INTERNATIONAL STANDARD

ISO 24801-2

First edition
2007-02-15

Recreational diving services — Safety related minimum requirements for the training of recreational scuba divers —

Part 2: Level 2 — Autonomous diver

Services relatifs à la plongée de loisirs — Exigences minimales liées à la sécurité concernant la formation des plongeurs en scaphandre autonome pratiquant la plongée de loisirs —

Partie 2: Niveau 2 — Plongeur autonome

Reference number
ISO 24801-2:2007(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword ... iv

Introduction ... v

1 Scope ... 1

2 Normative references ... 1

3 Terms and definitions ... 2

4 Competencies of a recreational scuba diver at level 2 — "Autonomous diver" ... 3

5 Prerequisites for training ... 3
5.1 General ... 3
5.2 Minors ... 3
5.3 Health requirements ... 3

6 Introductory information ... 4

7 Required theoretical knowledge ... 4
7.1 Equipment ... 4
7.2 Physics of diving ... 5
7.3 Decompression management ... 5
7.4 Dive planning ... 5
7.5 Medical problems related to diving ... 6
7.6 Psychological problems related to diving ... 7
7.7 Dive environment ... 7
7.8 Use of breathing gases other than air ... 8

8 Required scuba skills ... 8
8.1 Confined water scuba skills ... 8
8.2 Open water scuba skills ... 9

9 Practical training parameters ... 10

10 Assessment ... 11
10.1 Knowledge ... 11
10.2 Scuba skills ... 11

Annex A (informative) Examples for the degree of mastery required for the level 2 scuba diver examination ... 12

Annex B (informative) Example of an information sheet for medical screening ... 13

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 24801-2 was prepared by the European Committee for Standardization (as EN 14153-2:2003) and was adopted, under a special “fast-track procedure”, by Technical Committee ISO/TC 228, *Tourism and related services*, in parallel with its approval by the ISO member bodies.

ISO 24801 consists of the following parts, under the general title *Recreational diving services — Safety related minimum requirements for the training of recreational scuba divers*:

— *Part 1: Level 1 — Supervised diver*

— *Part 2: Level 2 — Autonomous diver*

— *Part 3: Level 3 — Dive leader*

Introduction

The International Standards relating to recreational diving services have been prepared by ISO/TC 228/WG 1 “Diving services”, with the aim of establishing a series of specifications for safety practices and the provision of services.

Therefore these International Standards specify:

— necessary levels of experience and competency of scuba divers and scuba instructors,

— safety practices and requirements for recreational scuba diving service providers appropriate to the different diving levels.

The requirements specified are minimal; they do not preclude the provision of additional training or the assessment by a service provider of additional competencies. These International Standards represent a tool for comparison of existing (or future) qualifications of scuba divers. In no way do they represent a course programme nor do they imply that course programs and scuba diver certifications issued by different nations or training organizations must necessarily correspond to these levels.

Recreational diving services — Safety related minimum requirements for the training of recreational scuba divers —

Part 2:
Level 2 — Autonomous diver

1 Scope

This part of ISO 24801 specifies the competencies that a scuba diver has to have achieved in order for a training organization to award the scuba diver certification indicating that he has met or exceeded scuba diver level 2 — "Autonomous diver" and assessment of these competencies.

It also specifies conditions under which training has to be provided, in addition to the general requirements for recreational diving service provision specified in ISO 24803.

This part of ISO 24801 applies only to contractual training and certification in recreational scuba diving.

2 Normative references

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

ISO 24801-3:2007, *Recreational diving services — Safety related minimum requirements for the training of recreational scuba divers — Part 3: Level 3 — Dive leader*

ISO 24802-1:2007, *Recreational diving services — Safety related minimum requirements for the training of scuba instructors — Part 1: Level 1*

ISO 24802-2:2007, *Recreational diving services — Safety related minimum requirements for the training of scuba instructors — Part 2: Level 2*

ISO 24803:2007, *Recreational diving services — Requirements for recreational scuba diving service providers*

EN 250:2000, *Respiratory equipment — Open-circuit self-contained compressed air diving apparatus — Requirements, testing, marking*

EN 12628:1999, *Diving accessories — Combined buoyancy and rescue devices — Functional and safety requirements, test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 250:2000 and EN 12628:1999 and the following apply.

3.1
training organization
entity providing recreational scuba diving training systems and certification, and which is responsible for the implementation and quality management of scuba diver training

NOTE Entity may include scuba diving federations and scuba diver training agencies.

3.2
certification
confirmation that a student has completed scuba diver training which fulfils all requirements in accordance with this part of ISO 24801, as issued by training organizations

3.3
scuba instructor
individual qualified in accordance with ISO 24802-1 or ISO 24802-2 respectively

3.4
dive leader
individual qualified in accordance with ISO 24801-3

3.5
breathing gas
mixture of oxygen and nitrogen with no less than 20 % oxygen

3.6
confined water
swimming pool with a depth appropriate to the activity or body of water that offers similar conditions with regard to visibility, depth, water movement and access

3.7
open water
body of water significantly larger than a swimming pool offering conditions typical of a natural body of water encountered in the region

3.8
diving equipment
equipment consisting of the following items:

— fins,

— mask,

— snorkel,

— demand regulator (also referred to as a regulator),

— alternative breathing gas system,

NOTE 1 This could range from a simple octopus system to a duplicate breathing system with a separate breathing gas supply.

— cylinder,

— cylinder-support-system,

— buoyancy compensator,

— a quick release weight system (if appropriate),

— submersible pressure gauge (breathing gas pressure monitor),

— diving suit (if appropriate).

NOTE 2 Specific environments may require additional equipment (e.g. an underwater navigational aid, knife/cutting device).

3.9
direct supervision
supervision by a scuba instructor or a dive leader of a group of divers in a position allowing rapid intervention on behalf of the diver

4 Competencies of a recreational scuba diver at level 2 — "Autonomous diver"

Scuba divers at level 2 — "Autonomous diver" shall be trained such that when assessed in accordance with Clause 10 they are deemed to have sufficient knowledge, skill and experience to dive with other scuba divers of at least the same level in open water without supervision of a scuba instructor.

Scuba divers at level 2 — "Autonomous diver" are qualified to dive within the following parameters unless they have additional training or are accompanied by a dive leader:

— dive to a recommended maximum depth of 20 m with other scuba divers of the same level,

— make dives, which do not require in-water decompression stops,

— dive only when appropriate support (e.g. first aid kit, a dive leader, support vessel; as appropriate to the dive site and the divers' experience) is available at the surface,

— dive under conditions that are equal or better than the conditions where they were trained.

NOTE If diving conditions are significantly different from those previously experienced, a scuba diver at level 2 — "Autonomous diver" requires an appropriate orientation from a dive leader. Where further instruction is required this can only be provided by a suitably qualified scuba instructor of level 2. If accompanied by a scuba instructor, a scuba diver at level 2 — "Autonomous diver" may gain progressive experience beyond these parameters and develop competency in managing more challenging diving conditions (e.g. increased depth and current, reduced visibility, extreme temperatures) designed to lead to higher qualifications.

5 Prerequisites for training

5.1 General

The service provider shall ensure that the client fulfils the following prerequisites to take part in the training course envisaged.

5.2 Minors

Documented parental or legal guardian consent shall be obtained when the applicant is a minor.

5.3 Health requirements

Documented evidence shall be obtained that the student has been medically screened as suitable for recreational diving by means of an appropriate questionnaire or medical examination. In any case of doubt, or

at the scuba instructor's discretion, students shall be referred to proper medical resources. If the student is not examined by a physician the student shall be obliged to confirm by signature that he or she has understood written information given by the scuba instructor on diseases and physical conditions which may pose diving related risks.

Students shall be advised of the importance of appropriate regular medical examinations.

6 Introductory information

Information in accordance with ISO 24803 shall be made available to the students prior to, or during the first class meeting.

7 Required theoretical knowledge

7.1 Equipment

Students shall have an appropriate knowledge concerning the physical characteristics, operating principles, maintenance and use of the following equipment items:

— mask,

— fins,

— snorkel,

— diving suits,

— quick release weight systems,

— float and flag,

— cylinders,

— cylinder valves,

— regulators,

— submersible pressure gauge (breathing gas pressure monitor),

— alternative breathing gas source,

— cylinder-support systems,

— buoyancy control devices,

— timing devices,

— underwater navigational aids,

— depth gauge/depth monitor,

— dive tables,

— dive computers,

— knife/cutting devices,

— lights,

— emergency signalling device (acoustical, optical),

— first aid and oxygen kit,

— personal diving log.

7.2 Physics of diving

Students shall have an appropriate knowledge concerning the physical principles and their application to diving activities, equipment and hazards relating to:

— sound,

— light,

— buoyancy,

— pressure/gas laws,

— temperature.

7.3 Decompression management

Students shall have an appropriate knowledge of decompression management using dive tables, dive computers and/or dive planning software, including:

— how to determine dive profiles which do not require in-water decompression stops for single and repetitive dives,

— be able to determine required stage decompression.

7.4 Dive planning

Students shall have appropriate knowledge concerning dive planning issues:

— planning and preparation, with emphasis on the prevention of out-of-breathing-gas situations and emergencies,

— emergency procedures,

— accident management/prevention,

— communications, both underwater and on the surface,

— diver assistance (self/buddy),

— recommended diving practices (e.g. separation procedures, safety stops),

— procedures for diving from boats,

— proper use of personal diving log.

7.5 Medical problems related to diving

Students shall have an appropriate knowledge concerning the causes, symptoms, prevention, first-aid and treatment of diving medical problems.

7.5.1 Direct effects of pressure

7.5.1.1 Increasing pressure (descent phase)

— gas compression (e.g. ears, sinuses, masks, lungs, suits, teeth).

7.5.1.2 Decreasing pressure (ascent phase)

— gas expansion (e.g. ears, sinuses, lungs, stomach, intestines, teeth),

— forms of decompression illness (DCI) (e.g. decompression sickness, arterial gas embolism).

7.5.1.3 Other pressure related conditions

— decompression illness (DCI) (including on-gassing, post-dive effects),

— nitrogen narcosis,

— hypercapnia (excess carbon dioxide),

— oxygen toxicity,

— contaminated breathing gas.

7.5.2 Other hazards

— physical stress (incl. fatigue and exhaustion),

— exposure/hypothermia/hyperthermia,

— in-water injuries,

— drowning,

— hyperventilation,

— airway control and related problems,

— medication, drugs, alcohol.

7.5.3 First aid after diving incidents

— cardio-pulmonary resuscitation (CPR),

— normobaric oxygen first aid.

7.6 Psychological problems related to diving

Students shall have an appropriate knowledge concerning causes, symptoms, prevention and management of:

— mental stress,

— panic,

— overconfidence.

7.7 Dive environment

Students shall have appropriate knowledge concerning the local and general conditions of the diving environment and their possible effects on the scuba diver and the scuba divers' impact on the environment.

7.7.1 Water

— temperature/thermoclines,

— visibility,

— movement (surface action, currents, tides, and the like),

— density (fresh and salt water).

7.7.2 Topography

— bottoms,

— shorelines.

7.7.3 Aquatic life

— animal,

— plant.

7.7.4 Environmental awareness

— preventive behaviour,

— conservation,

— preservation.

7.7.5 Other topics

— weather conditions,

— precautions for diving in new diving environments,

— surface hazards,

— overhead environments,

— entanglement.

7.8 Use of breathing gases other than air

Where a breathing gas other than air is used during the training course, the student shall be made aware of any depth limits, oxygen exposure management issues and equipment considerations relevant to the dives planned.

8 Required scuba skills

8.1 Confined water scuba skills

Students shall be able to demonstrate capability in the following skills; each skill shall be satisfactorily practised in confined water before that skill is performed in open water:

— use of mask, fins and snorkel,

— diving equipment assembly and disassembly (at water's edge),

— pre-dive inspection of diving equipment and in and out of water buddy checks,

— entries and exits,

— proper weighting,

— mouthpiece clearing — snorkel and regulator,

— regulator/snorkel exchanges at the surface,

— proper descent and ascent procedures (e.g. equalizing pressure in ears and mask),

— swim underwater efficiently with appropriate buoyancy and attitude control,

— mask-clearing, including removal and replacement,

— controlled breathing underwater without mask,

— buddy-system techniques (e.g. appropriate hand signals, staying close, monitoring the buddy),

— underwater and surface buoyancy control,

— underwater problem solving (e.g. regulator recovery),

— monitoring instruments,

— surface snorkel swimming with full diving equipment,

— surface operation of the quick release of the weight ballast system,

— removal and replacement of weight ballast system,

— removal and replacement of scuba system,

— procedures allowing a scuba diver to ascend to the surface in the event of an out-of-breathing gas situation, acting as both receiver and donor; this may include emergency ascents and the use of alternative breathing gas supply (own and buddy's),

— equipment care and maintenance.

8.2 Open water scuba skills

Students shall be able to demonstrate the following skills in a comfortable and relaxed manner. Students shall satisfactorily practise each skill using appropriate equipment and techniques for the local environment. They shall be capable of performing each skill in conditions typical of the local environment. Skills involving swimming shall be conducted over distances appropriate to local conditions and diving techniques:

— use of mask, fins and snorkel,

— diving equipment assembly and disassembly (at water's edge),

— pre-dive inspection of diving equipment and in and out of water buddy checks,

— entries and exits,

— proper weighting,

— mouthpiece clearing — snorkel and regulator,

— regulator/snorkel exchanges at the surface,

— proper descent and ascent procedures (e.g. equalizing pressure in ears and mask),

— swim under water efficiently with appropriate buoyancy and attitude control,

— mask-clearing, including removal and replacement,

— controlled breathing under water without mask,

— buddy-system techniques (e.g. appropriate hand signals, staying close, monitoring the buddy),

— underwater and surface buoyancy control,

— underwater problem-solving (e.g. regulator recovery),

— monitoring instruments including the means to measure depth and time and to safely limit exposure to inert gas,

— surface-snorkel swimming with full diving equipment; the student shall be able to swim back to the point of safe exit but no less than 50 m,

— surface operation of the quick release of the weight ballast system,

— removal and replacement of weight ballast system,

— removal of scuba system on the surface,

— procedures allowing a scuba diver to ascend to the surface in the event of an out-of-breathing gas situation, acting as both receiver and donor; this may include emergency ascents and the use of alternative breathing gas supply (own and buddy's),

— equipment care and maintenance (at water's edge),

— diver assistance techniques (self/buddy) (i.e. to assist a buddy to the surface and provide support on the surface),

— simple underwater navigation.

9 Practical training parameters

9.1 An open water dive shall comprise at least the following activities:

— briefing,

— preparation to dive,

— pre-dive checks,

— entry into water,

— descent procedures,

— underwater activity,

— ascent and surfacing procedures,

— exit from water,

— debriefing,

— post dive procedures,

— recording the dive.

9.2 All underwater skills in confined water shall be taught, directly supervised and evaluated by a scuba instructor, who shall be in the water during each session. The scuba instructor shall be in direct control of students throughout all sessions.

9.3 Prior to the first open water dive the student shall effectively show proof of, or demonstrate, to a scuba instructor the following skills, without the use of mask, fins, snorkel, or other swimming aids:

— distance swimming capability,

— 5 min survival swim/float.

9.4 Before participating in open water dives a student shall have demonstrated sufficient theoretical knowledge and scuba skills in confined water to be able to perform the open water dives in the prevailing conditions.

9.5 No more than three open water dives shall be conducted on a given day.

9.6 All open water dives shall be conducted in water that allows direct vertical access to the surface. Open water dives therefore shall not be conducted in underwater caves, inside wrecks or below ice.

9.7 During open water dives the student shall at least be equipped with diving equipment in accordance with 3.8.

9.8 All under water skills in open water shall be taught, and evaluated by a scuba instructor of level 2. The scuba instructor shall be in the water and in charge of each open water dive.

The safe supervision of students is solely the scuba instructor's responsibility. The scuba instructor shall limit the number of students per scuba instructor where environmental conditions are less than ideal, for example where underwater visibility is poor or there is significant water movement. The scuba instructor may also use additional aids to improve safety such as ascent lines, surface support stations or safety scuba divers. Where safety scuba divers are used they shall have an appropriate level of rescue competency of at least dive leader level.

9.9 The scuba instructor shall limit the number of students on open water dives so that either the scuba instructor or dive leader is able to provide direct supervision.

9.10 The scuba instructor shall cancel or abort the open water dive if environmental conditions, equipment problems or a student's physical or mental condition make this necessary.

10 Assessment

10.1 Knowledge

The student shall demonstrate to a scuba instructor knowledge of scuba diving by taking and passing an oral or written examination as prescribed by a training organization. This examination shall test scuba diver level 2 theoretical knowledge in accordance with Clause 7 and knowledge of scuba skills in accordance with Clause 8 (see Annex A for an explanatory example).

10.2 Scuba skills

The student shall satisfactorily demonstrate to a scuba instructor, the scuba skills in accordance with Clause 8 (see Annex A for an explanatory example).

Students to be certified shall complete at least four qualifying open water dives in accordance with 9.1 in the range between 4 m and 20 m under the direct supervision of a scuba instructor.

The underwater duration of each of these four qualifying open water dives shall be at least 15 min. Each student shall have logged a total accumulated minimum duration of 80 min underwater before certification.

NOTE The amount of underwater time, the number of dives and the depths needed for competence may vary. In determining these details, the scuba instructor and the training organization need to take into account that the training is for competence to 20 m and additional underwater time or dives may be required.

As an option a training organization may allow that students, after having acquired all skills required by this part of ISO 24801, but before they are awarded their certificates, demonstrate their maturity for autonomous diving by carrying out a dive without direct supervision, satisfying the following conditions:

— this dive is carried out in buddy groups,

— each pair is deploying a surface marker buoy,

— provisions are in place for monitoring the students' movements at all times, with means for rapid intervention in case of danger,

— all other parameters must be suitable for the competencies the students have achieved.