hereby attention for biological agents, hazardous substances and chemicals, not only for the diver but also for the other team members (think hereby for example about the diving bell, possibly equip with gas detection equipment), personnel on deck and ashore).</p> <p>Making use of the guidelines in information note Diving No. 3 Risks and Control measures working at contaminated locations.</p>	<p>Section 9 Chapter 4</p> <p>IMCA D 021</p> <p>Information note No. 3 Risks and Control measures working at contaminated locations</p>
5.3.3	Weather conditions			
	Precipitation	Cold, humidity, slippery	Protective clothing.	AB Chapter 6 Physical factors, outdoor climate and weather circumstances
	Wind	Wind chill, reduced stability of people and objects	Generic description of the limit which is based on the equipment being used and the location where the diving takes place.	AB Chapter 6 Physical factors, outdoor climate and weather circumstances

No.	Actor / Subject	Risks	Minimum control measure	Reference
	Thunder-storm	Lightning strike	Setting of a situation dependent limit regarding the minimum distance to the thunderstorm.	AB Chapter 6 Physical factors, outdoor climate and weather circumstances
	Darkness	insufficient overview of the work location	Lighting.	AB Chapter 6 Physical factors, outdoor climate and weather circumstances
	Reduced visibility (above water)	insufficient overview of the work location	Setting of a limit, the work area of the diver must always be visible and in case of shipping set a situation dependant limit.	AB Chapter 6 Physical factors, outdoor climate and weather circumstances
	Temperature	Hypothermia and overheating / heat stroke	1. Specific work instruction regarding the work duration, clothing, shelter, conditioned work environment, diver and also other personnel 2. Ways to maintain the body temperature of the diver in thermal balance.	AB Chapter 6 Physical factors, outdoor climate and weather circumstances
5.3.4	Ice	Dysfunction of diving equipment as a result of freezing	In case of freezing discontinue diving operation, establish a specific work instruction.	AB Chapter 6 Physical factors, outdoor climate and weather circumstances
		Ice formation resulting in increase of weight	(Support) equipment must be designed for ice formation.	AB Chapter 6 Physical factors, outdoor climate and weather circumstances
5.3.5	Hazardous marine life	Personal injury	Protective clothing conform Work instruction.	

No.	Actor / Subject	Risks	Minimum control measure	Reference
5.4	Communica-tions			
5.4.1	Communica-tion with third parties / bystanders, such as shipping, deck personnel, operators, crane drivers	Emergence of dangerous situations such as: collision, being run down, falling loads, getting trapped, be sucked against or getting stuck, etc.	Agree and remain in contact with third parties / bystanders, marking of the dive location and show the prescribed signals.	
5.4.2	Miscommuni-cation	Uncertainty about instructions diving supervisor versus diver	In advance agree language to be used. Recording of communication procedure in the work instruction.	AB: 1.5 ha

8.6 EMERGENCY PROCEDURES AND CONTINGENCIES

No.	Actor/ Subject	Risks	Minimum control measure	Reference
6.1	Diving emergencies			
6.1.1	Loss of communication	Increased risk of accidents	Abort the dive. Working conform WOD-SOE.	WOD-SOE Minimum system requirements
6.1.2	Diver in distress	Increased risk of personal injury	Abort the dive, provide assistance including deployment of the standby diver and implementation of the agreed emergency procedure.	AB article 4.7 Measures for unintended events AW article 15 Expert company emergency response assistance AB article 6.15 Safety measures paragraph 1 d Adequate first aid equipment
6.1.3	Dealing with an injured or unconscious diver	Risk of (additional) injury, drowning	Inclusion of this emergency procedure in the work instruction.	AB article 4.7 Measures for unintended events AW article 15 Expert company emergency response assistance AB article 6.15 Safety measures paragraph 1 d Adequate first aid equipment

6.1.4	Non-functioning or defective equipment	Increased risk of accidents and personal injury	Abort the dive and implement agreed emergency procedure.	<p>AB article 4.7 Measures for unintended events</p> <p>AW article 15 Expert company emergency response assistance</p> <p>AB article 6.15 Safety measures paragraph 1 d Adequate first aid equipment</p> <p>WOD-SOE Minimum system requirements</p>
6.2	Diving contractor contingency centre	Inability to deal adequately with emergencies which may occur	The availability of a room equipped with sufficient communication facilities, relevant documentation and other necessary facilities for the supporting / coordinating team that is deployed in case of an emergency.	<p>AB article 4.7 Measures for unintended events</p> <p>AW article 15 Expert company emergency response assistance</p> <p>AB article 6.15 Safety measures paragraph 1 d Adequate first aid equipment</p>

9 REFERENCES WORKING CONDITIONS CATALOGUE DIVING WORK

9.1 LAW

9.1.1 Working Condition Legislation / Working Conditions Act (AW)

The Working Conditions Act itself contains no articles that specifically deal with working under hyperbaric conditions or diving work. However the Act does contain general articles which focus on safety, health and welfare.

Important articles in the context of diving work are amongst others:

- Inventory and evaluation of risks: article 5
- Information and training: article 8
- Reporting accidents and occupational diseases: article 9
- Preventing hazards to third parties: article 10
- General obligations of the employees: article 11
- Expert company emergency response assistance: article 15
- Occupational health medical examination: article 18
- Multiple employers: article 19
- Certification: article 20

See www.wetten.overheid.nl/BWBR0010346

(An English Translation of the Working Conditions Act can be found on the OSHA European website <http://osha.europa.eu/fop/netherlands/en/legislation/index.html>)

9.1.2 Working Conditions Decree (AB)

The Working Conditions Decree does contain specific requirements in relation to working under hyperbaric conditions and diving work. In Chapter 6 (physical factors), section 5 (working under hyperbaric conditions) those requirements can be found. Important requirements in relation to diving work are:

- Organisation of workplaces: Chapter 3
- Dangerous substances and biological agents: Chapter 4
- Physical load: Chapter 5 Section 1
- Physical Load: Chapter 5 Section 3
- Outdoor climate and weather conditions: Chapter 6
- Personal protective equipment and health and safety signs: Chapter 8
- General definitions, item 2 construction site / structure: article 1.1
- Language requirement for regulated professions: article 1.5ha
- Health and safety plan: article 2.28
- Preventing danger of falling: article 3.16
- Measures for unintended events: article 4.7
- Definitions and Applicability: article 6.13
- Suitability: article 6.14
- Occupational Health medical examination: article 6.14a
- Diving physician: article 6.14b
- Safety Measures: article 6.15
- Certification of maintenance system for diving and caisson equipment: article 6.15a (withdrawn in view of WOD-SOE)
- Diving work: article 6.16

- Reporting diving work: article 6.17
- Compression chamber diving work: article 6.18
- Diving work of pupils and students: article 6.31
- Suitability of work equipment: article 7.3
- Soundness of work equipment and unintended events: article 7.4
- Obligations of self-employed persons and co-operating employers: article 9.5

See www.wetten.overheid.nl/BWBR0008498

(An English Translation of the Working Conditions Decree can be found on the OSHA European website <http://osha.europa.eu/fop/netherlands/en/legislation/index.html>)

9.1.3 Working Conditions Decree and Self-employed persons (ZZP-ers)

Article 9.5 of the Working Conditions Decree describes the obligations of self-employed persons and co-operating employers. In this Article 9.5 is indicated that nearly all requirements of the Working Conditions Decree in relation to diving work are applicable. The relevant articles are: 6.14a, 6.15a, 6.16, 6.17 and 6.18.

See also

<https://www.nlarbeidsinspectie.nl/onderwerpen/arboregels-voor-zelfstandigen>

<https://www.arboportaal.nl/onderwerpen/zelfstandige-ondernemers-zonder-personeel-zzp>

9.1.4 Working Conditions Regulations (AR)

Also in the Working Conditions Regulations articles and annexes can be found which relate to diving work. The regulations provide further details regarding the articles in the Working Conditions Decree. The following articles relate to diving physicians, divers, diving supervisors and diving medical attendant / diver medic.

See Chapter 6 Work under hyperbaric conditions

- Certification: Section 6.1
- Certification: diver, diving supervisor, diving medical attendant and diving physicians: Section 6.5
- Certification: Fire brigade diver Fire Brigade diving supervisor: Section 6.6

See Annex:

- XVIa: Area specific certification scheme for the personal certificate for diving physicians
- XVIc: Area specific certification scheme for the personal certificate for diving work
- XVI d: Area specific certification scheme for the personal certificate for Diving medical supervisor

See <http://wetten.overheid.nl/BWBR0008587>

(An English Translation of the Working Conditions Regulations can be found on the OSHA European website <http://osha.europa.eu/fop/netherlands/en/legislation/index.html>)

9.1.5 Working times legislation

The Working Times Act provides rules regarding maximum working hours and minimum rest periods. The Working Times Act does however make exceptions for Defence, Fire Brigade, Supervisory and (special) Investigative services. For divers working in the mining industry in addition to the normal rules of the Working Times Act and – Decree further rules are applicable.

See [publication of the Ministry of SZW regarding Working Hours Act in Dutch](#)

See [publication of the Ministry of SZW regarding Working Hours Act in English](#)

See also the information of our government on the website of the National Labour Authority

<https://www.nlarbeidsinspectie/onderwerpen/arbeidstijdenwet>

9.1.6 Working times in the mining sector

The Working times Act (hereafter called ATW) is the basic legislation for working hours. Working hours and rest periods, as laid down in the ATW, do not always allow sufficient scope for all sectors to conduct their business effectively. Mining is one of those sectors for which additional and different regulations are required. Therefore the Working Times Decree (hereafter called ATB) contains additional and different rules for employees who perform work on or from a mining installation (an at sea or surface water located drilling or production platform) or an onshore mining location.

Also for divers who carry out work for the mining sector additional and different rules are contained in the ATB.

When applying the rules of the ATB, it must be remembered that the regulations of the ATW which are not explicitly deviated from in the ATB remain applicable. Furthermore, for some work a choice may be made between the working times scheme of the ATW and that of the ATB.

Collective scheme NADO, NVB, CNV and FNV Bondgenoten

Since April 2007 the ATW legislation has been changed on a number of points in order to respond to the wish to create more flexibility. The ATW no longer has a standard and consultation scheme. There is now a (principal) norm which may be deviated from in a collective scheme. At companies where nothing has been agreed the principal norm will apply. It is only possible to deviate from the principal norm by means of collective agreements between the employer and employees. In that case, the more flexible norm of the collective scheme will apply.

In April 2008 the branch organisation NADO (Netherlands Association of Diving Companies), the NVB (Netherlands Association of Professional divers), CNV and FNV signed a collective agreement so the more flexible norm of the collective scheme is applicable to them.

[Download the publication van Staatstoezicht op de Mijnen](#)

9.1.7 Decree medical devices

<http://wetten.overheid.nl/BWBR0007307>

9.1.8 In-house Emergency Service organisation (BHV)

<https://www.arboportaal.nl/onderwerpen/bedrijfshulpverlening>

9.1.9 Law on professions in the individual Health Care (Act BIG)

<http://wetten.overheid.nl/BWBR0006251>

9.2 DOCUMENT WORKING UNDER HYPERBARIC CONDITION SYSTEM- AND MAINTENANCE REQUIREMENTS

See our website for downloading the PDF Document www.ArbocatalogusWoO.nl.

Also available in English. <https://www.arbocataloguswoo.nl/en/>

9.3 INFORMATION NOTES

- Information note Diving No. 1 Risks and control measures of differential pressure (Delta P) <https://www.arbocataloguswoo.nl/nl/drukverschillen-delta-p>
- Information note Diving No.2 Risks and control measures of High pressure jetting gun operations <https://www.arbocataloguswoo.nl/nl/werkzaamheden-met-hogedrukspuit>
- Information note Diving No.3 Risks and control measures of working at contaminated locations <https://www.arbocataloguswoo.nl/nl/werkzaamheden-op-verontreinigde-locaties>

9.4 SWOD EXAMINATION GUIDELINE

Examination guideline Occupational health examination Working under Hyperbaric Conditions Diving Work. Document code: CAT 003.1 <https://www.arbocataloguswoo.nl/nl/keuringsrichtlijn-werken-onder-overdruk-duikarbeid>

9.5 INFECTIOUS DISEASES

NIPV Infectious diseases: prevention is better than cure. www.nipv.nl

RIVM guidelines www.rivm.nl

9.6 A EUROPEAN CODE OF GOOD PRACTICE FOR HYPERBARIC OXYGEN THERAPY ANNEX 7

<http://www.echm.org/>

9.7 DIVING WORK GUIDELINES / STANDARDS

DMAC Diving Medical Advisory Committee

<http://www.dmac-diving.org>

DMAC 06 The effects of sonar transmission on commercial diving activities

DMAC 12 Safe diving distance from seismic surveying operations

DMAC 15 Medical equipment to be held at the site of an offshore diving operation

DMAC 20 Duration of bell lock-outs

DMAC 21 Guidance on the duration of saturation exposures and surface intervals between saturations

DMAC 28 The provision of emergency medical care for divers in saturation

HSE The Health and Safety Executive

<http://www.hse.gov.uk>

<http://pilot.ndc.nl/images/pdf/HSE-MaTR133-Investigations-into-the-damage-caused.pdf>

IMCA – IMCA Marine Contractors Association

<http://www.imca-int.com/>

IMCA Diving

IMCA D 003 Guidelines for oxy-arc cutting

IMCA D 010 Diving operations from vessels operating in dynamically positioned mode

IMCA D 014 IMCA International Code of Practice for Offshore Diving

IMCA D 016 Underwater air lift bags

IMCA D 021 Diving in contaminated waters

IMCA D 028 Guidance on the use of Chain lever hoists in the offshore environment

IMCA D 031 Cleaning for oxygen service: Setting up facilities and procedures

IMCA D 045 Code of practice for the safe use of electricity underwater

IMCA D 049 Code of Practice for the use of high pressure jetting equipment by divers

IMCA D 050 Minimum quantities of gas required offshore

IMCA D 051 Hyperbaric evacuation systems (HES) interface recommendations

IMCA D 052 Guidance on hyperbaric evacuation systems

IMCA D 054 Remotely operated vehicle intervention during diving operations

IMCA D 061 Guidance on health, fitness and medical issues in diving operations

IMCA D 064 Guidance on Diving Cylinder and Valve Compatibility

IMCA D 067 The Effects of Underwater Currents on Divers' Performance and Safety

AODC 038 Guidance note on the use of inert gases: Replaced by IMCA D 070

IMCA Remote Systems and ROV

IMCA R 004 Code of Practice for the Safe & Efficient Operation of Remotely Operated Vehicles

IMCA R 045 Code of practice for the safe use of electricity under water

IMCA Marine

IMO 113 (IMO MSC Circular 645) Guidelines for vessels with dynamic positioning systems

IMCA Competence & Training

IMCA C 002 Competence assurance and assessment - Guidance document and competence tables:
Marine Division

IMCA C 003 Competence assurance and assessment - Guidance document and competence tables:
Diving Division

IOGP – International Association of Oil & Gas Procedures

<https://www.iogp.org/?s=publications>

IOGP Report 471 [Oxy-Arc Underwater Cutting Recommended Practice](#)

IMO International Maritime Organization

www.imo.org

IMO RESOLUTIONS

<http://www.imo.org/en/KnowledgeCentre/IndexofIMOResolutions/Pages/Default.aspx>

IMO MSC / circ. 645 Guidelines for vessels with dynamic positioning systems

(See IMCA Marine Division IMO 113)

IMO resolution A.692(17)

[Guidelines and specifications for hyperbaric evacuation systems](#)

IMO resolution A.831(19) Code of Safety for Diving Systems

NEN Normen

NEN Normen zijn verkrijgbaar bij het Nederlands Normalisatie-instituut (NNI).

Voor meer informatie. www.nen.nl

NEN Normshop <http://www.nen.nl/web/Normshop.htm>

NEN-EN 12021:1999 en “Ademhalingsbeschermingsmiddelen - Perslucht voor ademhalingstoestellen”

NEN-EN 144-1 Ademhalingsbeschermingsmiddelen - Afsluiters voor gasflessen - Deel 1: Verbindingen voor inlaataansluitingen

NEN-EN 1829-1 Hogedrukreinigers met een waterstraal - Veiligheidseisen - Deel 1: Machines

NEN-EN 1829-2 Hogedrukspuitmachines - Veiligheidseisen - Deel 2: Slangen, slangverbindingen en verbindingselementen

VCA - Safety, Health and Environment Checklist Contractors

<http://www.vca.nl/>

9.8 DELTA P

ADCI

Association of Diving Contractors International (ADCI) video on the dangers of differential pressure:

<http://videos.adc-int.org/dangers-of-delta-p>

https://www.youtube.com/watch?v=AEtbFm_CjE0

<http://videos.adc-int.org/expanded-approach-to-calculating-the-effects-of-differential-pressure-delta-p-on-working-divers>

UK Health & Safety Executive (UK HSE)

<http://www.hse.gov.uk/pubns/diveindx.htm>

Diving Information Sheet No. 13:

Differential pressure hazards in diving

UKHSE research report:

RR761 - Differential pressure hazards in diving

<http://www.hse.gov.uk/research/rrhtm/rr761.htm>

Ontario Ministry of Labour

[Video produced by the Ontario Ministry of Labour, this video talks about the hazards of Delta P around dams \(Courtesy Ontario Ministry of Labour. 2011\)](https://www.youtube.com/watch?v=7yEmC-z-dRU)
<https://www.youtube.com/watch?v=7yEmC-z-dRU>

ADC

ADC-GP-01

Diving From, On or in Close Proximity to Merchant Vessels – Protocol for Isolating Machinery Systems
(ADC UK website or IMCA Information Note 13/09)

ADC-GP-02 Identification, Assessment and control of differential pressure ha