



**International
Standard**

ISO 8804-3

**Requirements for the training of
scientific divers —**

**Part 3:
Scientific diving project leader**

Exigences concernant la formation des plongeurs scientifiques —

Partie 3: Responsable de projet de plongée scientifique

**First edition
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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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.

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 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).

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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.

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).

A list of all parts in the ISO 8804 series can be found on the ISO website.

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.

Introduction

The ISO 8804 series is aimed primarily at scientists and academics training to become scientific divers (at three levels of competency) and sets minimum requirements for the training of scientific divers at the three levels reflected in the names of the three parts. It will be beneficial both to organizations involved in training scientific divers and the scientific diving community as a whole.

This document is considered the minimum competency standard for recognition as a scientific diver. It is intended to provide guidance regarding agreed-upon minimum training requirements, thereby easing barriers to cross-programme co-operation and reciprocity through common acknowledgment of the basic skill set for scientific divers.

Many organisations will have additional requirements for qualification of scientific divers. These supplementary requirements can include, but are not limited to, a greater number of training dives, additional training, enhanced fitness qualifications and requirements for maintenance of active diver status.

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Requirements for the training of scientific divers —

Part 3: Scientific diving project leader

1 Scope

This document specifies minimum requirements for the training of scientific diving project leaders.

This document specifies evaluation criteria for scientific diving project leaders.

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.

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 8804-1, *Requirements for the training of scientific divers — Part 1: Scientific diver*

ISO 8804-2, *Requirements for the training of scientific divers — Part 2: Advanced scientific diver*

ISO 24801-3, *Recreational diving services — Requirements for the training of recreational scuba divers — Part 3: Level 3 — Dive leader*

ISO 24802-2, *Recreational diving services — Requirements for the training of scuba instructors — Part 2: Level 2*

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

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/>

3.1 scientific diving

diving performed as part of a scientific, research or educational activity

3.2 scientific diver

diver competent in scientific methodology undertaking *scientific diving* (3.1)

4 Competencies

Scientific diver project leaders shall be trained such that when evaluated in accordance with [Clause 10](#) they are deemed to have sufficient knowledge, skills and experience with regard to managing the following aspects of scientific diving projects:

- planning;
- experimental design;
- execution;
- documenting and reporting of the findings.

Scientific diver project leaders shall have the competency to handle complex scientific diving operations, including:

- coordinating diving operations in remote locations;
- coordinating multiple diving teams;
- vessel operations for scientific dives.

Scientific diver project leaders shall have the competency to evaluate the quality of sampling (e.g. accuracy, possible sources of bias, repeatability).

In order to be deemed competent to supervise training courses in accordance with ISO 8804-1 and ISO 8804-2, scientific diver project leaders shall also meet the requirements of ISO 24802-2.

5 Prerequisites for training

5.1 General

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

5.2 Health requirements

Documented evidence shall be obtained that the trainee has been medically screened as suitable for diving. Trainees shall be advised of the importance of appropriate regular medical examinations.

NOTE See Reference [1] for an example of a medical questionnaire and accompanying guidance to physicians.

5.3 Scientific diving prerequisites

Trainees shall have the qualification of an advanced scientific diver in accordance with ISO 8804-2. Trainees shall hold a relevant scientific credential or be able to provide documented equivalent experience.

Trainees shall have participated as a scientific diver in at least two separate scientific diving projects.

6 Introductory information

Information in accordance with ISO 24803 shall be made available to the trainees prior to or during the first instructional session or meeting.

In particular, trainees shall be informed of the limits of their training and qualification as specified in accordance with [Clause 4](#).

7 Theoretical knowledge concerning project leadership

7.1 Experimental design

The training programme shall ensure that trainees have knowledge of the following aspects of experimental design and how it can be applied in scientific diving projects:

- scientific method: the question, hypothesis, sampling design, testing, data analysis, discussion and conclusions;
- sampling design (e.g. random sampling, systematic sampling, sampling by chance or by choice);
- estimating error and avoiding bias;
- required numbers of replicates for valid test results;
- factors influencing test results;
- power calculation and statistical analyses;
- reporting (e.g. technical reports, scientific publications).

7.2 Generic methods

The training programme shall ensure that trainees are able to explain how the following techniques are used in scientific diving and list the advantages, disadvantages and potential environmental and safety hazards associated with each one:

- search methods;
- survey methods, both surface and sub-surface;
- locating and marking objects and sites;
- the use of airbags and airlifts for controlled lifts, excavations and sampling;
- rigging and rope work;
- construction and deployment of transects and search grids;
- underwater navigation methods using suitable techniques;
- recording techniques;
- acting as a roped diver and as a surface tender to a roped diver;
- sampling techniques;
- communication methods (e.g. verbal and non-verbal, hardwired, through-water, video).

7.3 Planning of scientific dives

The training programme shall ensure that trainees have extensive knowledge of:

- initial scientific project-planning process in order to achieve scientific goals;
- methods to address research goals;
- equipment selection and usage (troubleshooting, assembling, transporting);
- preparation and entry procedures;
- planning for scientific activities on each dive (with dry runs if applicable);

- process for data recording;
- post-dive procedures;
- increased gas consumption on scientific dives and the importance of monitoring gas consumption;
- risk assessment related to scientific tasks performed during the dive.

7.4 Team management

The training programme shall ensure that trainees are able to apply their knowledge and skills in the context of organising scientific dives and ensuring that scientific dive teams can meet the dive objective.

The training programme shall ensure that trainees have extensive knowledge of:

- how to organise and coordinate multiple scientific diving teams;
- how to assign scientific tasks to multiple teams;
- how to coordinate scientific underwater activities;
- how to coordinate diving operations in remote locations;
- how to organize vessel operations for scientific dives;
- how to communicate effectively;
- how to manage and report accidents and incidents;
- human factors which can influence the performance of a dive team.

7.5 Legal aspects

The training programme shall ensure that trainees have extensive knowledge of:

- the relevance of local rules, regulations or laws (e.g. with regard to possible local limitations on oxygen first aid, sampling licenses for wildlife or archaeological sites);
- health and safety regulations;
- duty of care, personal responsibility;
- safety measures, managing the safety of a dive site;
- personal protective equipment;
- standards that are relevant to diving and diving equipment, breathing gases;
- the relevance of permits required for scientific work;
- the relevance of approvals and certifications for equipment.

8 Skills

8.1 Practical diving skills

The training programme shall ensure that trainees are able to coordinate and oversee one or more scientific dive teams conducting and planning:

- search methods;
- survey methods, both surface and sub-surface, designed to accurately locate and mark objects and sites;

- the use of airbags and airlifts for controlled lifts, excavations and sampling;
- rigging and rope work, including the construction and deployment of transects and search grids;
- underwater navigation methods using suitable techniques;
- recording techniques;
- sampling techniques appropriate to the scientific discipline being pursued.

The training programme shall ensure that trainees are able to coordinate and oversee one or more scientific dive teams carrying out the following tasks:

- survey techniques (e.g. digital imaging, transects and quadrats, mapping);
- sampling techniques (e.g. coring, specimen collection, tagging);
- data collecting or data recording.

The training programme shall ensure that trainees are able to manage and distribute multiple tasks to one or more dive teams while minimising the environmental impact and maintaining good and safe diving practices, such as:

- always putting safety before the scientific objectives;
- maintaining good buoyancy control;
- maintaining a buddy system;
- monitoring depth, time and gas supplies.

The training programme shall ensure that trainees are able to demonstrate how to do the following in order to achieve the intended scientific objectives of the dive:

- plan a scientific dive, including organising the dive team;
- assign scientific tasks to the individual team members;
- coordinate scientific underwater activities.

8.2 First aid and emergency oxygen administration

Trainees shall complete a course or courses in first-aid and cardiopulmonary resuscitation (CPR) approved by the training organization and have a valid qualification or certificate.

Trainees shall have completed training in emergency administration of oxygen and have a valid qualification or certificate. This training shall include theoretical instruction of the medical principles involved and practical tuition on the use of an emergency oxygen unit.

9 Requirements for training provision

9.1 Overall supervision

The training programme shall be conducted under the auspices of an organisation implementing a scientific diving operation.

Each training course shall be conducted under the overall supervision of an individual approved by a scientific body with at least the following:

- a scientific diver qualification in accordance with this document,
- the competencies of a diving instructor in accordance with ISO 24802-2.

9.2 Instructors and lecturers

Instruction of scientific diving knowledge and skills shall be provided by competent specialists in scientific diving. Such specialists in scientific diving shall either be:

- instructors competent in accordance with ISO 24802-2 who have been assessed as an advanced scientific diver in accordance with ISO 8804-2, with additional documented experience in scientific diving; or
- professionally qualified scientists who have documented experience of scientific diving methodologies.

Instruction for competencies not requiring dives (e.g. management, communications or medical topics) may be delivered by specialist lecturers with demonstrated competence in their specialist fields. While such lecturers need not hold a formal qualification as a diver, they shall be familiar with scientific diving operations.

9.3 Risk assessment

The training provider shall ensure that a site- and task-specific risk assessment is conducted before each in-water activity and shall adopt procedures to ensure that all risks are controlled as far as is reasonably practicable. The following factors shall be considered as part of this assessment, taking into account the capability of participants and available equipment:

- water movement (e.g. high water-flow rates, wave action, tides and currents);
- depth, decompression;
- underwater visibility;
- temperature;
- pollution;
- entry and exit methods;
- surface traffic and restricted zones (e.g. ports, harbours and marinas, differential pressure hazards);
- suitability of the site for the planned activities, including hazardous fauna and flora;
- emergency action plan;
- special hazards associated with the specific scientific diving project;
- type of gas; reserve gas; gas strategies;
- dive equipment failure contingencies and risks directly relating to use of specific types of equipment.

9.4 Surface support procedures and related safety provisions

The training provider shall ensure that each person is recorded on entering the water and accounted for on exit.

For each group entering open water, a maximum time for the activity shall be agreed upon. Provisions shall be made to trigger search and rescue operations should this time be exceeded.

9.5 Emergency equipment and procedures

9.5.1 Emergency equipment

For all locations where diving activities take place, the service provider shall ensure the availability of the following:

- a first aid kit suitable for the planned activities;