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~~Secretariat: UNE~~  
Recreational diving services — Requirements for rebreather diver training —  
Decompression diving to 60 m

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ISO copyright office

Ch. de Blandonnet 8 • CP 401

CH-1214 Vernier, Geneva, Switzerland

Tel. + 41 22 749 01 11

Fax + 41 22 749 09 47

copyright@iso.org

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## Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents/document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 228, *Tourism and related services*.

~~This document was prepared by Technical Committee ISO/TC 228, Tourism and related services, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 329, Tourism services, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).~~

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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## Introduction

Rebreathers (i.e. breathing devices that recirculate some or all of the diver's exhaled breath and replenish any consumed oxygen to maintain a breathable mixture) are becoming much more widely available and popular among divers. The market for rebreather diving has been constantly growing in recent years and is now considered to be large enough that the need for standards for training organizations on minimum training requirements is evident. Rebreathers allow divers to dive for longer and to greater depths. Such depths can go beyond 30 m and may can therefore require mandatory decompression stops. If rebreathers are used improperly, they can be hazardous; divers have had fatal accidents due to incorrect use of these devices. It is therefore important to specify training for diving with such devices.

Training organizations offering training that conforms with this document may exceed any of the requirements in terms of the volume or complexity of training but should at least ensure the students master all the skills and knowledge defined in this document.

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# Recreational diving services — Requirements for rebreather diver training — Decompression diving to 60 m

## 1 Scope

This document specifies requirements for rebreather diver training programmes which provide the competencies required to perform dives to 60 m with a rebreather, using a breathing mixture containing helium **and** requiring mandatory decompression stops.

This document specifies evaluation criteria for these competencies.

This document specifies the requirements under which training is provided, in addition to the general requirements for recreational diving service provision in accordance with ISO 24803.

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## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 24802-2, *Recreational diving services — Requirements for the training of scuba instructors — Part 2: Level 2*

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ISO 24803, *Recreational diving services — Requirements for recreational diving providers*

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ISO 24805, *Recreational diving services — Requirements for rebreather diver training — Decompression diving to 45 m*

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## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

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### 3.1 rebreather

apparatus that has a supply of gas carried by the diver, allowing the diver to breathe under water which enables the diver to inspire gas from a facepiece connected to a counterlung and to pass exhaled gas through a carbon dioxide absorption material before it is re-breathed from the counterlung and inspired partial pressure of the gases within the apparatus remain within acceptable physiological limits so that gas is thus recirculated within the apparatus

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Note 1 to entry: A rebreather can also be called a self-contained rebreathing apparatus.

Note 2 to entry: A facepiece can be a mouthpiece assembly, a half mask, a full-face mask or a helmet.

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[SOURCE: EN 14143:2013, 3.1, modified — Note 1 to entry modified and Note 2 to entry added. This content has been reproduced with the permission of CEN. Copyright remains with CEN.]

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3.2 rebreather type

primary rebreather design

EXAMPLES Closed-circuit rebreather (CCR), manually controlled closed-circuit rebreather (mCCR), electronically controlled closed-circuit rebreather (eCCR), semiclosed-circuit rebreather (SCR), manually controlled SCR (mSCR), electronically controlled SCR (eSCR), hybrid closed-circuit rebreather (hCCR).

3.3 rebreather unit

type of rebreather (3.1) having consistent controls, displays and configuration over several rebreather models (3.4), where the operation is essentially the same from rebreather model to rebreather model

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3.4 rebreather model

specific individual design of rebreather (3.1) made by a manufacturer

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3.5 breathing gas

gas present in the breathing loop (3.12) inspired by the diver

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3.6 supply gas

gas present in a cylinder which may can be added to the breathing loop (3.12)

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3.7 bailout gas

gas present in a cylinder that may can be breathed directly by the diver

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3.8 trimix

gas comprising a specified mixture of oxygen, helium and nitrogen, capable of supporting human life under appropriate diving or hyperbaric conditions

Note 1 to entry: This includes manufactured gas mixtures made up from combinations of pure oxygen, pure helium and pure nitrogen, with or without compressed air.

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3.9 PO<sub>2</sub>

partial pressure of oxygen in a gas mixture

Note 1 to entry: This usually refers specifically to the breathing-gas mixture inhaled by a diver.

3.10 set-point

PO<sub>2</sub> setpoint set-point PO<sub>2</sub> value that is used by a control system to determine when a solenoid valve injects oxygen into the breathing loop (3.12)

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**3.11  
respiratory minute volume  
RMV**

product of the tidal volume and breathing frequency measured in litres per minute

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**3.12  
breathing loop**

portion of a rebreather (3.1) through which gas circulates, usually consisting of a mouthpiece, breathing hose(s), counterlung(s), non-return valves and a CO<sub>2</sub> absorbent canister

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**3.13  
scrubber**

canister in the breathing loop (3.12) containing CO<sub>2</sub> absorbent

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**3.14  
confined water**

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

[SOURCE: ISO 24801-2:2014, 3.5]

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**3.15  
open water**

body of water significantly larger than a swimming pool, offering conditions typical of a natural body of water

[SOURCE: ISO 24801-2:2014, 3.6]

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**3.16  
limited open water**

open water (3.15) no deeper than 20 metres, with no appreciable water movement, and visibility that is sufficient to allow effective student supervision and skill development

**3.17**

**service provider**

entity (individual or organization), including any individual acting on behalf of such an entity, which offers one or more of the following services:

- introductory diving activities;
- snorkelling excursions;
- provision of training and education;
- organized and guided diving for qualified divers;
- rental of diving equipment.

[SOURCE: ISO 24803:2017, 3.1]

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3.18

**safety stop**

non-mandatory *decompression stop* (3.19) near the surface prior to surfacing

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3.19

**decompression stop**

mandatory stop during ascent from depth prior to surfacing

3.20

**decompression diving**

diving with mandatory *decompression stops* (3.19)

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3.21

**delayed surface marker buoy**

**DSMB**

surface marker buoy that can be deployed by a diver from underwater

## 4 Competencies

The training programme shall ensure that students are qualified to independently plan and conduct dives requiring mandatory decompression stops using the specific rebreather unit for which the diver has received training.

Divers qualified in accordance with this document are competent to dive with a suitably qualified buddy to 60 m using a rebreather with a supply gas containing:

- a minimum of 15 % oxygen;
- sufficient helium to control narcosis and to ensure a breathing gas density of less than 6,3 g/l.

In order to be deemed qualified to dive with a specific rebreather unit other than the one that the diver has received initial training for, a diver will need further unit-specific training.

The training ~~program~~programme shall ensure that the student has a full understanding of any theoretical concepts or skills applicable to the rebreather type, rebreather unit and rebreather model they will use. Students shall be provided with an overview of any information that is not specific to their rebreather, but this only needs to be informative in nature so that they are aware of the general possible configurations that other divers ~~may~~could use.

Student crossover training programmes shall be carried out in accordance with Annex-B.

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## 5 Prerequisites for training

### 5.1 General

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

In order to participate in a training programme in accordance with this document, students shall be qualified in accordance with ISO 24805.

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### 5.2 Minimum age

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The minimum age to participate in a training programme in accordance with this document shall be 18 years.