CMAS

CONFÉDÉRATION MONDIALE
DES ACTIVITÉS SUBAQUATIQUES

WORLD UNDERWATER FEDERATION

ICE DIVER
ICE DIVING INSTRUCTOR
ICE DIVING INSTRUCTOR TRAINER

Standards

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(Bod 166)

Some visual impressions

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General Terms

1. Used terms, abbreviations and definitions

CMAS	Confédération Mondiale des Activités Subaquatiques / World Underwater Federation
Safety reel	personal reel; for finding lost line etc. with min. 50m of line; never to be given away
Isolator valve	valve in the middle of a double-tank manifold, used in emergencies for interrupting the connection between the two tanks
HID	High Intensity Discharge light
LED	Light Emission Diode (lighting system based on this technology)
Regulator rig	Complete regulator system with 1st + 2nd stage, intermediate pressure hose, inflator hose (jacket or dry-suit) and SPG
Chemical light	Plastic sticks with 2 chemical agents that (once brought together and shook) produce a chemical reaction with light emission
(Hollow) Ice screw	Special steel or titanium screws with a hollow core for fixations in ice
BC	Bouyancy Compensator (vest, jacket)
FFM	Full Face Mask
SPG	Submersible Pressure Gauge (finimeter)
A dangly	a piece of equipment loosely hanging down, not closely attached to the body
(uw-)Scooter / DPV	a submersible diver operated vehicle, with the pilot being towed behind or riding on top
OOA-situation	Out-of-Air situation
OOG-situation	Out-of-Gas situation (same; more general term for any gases)
CPR	Cardiopulmonary Resuscitation
BLS	Basic Life Support
MC	Multiple Choice (-test)

2. Legal Notice

- Whenever or wherever applicable international, national, regional or local laws, regulations, ordnances, legal directives and technical norms exist on diving in general or for particular diving activities, such legislation prevails any CMAS standards and therefore must be strictly observed at all times.
- It is self-understanding that such laws and regulations precede all similar rules from any private organizations (incl. all diving organizations such as CMAS).
- Under no circumstances violations of such legal requirements will be endorsed or supported by CMAS.
- It is therefore the sole responsibility of each diver, dive guide, instructor and course director to procure such relevant legal information in due time. This responsibility cannot be waived or delegated.
- All divers and instructors must be aware of the fact that in case of an incident the present standards may be used by investigating authorities as a source for specified duties. Breach of such duties may be judged as negligence or gross negligence in court.
- Warning: to walk on ice is always potentially dangerous and should be avoided if there are any doubts on safety. This holds especially true if the thickness of the ice and its actual physical properties may not be determined with the desirable accuracy.

  Therefore a measurement of the thickness must be made under all circumstances by specially secured Course Staff before any course activities take place.
- CMAS does neither endorse nor promote under ice diving in waters with current (e.g. rivers or tidal currents). Therefore this course MUST NEVER be given in such an environment.
- In all overhead environments (such as diving under ice), the rule of thirds (or a more restricting one) must be strictly applied!
- For students, the use of Trimix, rebreathers and scooters is not allowed within the ice diver course. Instructors and Alert-/Stand-by Divers however may use such equipment to enhance safety and in emergency situations.
- It should be noted that current verdicts of various European courts rule that diving in specific environments without adequate training and equipment is regarded as gross negligence with all legal implications.
- With regard to the public image of the diver and the desirable behaviour, we strongly urge everyone to read **Appendix 1** (diver's etiquette)
- **STRICTLY FORBIDDEN:**
  handling of any environmental-hazardous matters and liquids such as motor oil, gasoline, deicers etc. on the ice; if such matters have to be used, this must be done on dry land with the requested caution.
- **STRICTLY RESPECT:**
  any area-restrictions for environmental protection or other reasons issued by relevant authorities
- Activities on frozen water areas are always potentially hazardous and impose some inherent risks. Therefore all such activities should be carried out with caution and great care. For general guidelines for safe operations, ref. to **Appendix 2** (guidelines for safe operations on ice).

3. The CMAS Ice Diving Training system

3.1 Certificates for Diver levels

- There is one level of Ice Diver → **Part II**

3.2 Certificates for Instruction levels

There is 1 Instructor Level:

- Ice Diving Instructor → **Part III**

3.3 Non-certification levels for Support Course Staff

- (Surface) Line Tender → **Part IV**
- Alert-/Stand-by Diver → **Part IV**
- Dive Guides ("Assistant") → **Part IV**
- other Surface Support Course Staff → **Part IV**

Part II:
Standards for Ice Diver, Course & Certificate.

I. Definition (diver's profile, knowledge and skills)

- A certified CMAS Ice Diver is a diver who has all the necessary knowledge and the skills that are requested to plan and perform safe dives under ice together with a dive partner of equal or higher qualification.
- He/she masters all required emergency procedures for this environment.

II. Course classification (Type & Level)

- The CMAS Ice Diver course is considered as an add-on to the CMAS 2* diver, is therefore an advanced level specialty course.
- It is agreed among the most competent organisations in this field that diving under ice must be considered as diving in an overhead environment. More precise, it is accepted that diving under ice comes very close to diving in the cavern zone (zone 1) of a cave.
- Therefore, prerequisites, equipment and safety requirements are mostly taken or adapted from the ones stipulated in the CMAS Standards for Cavern- and Cave Diving.

III. Aims & Objectives

- To educate divers to the risk associated with diving under ice.
- To educate divers in the correct equipment setup and configuration for diving under the ice.
- To educate divers in the required self-rescue procedures and skills.
- To give the student practical diving exsamples of diving under ice.

IV. Course Entry Requirements (prerequisites)

4.1 General

- CMAS 2* Diver or equivalent
- 50 logged open water dives in total, at least 20 must be after the 2* diver certification
- Valid medical for diving fitness according to the concerning requirements of the national federation
- Successfully passed entry assessment if requested by the Course Director

4.2 Other Recommended specialty certificates

- UW-Orientation / Navigation certification
- Night Diver CMAS certificate or equivalent
- Dry Suit diving (or equivalent practical experience), if dry suit is used during course

4.3 Other Compulsory Specialty Certificates

- If Nitrox is to be used during dives (on student's demand): Nitrox Diver CMAS or equivalent
- If O_2 is to be used during safety stops (on student's demand): Advanced Nitrox Diver CMAS or equivalent
- In case that dry-suit is used during course:
  * Dry Suit Diver Certificate
  * 10 dives with the dry-suit since certification

4.4 Entry assessment (only if needed)

An entry assessment can be utilized (at the discretion of the coursed director) to verify that candidates fulfil all prerequisites with regard to theoretical knowledge, practical skills and physical performance. Candidate must successfully pass all assessment requirements before being accepted to course.

V. Course parameters

5.1 Minimum course duration

2 days:
- Classroom section (0.5 day)
- 1 open water training (drill) dive (0.5 days)
- 2 dives (1 training, 1 leisure) under ice (1 day)

5.2 Minimum course content

5 classroom lectures

Introduction
- Introduction: what is recreational ice diving about?
- The CMAS ice diver training system

Physics
- Physical properties of water in relation to temperature
- The effects of chill factor
- The mechanical properties of ice and how to evaluate ice quality

Physiology
- Breathing and hypothermia
- Frostbite
- Increased risk of DCI
- Psychological Effects
- Reducing the risks
- Hypoglycaemia
- Dehydration
- The correct thermal protection in and out of the water

The risks and hazards / safety rules
- Risks and hazards of ice diving in general
- Freezing/freeflowing of regulators
- Lost line protocol
- Lost orierentation
- Importance of dry air/gas
- Safety rules in ice diving and consequences for equipment

Diving equipment and other material
- Special civil engineering material for on-site installations
- Special ice diving material & equipment
- Diver's configuration
- Knowledge of knots used for ice diving

Planning and preparation
- Selection of ice diving site, planning, preparation of ice diving activities
- How to get safe access
- How to act on the frozen surface
- How to estimate the carrying properties of ice
- How to measure the thickness of ice
- How to cut entries into ice
- How to secure the entries
- How to mark the entries
- Site installations
- The different roles of the Course Staff
- Use of Dive tables in cold water
- Poor visibility environment

Diving techniques
- The rule of thirds and its application
- Line handling both as diver and line man
- UW line signals
- UW touch contact signals
- Theoretical explanations on all required practical skills (see below)
- UW orientation, reading marine charts & maps
- Kit configuration
- Special UW hand signals

Trouble shooting

- Line entangling and self-freeing including cutting ropes and lines
- Free-flow management
- Lost orierentation
- Finding broken/lost line
- Search patterns over ground & under ice
- Safety factors common to all rescues in ice diving.
- Different types of rescue in ice diving.
- Basic first aid requirements.
- Being able to search for and rescue a lost diver as a stand by diver

Others

- Environmental aspects
- Legal aspects

5.3 practical lessons (2 days)

- 1 training dive in open water or in a swimming pool:
  The following exercises and skills must be carried out to a satisfactory:

  - Check that the configuration of the student diver's equipment is technically correct
  - Correct fixing of the tender line to the ice
  - Correct fixing of the tender line to the lead diver
  - Correct fixing of the tender line between 2 divers
  - Poor visibility training
  - UW-communications, hand signals
  - Student's buoyancy and trim
  - Hovering motionless at any given depth without visual references
  - How to correctly cut a rope / line
  - How to find a broken/lost tender line
  - Bubble check at 3-5m
  - Compass navigation
  - Reel use
  - Shut-down drill (pass/fail)
  - Mask exchange (pass/fail)
  - Longhose air-sharing horizontally (pass/fail)

- In order to be allowed to follow the under ice training part, all exercises have to be passed in a satisfactionnary manner
- In order to allow students to adapt their configuration to the ice diving requirements, there should be a minimum of 1 week between the OW-training dive and the ice dives
- Minimum 2 dives under the ice:
  - 1^{st} dive is a training dive with selected exercises from the open water training section; this dive must be led by an ice diving instructor
  - If student successfully passes, 2^{nd} dive is leisure dive; this dive may be guided by assistants (instructor not required)
  - A maximum of 2 dives per day is permitted with adequate surface intervals.
  - Student must act as a line man at least once during the course

5.4 Student / Instructor ratios for practical instruction

- In open water, confined area: max. 2 students per 1 instructor
- Under ice: 1 student per 1 instructor during instructional dives, buddy pairs only.
- Diving alone is not permitted

5.5 Equipment

All equipment must strictly fulfil the requirements as listed in Part III. It should be noted, that any deviation from these basic safety requirements could be regarded as gross negligence from authorities or - in case of an accident - by the court.

5.6 Depth Limit

Maximum depth limit for all dives for the duration of this course is 30m.

5.7 Dive Profiles / Decompression

Due to known adverse physiological effects of cold on circulation, CMAS strongly recommends to execute ALL dives during this course to be within the no-decompression limits for air (even when Nitrox is used!) of the tables used or the individual dive computers of the students.

5.8 Academic reference & documentation

- Any accepted/endorsed manual from the national CMAS federation.
- Additional material at the discretion of the Course Director

5.9 Course leadership / assistance

All requirements for any of the positions within the Course Staff are defined in Part IV.

- As course director: Ice Diving Instructor CMAS in active teaching status.
- Other certified Ice Diving Instructors, working under the directives of the Course Director
- As dive guides or assistants in the water during leisure dives under the ice, experienced Ice Divers fulfilling the requirements as described in Part IV may be used, but not more than one (1) assistant per one (1) student.

5.10 Evaluation

a) Theory

Theoretical knowledge will be evaluated with one single, written MC-test, consisting of 30 questions on the topics listed above (5.2)
In order to pass, the student must have a scoring of at least 80% (correct answers).

b) Practical skills

The standard exercises/drills for Ice Diver
The skills evaluation is done within the framework of a continuous evaluation system. All required qualifications will be repeatedly assessed and evaluated during the training course. The certificate will only be given at a point when the candidate has finally passed all requirements.

5.5 Maximum course line distance

- A maximum of 50 meter line between diver and line man

5.6 Recommended equipment list

- Spare air, complete redundance
- Long hose for sharing air
- Two underwater lights for poor visibility

VI. Post course

6.1 Certification

- CMAS double-sided card

VII. Equipment Requirements

1. General requirements for diving equipment

- The general rules for ALL personal equipment are: **select only equipment which**
  - ***is of good quality***
  - ***is functional***
  - ***is easy to use***
  - ***is safe to use and robust***
  - ***you are familiar with***
  - ***fulfils exactly the intended tasks***
  - ***is conform with all CMAS standards and requirements***
- Further CMAS General Guidelines for equipment:
  - Take only equipment with you that is appropriate for the dive you intend to carry out
  - However, the really important pieces of equipment must be carried with the required redundancy.
  - Within the overhead diving environment, it is important to have a most streamlined outer profile.
  - If ever possible, there must not be any obstructive or dangling pieces of equipment, which can easily get caught from and entangled in the guideline.
  - ***The ice diver has to select his equipment configuration from the focus of a complex system, in which every module has to harmonize with all others or at least no piece must noticeably restrict any other piece in its functionality. As a cohesive and carefully arranged unit, it has to facilitate the dives and must be configured so as to provide the greatest support.***

2. Further course specific rules

- Rebreathers must NOT be used during course
- Scooters (DPVs) must NOT be used during course except for Alert-/Stand-by Diver
- Full Face Masks (FFMs) must NOT be used EXCEPT when
  - required for medical reasons
  - student can prove perfect mask exchange during training OW dive
  - for leisure dive (dive #3)
- All parts of the diving equipment must be cold-water proof and in perfect working order
- Regulators must be EN250 approved (cold-water part) as this has become a worldwide accepted technical standard
- Each diver (student, instructor, guide etc.) has to use 2 complete independent regulators (1st/2nd stage); so-called octopus rigs are strictly forbidden
- So-called international yokes are strictly forbidden; only DIN fitting is allowed
- Each diver has a BC (jacket or wings) with min. 20l capacity
- Each regulator's 2nd stage is easily accessible at any time and secured with a safety lanyard or a rubber necklace
- Inflators for dry suit and for BCs MUST be connected to different 1st stages
- Burntime of each lamp used must be at least twice (2x) the planned dive time
- Every diver must have dive computer, compass, submersible pressure gauge
- Before and between dives, all diving equipment should be stored in protected environment, preferably in a warm one as long as possible
- For visibility less than 10m or natural daylight is weak, a chemical light stick must be be fixed to the divers harness or tank.
- Especially for ice diving, it's of paramount importance to have very dry gas in the tanks to avoid regulator freezing
- All pieces of the equipment must be cleanly tucked away in order to avoid any entanglement with lines; instructors are requested to enforce a strict NO DANGLY policy
- Use only bolt-snaps (and double-enders) for tucking away diving equipment
- Every diving person MUST have a wrist slate with a rough sketch of the dive site, including entries/exits, distances and compass bearings and with the dive plan (to be checked by lead diver).
- Fixation for ropes: either directly fixed to body of person or with carabiner with screw locking gate!

3. Specific Equipment Requirements for (Student) Divers

a) Standard diving equipment per student diver

- Students are strongly advised to use dry suits
- Must have complete standard open water diving equipment
- Students are recommended to use double tanks, either completely independent or with a manifold and an isolator valve in the middle; however, mono-tanks are acceptable if fulfilling requirements below
- Minimum tank size for student double tanks is 2 x 7 liter / 200bar rating (or higher)
- If mono tanks are used:
  - minimum tank size is 10 liter / 200bar rating (or higher)
  - must have 2 separate outlets (H- or V-valve)
-

b) Special equipment for under ice diving per diver

- ***2 completely independent regulator systems***
- 2 cutting tools (knive, cutter)
- 1 main-lamp, 30-50W Halogen or 12-18W HID / 1 Backup-lamp 4-6W Halogen or LED
- Safety reel with at least 50m line (dia.=2mm)

4. Equipment Requirements for Instructors

- Must use drysuit
- Compulsory to use double tank (twin-) sets either completely independent or with a manifold and an isolator valve in the middle;
- Minimum tanks size for instructors is 2 x 8 liter / 200bar rating (or higher)
- Must have longhose of approx. 2m (7ft) on right-hand side regulator
- 2 cutting tools (knive, cutter)
- 2nd mask (backup)
- 1 main-lamp, 30-50W Halogen or 12-18W HID / 1 Backup-lamp 4-6W Halogen or LED
- Safety reel with at least 50m line (dia.=2mm) OR minimum distance to emergency exit plus 10m, whichever is greater
- 1 hollow ice screw that can be screwed into the ice by hand; must have ring at other end to fix a line

5. Equipment Requirements for other Staff (Personnel)

5.1 Alert-/Stand-by Diver

- Must have same equipment as instructor
- Must be completely dressed; tanks must be ready for immediate donning beside entrance pool and sheltered from snow,
- In emergencies: must be fixed to a 2nd tender line, operated by another qualified person of the Surface Support Course Staff, NOT by the “standard” tender.
- May use a scooter in case of an emergency

5.2 Diveguide / Divemaster

- Must have same equipment as instructor

5.3 Surface Line Tender (“line man”)

- Must be completely dressed in a dry suit, so that for an emergency he may also work in the water (at the surface in the entrance hole)
- Should stand on a good isolating wooden plank which is solidly fixed to the ice and cannot slip away in any direction

5.4 Other Surface Personnel

- Other surface personnel (“helpers”) need not to be dressed up for diving
- Should wear adequate thermal protection, incl. gloves and very good isolating boots

6. Requirements for any other infrastructure and material

6.1 Classroom infrastructure

- Classroom must be adequate in size, lighting, ventilation and seating for the number of participants
- Must have all necessary technical infrastructure such as black- and whiteboard, overhead projector, beamer, electricity appliances
- Appropriate sanitary installations must be provided

6.2 Open water dive site (OW training dive / dive #1)

- Area must be in a sheltered place with easy access, away from motorboat passages or shipping routes, with no surf zone
- Area must have appropriate parking space and facilities for staying one day at the site
- Required signals for indicating the presence of divers have to be set (e.g. alpha flag)
- Sea bed should be flat, evtl. having a slight slope, must not be on a drop-off; ideal max. depth is 5-20m for all exercises
- Divers should never be more than 50m away from the shoreline

6.3 On the ice (per main entry/exit / dives #2 + #3)

- Min 1 saw suitable for cutting ice, preferably a chain saw.
- **ATTENTION: personnel using chain-saws must be trained and familiar with their use!**
- 1-2 hand-saws for cutting ice
- 1-2 hollow ice drills with dia.=5-10cm (e.g. for checking thickness of ice)
- 3-4 appropriate shovels for clearing the snow around entries/exits and on all paths
- Bio compatible material for making indicators on the ice (ashes, sand, colour spray); must be legal under applicable environmental protection laws
- Warm and dry cloth for the divers and the Alert-/Stand-by Diver
- Warm drinks for everyone on the ice
- A makeshift shelter against wind, snowfall
- Enough wooden planks of L2.0m x W0.4m x T2cm to place at the sides of the main-Entry/exit
- Enough pieces of timber (approx. 8cm x 5cm; l=0.5-1m) for material storage
- Tarpaulins for parking material on it
- A wooden ladder L=3-4m for rescue purposes
- Per main entry/exit: 2 tender lines (one for Instructor/student, one for alert diver) plus 1 backup-/ rescue line for the surface (e.g. breaking though ice)
- 6 hollow ice screws for any MAIN-entry/exit for double securing the 2 tender lines and for shot line
- communication items (portables)
- 1 (one) 1st aid set incl. O_2 with an open- or closed circuit O2 breathing system
- 1 inflatable diving jacket
- 1 x 50m floating, static rope of 8-10mm thickness as tender line, bright colour BUT different from the rescue lines
- 1 x 50m floating, static rope of 8-10mm thickness for rescue purposes, bright colour BUT different from the one of the tender lines
- 1 bigger bucket fore storing tender line while in use (between tender and surface fixation)

6.4 On shore (and ready for use; sheltered from natural influences / dive #2 + #3)

- Communication items (portables)
- Some woollen blankets
- 1 wooden- or metal ladder for emergency use with L=3-4m
- 3-4 additional wooden planks and timbers
- 1 x 50m floating, static rope of 8-10mm thickness for rescue purposes, bright colour BUT different from the one at the main entry/exit
- 1 inflatable diving jacket
- 1 additional 1st aid set incl. O2 with an open- or closed circuit O2 breathing system

Part III.
Standards for Ice Diving Instructor Course & Certificate

I. Definition (instructor's profile, knowledge and skills)

A certified CMAS Ice Diving Instructor is an instructor who is competent in teaching the safe and correct techniques of diving under ice and to organize and conduct complete ice diver courses under his own responsibility from the planning stage to the final certification.

II. Requirements (prerequisites)

2.1 General

- Minimum 20 years old
- Membership in the national CMAS federation for at least 1 year (must be in good standing!). For instructors having just passed a cross-over course to the CMAS federation, this requirement applies to the membership in the federation they are coming from.
- Instructor 1* CMAS or equivalent in active teaching status
- Min. 100 logged open water dives in total
- Min. 30 logged dives in overhead environment, of which
  * 10 dives must be under the ice
  * at 5 different dive sites
- CMAS Ice Diver or equivalent for at least 1 year
- A valid 1st Aid and CPR certification from a nationally recognized organisation
- Teaching/training experience:
  must have acted at least during a full Ice Diver course for each of the listed roles
  - as a Line Tender
  - as a Dive Guide (leisure dive #3)
  - as an assistant to the course director (co-teaching)
  (written confirmation by responsible CMAS course director)
- Valid medical attest for diving fitness according to the concerning requirements of the national federation

2.2 Other Recommended Specialty Diving Certificates

- Underwater Navigation

2.3 Other Compulsory Specialty Diving Certificates

- Advanced Nitrox Diver CMAS or equivalent
- Rescue Diver CMAS or equivalent

III. Ice Diving Instructor training

In order to become a certified CMAS Ice Diving Instructor, the instructor candidate's performance will be assessed as follows:

a) Theory

- Theoretical knowledge will be evaluated with one single, written MC-test, consisting of 50 MC and open text questions on the topics listed for the Ice Diver classroom lectures
- In order to pass, the instructor candidate must have a scoring of at least 80% (correct answers).

b) Practical skills

- The instructor candidate must be able to perform all s*tandard exercises/drills* for Ice Diver qualification
- The skills evaluation is done within the framework of a continuous evaluation system. All required qualifications will be repeatedly assessed and evaluated during the training course. The certificate will only be given at a point when the candidate has finally passed all requirements.

c) Course leadership

- Must have organized and given a complete ice diver course under the supervision of and to the satisfaction of an ice diving instructor trainer

IV. Post evaluation / Certification

4.1 Certification

- CMAS double-sided card
- Wall certificate in A4 format

4.2 International comparison of certification level

This level corresponds to the classification Ice Diving (Specialty) Instructor as used by most recognized training organisations.

4.3 Activities and guiding/training competences

- organization, conducting ice diver courses incl. certification
- after having performed 2 complete ice diver courses on his own, may act as an assistant to an ice diving instructor trainer during evaluation of other ice diving instructor candidates

Qualifications & Duties of Course Staff (Personnel)

1. General requirements

- All MAIN entries/exits must be manned with
  1 Tender, 1 Alert-/Stand-by Diver and min. 2 additional Surface Personnel
- One (1) Surface Personnel must always be on the shore; may rotate with Surface Personnel on ice in regular intervals