

# The Diving Medical Advisory Committee

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## Approval of Diving Medicine Courses

DMAC 29 Rev. 3 – March 2019

*Supersedes DMAC 29 Rev.2, which is now withdrawn*

### 1 Objective

This guidance is for those who seek international approval by DMAC/EDTCmed for the recognition of courses in occupational diving medicine for physicians. This recognition by DMAC/EDTCmed is available for two types of courses:

- ◆ Level I Medical examiner of divers
- ◆ Level 2D Diving medicine physician

It is important to note that 'occupational diving' would include some recreational diving instructors and diving guides.

Some needs more specific to doctors who are associated with recreational diving or military diving have not been addressed by this committee. Some course organisers may wish to add extra lectures and/or practical sessions more specifically related to recreational diving or military diving at their discretion. However, such modifications must not affect the integrity of the content and hours as required by DMAC and would not be considered for assessment for accreditation by DMAC/EDTCmed. Course organisers must bear in mind that DMAC advises the commercial diving world and aims to improve the competence of doctors on which the diving industry relies. The hours of training and the content of the lectures would hence need to satisfy this diving industry perspective.

### 2 Background

Legal regulations and industrial standards concerning the training of doctors involved in examination and treatment of working divers and the medical consultants to diving contractors vary throughout the world. Many occupational divers work in different nations as a part of their employment and, even though the guidance on medical standards for fitness to dive is reasonably well established internationally, the training of doctors to conduct those examinations and to provide competent occupational medical advice and support for diving emergencies appears inconsistent and often not adequate for diving industries.

In 2004 the European Diving Technology Committee (EDTC) produced its guidance on the "*Medical Assessment of Working Divers*". This has been published by the International Marine Contractors Association (IMCA). A slightly modified version, "*Fitness to Dive Standards. Guidelines for Medical Assessment of Working Divers*" is available on the EDTC [website](#).

Previously, a joint committee of the European Committee for Hyperbaric Medicine (ECHM) and EDTC developed "*Educational and Training Standards for Physicians in Diving and Hyperbaric Medicine*". At present, this still remains the best recognised international standard for such training. However, no organisation has accepted responsibility for administering an approval procedure for these basic courses. Until another recognised body takes on this responsibility, DMAC has accepted the obligation to assess selected courses in diving medicine together with a representative of the EDTC Medical Subcommittee; this alliance is to be referred to as 'DMAC/EDTCmed'.

It is emphasised that DMAC/EDTCmed will approve only the courses and not the competence of those who have attended them. DMAC is not constituted to be in a regulatory position and have a procedure for assessing the training record, experience and competence of individual doctors. This should be done in conjunction with other aspects of professional qualifications and accreditations overseen by relevant legislative bodies at the corresponding national level or the International Certifying Board IDMEB at an international level.

## 2.1 Definitions and Abbreviations

|                   |   |
|-------------------|---|
| Blended learning  | A training program combining traditional classroom training with CBT.   |
| CBT               | Computer based training. Distance learning where the primary means of delivery is computer. Such training material could consist of, but is not limited to, conventional text, presentations, hand-outs, videos etc.  |
| Contact time      | The training time, excluding breaks, for which the student(s) have immediate contact with one or more teacher/instructor.   |
| EDTC              | European Diving Technology Committee ( <a href="http://www.edtc.org">www.edtc.org</a> )   |
| E-learning        | See WBT   |
| Hour of lecture   | 60 min  |
| IDMEB             | International Diving Medical Expert Board ( <a href="http://www.edmd.eu">www.edmd.eu</a> )  |
| Lecture time      | The time used for training in a certain topic, including necessary break(s)   |
| Virtual classroom | Online and real time training by which interaction between the students is facilitated and prepared as part of the training method. A virtual classroom training session is structured to use interaction between the students as a means of training. Teacher(s)/trainers(s) will supervise and moderate the discussion.         |
| WBT               | Web-based training. A subset of CBT where the training material is transmitted over internet.   |
| Webinar           | Web-based seminar. An online and real time lecture (one-to-one or one-to-many) transmitted over internet allowing participants to post or ask questions to the lecturer. A webinar is a replacement for a traditional classroom lecture with questions at the end but allows no or very limited interaction between the students. |

## 2.2 Course Scope

To be considered for approval by DMAC/EDTCmed the course should firstly be compliant with the ECHM-EDTC “*Educational and Training Standards for Physicians in Diving and Hyperbaric Medicine*”. A copy of this document, which is for all health professionals in hyperbaric and diving medicine, can be downloaded from [www.edtc.org](http://www.edtc.org). When any proposed changes to the sections concerning diving doctors have been approved by EDTC, an amended version of that section will be added to the EDTC website.

The application for course approval by DMAC/EDTCmed should also demonstrate compliance with the attached ‘*Curriculum Checklist*’ in Appendix A.

The application form should clearly state for which of these two categories (or both) approval is sought:

- ◆ Level I Medical assessment of divers (Medical Examiner of Divers);
- ◆ Level 2D Medical management of diving accidents and illnesses (Diving Medicine Physician).

## 2.3 Organisation and Responsibilities, Course Faculty

The application must clearly show how responsibilities are shared. The application must identify the administrative aspects (legal, economic, personnel) as well as professional responsibilities of the faculty members (including a description of their relevant professional background).

The application must identify the person(s) having overall administrative and professional responsibility of the course.

The application should list how many times the course has been arranged and, unless new, the number of students who have previously attended.

## 2.4 Students

The course programme should clearly state the acceptance requirements (professional skills/training) for candidates.

## 2.5 Curriculum

The detailed curriculum should be attached to the application. The curriculum should define contact hours, main topic and training objectives of each lesson (theoretical or practical) and identify the teacher or trainer responsible. The curriculum should demonstrate compliance with Appendix C in a structured way that is efficient to audit.

A course will usually be approved for either a Level 1 or a Level 2D approval. If the applicant would apply for dual approval (Level 1 and Level 2D), the application must clearly describe the extent and progression of training as well as examination for each separate course/level. The number of required training hours for such dual 1 and 2D approval would have to be the addition of required hours of Level 1 and Level 2D

The checklist demonstrating compliance with 'Contents of Modules' should be attached. If any non-compliance is identified, the reason for this should be explained or details offered of corrective actions to be implemented. Applicants are advised to use the "Training Objectives for a Diving Medicine Physician" (available on the DMAC website at [www.dmac-diving.org/guidance/DMAC29-EDTC.pdf](http://www.dmac-diving.org/guidance/DMAC29-EDTC.pdf) and also available from the [EDTC website](#)) and the ECHM-EDTC "Educational and Training Standards for Physicians in Diving and Hyperbaric Medicine" as a framework for actual course contents for Level 2D courses, though these training objectives are not considered a normative standard by DMAC.

The applicant may, on request, be required to submit the following documentation (in part or full) to be considered for review of approval of the course by DMAC/EDTCmed:

- ◆ PowerPoint presentations of selected lectures or other lecture material which allows the reviewers to adequately evaluate whether the content of the course is sufficiently relevant to commercial diving. The assessors may request translation into English language for up to 4 hours for a Level 1 course and up to 8 hours for a Level 2 course;
- ◆ List of cases presented on the course: type of diver, type of industry, problem discussed;
- ◆ Exam questions (see point 2.7).

## 2.6 Training Time

The actual training time for a Level 1 course should be a minimum of 25 lecture hours theoretical training and 3 hours practical training. A theoretical lecture period of 60 minutes will on average hold 50 minutes of formal contact time and a 10 minutes break. Accordingly, a level 1 course should hold a minimum of 20 hours of formal theoretical training contact time if breaks are not counted. A lecture period of 100 minutes should be followed by a minimum of 10 minutes break. A day of training should not include more than 400 minutes of formal contact training time (excluding breaks). Practical training may extend beyond this, but a schedule of a day of training (start of the first lecture until the end of the last lecture) should not be extended beyond 12 hours.

A level 2D course should be a minimum of 80 lecture hours of training (60 minutes per lecture period; see above). A level 2D course is advised to contain a minimum of 20 hours but preferably 24 hours or more of practical training.

Time for exam should not be included in the theoretical or practical training time.

Time spent on introducing the course, faculty and students should not be included in training time.

Student presence during training should be monitored, and requirement for presence clearly described in the information provided to the students. If some of the training time is mandatory, this should be clearly identified in the schedule and curriculum. If the course allows absence exceeding 10% of the training time, the application should detail how such lack of training would be compensated.

## 2.7 Computer Based Training

### 2.7.1 Introduction

DMAC/EDTCmed acknowledges the potential for computer-based training (CBT)/internet-based training. As long as the training objectives are reached, the applicant may include such training as part of the course (blended learning). Due to the requirement for practical training, DMAC/EDTCmed will not recognise basic Level 1 and Level 2D courses based on CBT alone (though this may be considered for some refresher courses of a Level 1). Furthermore, it is a requirement that the final examination includes tests of topics covered by CBT to verify that the student has actually gained sufficient knowledge of these topics covered by CBT. When CBT is included as part of the course, the applicant must ensure compliance with these requirements:

- ◆ Detailed curriculum of the CBT identical to paragraph 2.4 above/Appendix C must be submitted;
- ◆ The application must describe how the students are tested and training objectives are measured during the CBT session(s);
- ◆ The application must describe how the course ensures that the training objectives of the CBT are tested at the end of the course.

### 2.7.2 Virtual Classrooms

Teleconference modalities allow establishment of 'virtual classrooms'. Such virtual classroom training can be assessed similar to conventional classroom lectures, pending appropriate arrangements and technical solutions have been prepared. A non-interactive webinar is **not** accepted as a virtual classroom. Applications including virtual classroom training should in detail describe:

- ◆ Limitation of the number of students in the virtual classrooms;
- ◆ How attendance is monitored. The organizer should file documentation of virtual classroom attendance;
- ◆ By which means interaction between students and between students and teachers are facilitated and prepared;
- ◆ Scheduling of virtual classroom training.

### 2.7.3 CBT Training (Except Virtual Classrooms)

The training achievements of any training program will depend on a number of factors including teacher's competence and training skills, training material and the format of training (reading, listening, interaction, practical experience etc.). For CBT training, additional challenges may compromise training achievements, including AV quality, possibility for interaction and active participation.

- ◆ A level 1 course would be considered to last for four days if all training is based on conventional formal training. A level 1 course supported by CBT/e-learning should still last for a minimum of three days with formal training to allow interaction between students over sufficient time.
- ◆ A level 2D course is normally considered to last for two weeks if all training is based on conventional formal training. If some of the training is replaced by CBT/e-learning, the amount of formal/conventional training should still be at least seven days.
- ◆ The assessors may request translation in English language of CBT/e-learning material for a maximum of 4 hours for a level 1 course and maximum 8 hours for a level 2D course. The full CBT/e-learning material should be available for the assessors in the native language of the course organizers.
- ◆ Topics identified with competency level 'A' in the 'Curriculum checklist' may be provided by CBT without requirement for formal or virtual classroom training. In addition, the training in hyperbaric physics (Section 1.1 in the 'Curriculum checklist') may be trained by CBT on a level

1 course. Training in other topics may be supported by CBT but should include formal or virtual classroom training.

- ◆ Where a proportion of a lecture hour is conducted as e-learning, it is anticipated that the time requirement needed to achieve the required hours of learning will be doubled compared to traditional face-to-face training. This means that 2 hours of e-learning can be counted as 1 hour of lecture periods, adding towards to required hours for level 1 and 2D approval.
- ◆ Detailed curriculum of the CBT identical to section 2.4 above/Appendix C must be submitted. The number of study hours should be assessed according to the bullet point above.
- ◆ The application must describe how the students are tested/training objectives are measured during the CBT session(s).
- ◆ The application must describe how the course ensures that the training objectives of the CBT are tested at the end of the course.

## 2.8 Video Documentation

When a course is approved, the DMAC/EDTC working group may require the applicant to provide video documentation of a maximum of 3 contact hours of training from the next course (not necessarily in the English language) on DVD for review by the working group (any other format should be agreed in writing between the applicant and DMAC/EDTCmed). Based on the course curriculum, the DMAC/EDTCmed working group will decide at least 14 days before the course starts which contact hours the applicant is to video. Failure to provide video documentation will normally cause withdrawal of DMAC/EDTCmed recognition. If the video demonstrates some unsatisfactory teaching standards, the course director will be asked for a statement which should include his plans to revise the programme in the future.

## 2.9 Examination

Students receiving a course certificate or diploma should demonstrate sufficient knowledge according to the scope of the course. The application should detail how the students will be examined and the pass/fail criteria. A written examination is mandatory. If the course additionally holds a verbal and/or practical exam, the criteria for pass and fail should be described. The application should detail whether and how a student failing to meet the training standard could undergo re-examination. The applicant is requested to forward a representative sample (approximately 25%) of the exam questions (i.e. if the students are given 20 questions in the final exam, 5 representative questions should be forwarded). On request, the applicant should send the full set of exam questions.

## 2.10 Course Certification

An approved course is eligible to state in the diploma or course certificate that the course has been approved by DMAC/EDTCmed for training, as appropriate, of:

- ◆ Level 1 Medical assessment of divers (Medical Examiner of Divers);
- ◆ Level 2D Medical management of diving accidents and illnesses (Diving Medicine Physician).

DMAC/EDTCmed does not approve training of other categories of personnel and any non-physicians who participate in the course must not receive certificates that indicate DMAC/EDTCmed approval of training.

The course organizer must not issue certificates indicating DMAC/EDTCmed approval if the approval has not yet been granted, has expired or has been withdrawn. Inappropriate issuance of certificates may require DMAC to address this correspondingly and could result in loss of DMAC/EDTCmed approval.

## 2.11 Secrecy/Confidentiality

DMAC/EDTCmed may contact any member of the applicant's faculty directly for further information and/or review. When the application has been approved, DMAC/EDTCmed's final conclusion concerning that course will be made available on the EDTC, DMAC and IMCA websites. However, no information concerning course content or other details will be disclosed (see section 4). DMAC/EDTCmed may contact

students after completing the course to verify that the course actually complies with the guidelines. The course organiser will be informed before any such student contact is established. At the time of each course, the course organiser should request explicit consent from each student whether they can be contacted by DMAC via email for the purpose of quality control of courses.

## 2.12 Attachments

These attachments should follow the application. They are all to be submitted in an electronic format and numbered as detailed below:

- ◆ Annex 1: Time schedule
- ◆ Annex 2: Tabulated list of contact hours (as per administrative checklist Serial 9)
- ◆ Annex 3: Course curriculum
- ◆ Annex 4: CV of faculty members and senior lecturers
- ◆ Annex 5: Sample diploma/certificate for physicians and non-physicians
- ◆ Annex 6: Completed administrative checklist
- ◆ Annex 7: Completed Curriculum checklist
- ◆ Annex 8: For renewal applications: Summary of completed courses since last approval, responses from previous students and changes undertaken
- ◆ Annex 9 and onwards: Any other information, e.g. details of CBT training, e-learning and virtual classroom training.

## 2.13 Cost

Application fee is to be decided by DMAC/EDTCmed. Applicants should contact the DMAC Secretary for further information concerning cost and payment.

## 2.14 Period of Validity

Unless course content is changed, the approval period is three years. After this, the course must be reviewed by DMAC/EDTCmed. The course organizer is responsible for submitting a renewal application no later than 6 months before the end of the expiry period.

If any faculty members or the course curriculum are changed, the applicant is obliged to forward information on this to ensure that the course remains DMAC/EDTCmed-approved. Unless changes are significant, DMAC/EDTCmed will not request further fees for recognition of minor changes and this would not affect the running period of approval. If DMAC suspects that courses have been run with contents significantly deviating from that described in the application, this should be investigated by two assessors nominated as described in section 3.1. The assessors will advise the DMAC chairman on a recommended decision. The decision may be to request the course organizer provide further information or change the course contents or organization. In cases of significant, obvious or wilful negligence, approval may be temporary or permanently withdrawn. In case of withdrawal, the course organizer should respond to the decision at the latest within 31 days. The course organizer may appeal the decision to DMAC plenary. The DMAC chairman is granted authority to accept or reject postponed implementation of the decision until DMAC in plenary has agreed on the final decision.

## 3 DMAC/EDTCmed Internal Procedure for Reviewing Applications for Approval

### 3.1 DMAC/EDTCmed

The DMAC chairman will nominate a working group consisting of a minimum of two persons (the assessors) who shall be responsible for reviewing the applications. A representative of the EDTC Medical Subcommittee should be invited. The DMAC chairman should ensure that the nominated assessors have no potential conflict of interest or is unavailable. An assessor would be considered as having a potential

conflict of interest if he/she is a member of the faculty seeking approval or if he/she is employed or working within the institution arranging the course. An assessor may also be considered as having a conflict of interest if he/she has contributed to the design of the course or helped with the application, has been invited to lecture or has any financial interest related to the outcome of the application. Any cases of doubt concerning conflict of interest should be referred to the DMAC Chairman for final decision. He/she may refer to the EDTC National Co-ordinator where appropriate. If a working group member is considered to be in an unacceptable position of conflict of interest, he/she will be replaced by a reserve DMAC member.

The approval of an application is a DMAC effort and the identity of the members of a working group would not be provided.

The members of a working group have never been remunerated for the significant work involved in reviewing applications for approval and are conducting this work on a voluntary basis. DMAC therefore request that applications are submitted with due diligence towards compliance and in a manner which is efficient to audit.

### **3.2 Administrative Remarks**

The DMAC Secretary will acknowledge receipt of applications, advise the applicant if any critical documentation is missing and forward an invoice.

### **3.3 Application Review**

The working group will review the application. The aim is that the initial review would reach a conclusion within three months unless further documentation/information is needed. Re-assessments should reach a conclusion within two months of receipt of further information unless yet more documentation is needed. The conclusion is forwarded by the working group to the DMAC Secretary for approval and issuing of a letter of approval/refusal. Recommendation of approval is based on the contents of forwarded information. In letters, refusal points of criticism will be outlined. If the members of the working group disagree, a final decision will be made by the DMAC Chairman.

### **3.4 Complaints/Appeal**

If the applicant contests the decision, an appeal procedure is initiated through the DMAC Chairman. The appeal will be decided by a committee consisting of 3 members. One assessor is nominated by the DMAC chairman, a second assessor nominated by the chairman of EDTCmed and a third assessor jointly nominated by the DMAC chairman and the EDTCmed chairman. The same time frames for approval work would apply.

## **4 DMAC Website**

DMAC will update a list of approved courses with such contents:

- ◆ Course organiser (name or institution);
- ◆ Level of course (1 or 2D);
- ◆ Dates of current DMAC approval period;
- ◆ List of previous courses approved;
- ◆ Expiry dates of past DMAC approvals;
- ◆ Practical details (contact names, e-mail addresses, scheduled courses and similar, etc.) (*optional*).

There is a link to this information from the [IMCA website](#).

## **5 Revision History**

- ◆ Details of revision from the original version to Rev. 1 (January 2006) is unknown.

- ◆ Rev. 2 (January 2014): details in course curriculum changed based on the 2011 revision of EDTC training standards. Requirements for a detailed curriculum specified. Procedure for handling the application detailed. Formatting requirements for course curriculum specified. Specification of training for Level I courses added (Appendix D).
- ◆ Rev. 3 (November 2018): a new chapter of definitions and abbreviations included. Assessment of CBT training specified. Appeal procedure adjusted. Nominal training time described with respect to contact time and breaks. Maximum training time per day stipulated. Requirement for student presence defined. Introductory chapter revised. A large number of editorial changes. Description of withdrawal of approval in case of significant changes in course contents not informed to DMAC. Revision of details relating to certificate of competency including IDMEB.

## Practical Application Procedure

To ensure compliance with DMAC/EDTCmed requirements, two checklists for applicants have been developed. The applicant should complete these carefully and must send them in an electronic format. All the information asked for must be documented, e.g. in course curricula, lecture objectives, enclosed CVs, course information folders, etc. It is not acceptable simply to state that 'this will be covered'. It is mandatory that all documents describing the course (i.e. course descriptions, time schedule, syllabus, curriculum) are provided in the English language. It is not requested that the specific training material for student use (handouts, presentations, textbooks etc) is translated and submitted at the initial application, but such training material may be requested (and if needed translated into English) as described in section 2.5. DMAC/EDTCmed strongly endorses development of a course manual compiling this information.

The applicant should consider focusing on three areas considered essential to receive DMAC/EDTCmed approval:

- ◆ The course should have a well reputed faculty and all teachers should demonstrate a high level of appropriate and relevant professional skills. When giving the CVs, there is no need to list all scientific publications of each member of the faculty.
- ◆ Though some flexibility in timing and order of lessons may be necessary and sometimes even beneficial, the course should have a stringent and well-defined structure and well-defined contents of its different modules. The contents of a course should contain clear and sufficient subject material, adequately covering the many aspects of professional and industrial diving activities.
- ◆ A practical demonstration of the acquired skills (examination) should be clearly defined.

DMAC/EDTCmed requires that a student receiving a diploma or course certificate indicating that DMAC/EDTCmed has approved the course must attend at least 80% of course lessons and that they must have demonstrated to the course director the level of skill achieved. However, DMAC/EDTCmed accepts that a number of students may want to attend some part(s) of the course and/or not present for a final exam. The applicant may issue diplomas or course certificates to such students, but such certificates must not indicate that the course is DMAC/EDTCmed approved and these students will not be accepted for listing as having attended a DMAC/EDTCmed approved course.

Two checklists have been prepared. The first is directed mainly towards course formalities and the second identifies required course content.

## Administrative Checklist

Fill in columns 'Applicant's reference and comments' and 'Complies Yes/No'.

|    | Applicant's reference and comments  | Complies Yes/No | DMAC/EDTCmed Comments |
|----|---|-----------------|-----------------------|
| 1  | Is an application letter enclosed, explaining course general background, previous courses, contents, etc.?  |                 |                       |
| 2  | Does the application letter state which category course is approval sought for? (Ref. section 2.1)  |                 |                       |
| 3  | Is this letter signed by both the professional and the administrative personnel responsible for the course?   |                 |                       |
| 4  | Does the application letter list and number all attachments and are these attachments numbered as stated in section 2.12?   |                 |                       |
| 5  | Is the organisation of the course, including faculty, clearly described?  |                 |                       |
| 6  | Are all faculty members listed by name, address, telephone and e-mail?  |                 |                       |
| 7  | Are CVs for all teachers attached? (no need to list scientific publications in a CV)  |                 |                       |
| 8  | Is a detailed time schedule for the course attached?  |                 |                       |
| 9  | Is a tabulated list of total contact hours attached, divided into classroom lectures and practical exercises? (The time schedule is not considered a tabulated list – this should be a separate document or table within the application listing lectures and contact time.)    |                 |                       |
| 10 | Is the course curriculum (describing the training objectives of each lesson) attached? (Please ensure compliancy with Appendix C.)  |                 |                       |
| 11 | Is a sample of 25% of the exam questions (with answer keys if MCQ) included?  |                 |                       |
| 12 | Does the application describe in detail how the students will be tested after the finished course?  |                 |                       |
| 13 | Does the application describe pass/fail criteria and the possible way of re-examining failed students?  |                 |                       |
| 14 | Does the application describe the requirement for attendance in order to receive a diploma/course certificate at the end of the course?   |                 |                       |
| 15 | Does the application describe how this attendance will be monitored?  |                 |                       |
| 16 | Does the application describe course literature given to the student or required by the course faculty?   |                 |                       |
| 17 | Does the application describe, in reasonable detail, how practical exercises and practical training will be completed ( <i>to a level assuring DMAC that sufficient equipment, space and planning will ensure success</i> )?  |                 |                       |
| 18 | Does the application describe the need for and availability of AV equipment?  |                 |                       |
| 19 | Does the application describe access to basic logistic support functions (e.g. photocopying, meals, etc.)? <i>DMAC/EDTCmed does not question details in this matter but wants to avoid that neglect of practical issues may disturb the professional outcome of the course.</i> |                 |                       |
| 20 | Has the course been recognised by any national or other international authority or organisation?  |                 |                       |
| 21 | Is a sample of a course diploma/course certificate enclosed?  |                 |                       |
| 22 | Is a sample of a course diploma/course certificate for students not passing the exam or failing the attendance requirement enclosed?  |                 |                       |
| 23 | Has the applicant confirmed willingness to provide video documentation of a maximum of three contact hours for post-course review?  |                 |                       |
| 24 | Are both checklists filled in and enclosed with the application in Microsoft Word format?   |                 |                       |
| 25 | Are all documents written in English and in an electronic format?   |                 |                       |

## Curriculum Checklist

The topics of this table represent the corresponding chapters in the training objectives (Appendix 2 of the ECHM-EDTC “Educational and Training Standards for Physicians in Diving and Hyperbaric Medicine” 2011). Fill in columns ‘Applicant’s reference and comments’ and ‘Complies Yes/No’. ‘Yes’ means that the teaching module of the applicant’s course complies with all the items in the ‘training objectives’. For a Level 2D course, a ‘No’ compliance should be given if the amount of training for a certain subject is less than stipulated in the ECHM-EDTC training standard. If a course is considered qualified as a combined Level I and Level 2D course, care should be given to describe how topics are taught and training progressed for each module/level.

| Topic   | I | 2D | Applicant’s reference and comments | Complies Yes/No | DMAC/EDTCmed Comments |
|---|---|----|------------------------------------|-----------------|-----------------------|
| <b>1 Physiology and pathology of diving and hyperbaric exposure</b>   |   |    |                                    |                 |                       |
| 1.1 Hyperbaric physics  | B | C  |                                    |                 |                       |
| 1.2 Diving related physiology (functional anatomy, respiration, hearing and equilibrium control, thermoregulation)      | B | C  |                                    |                 |                       |
| 1.3 Hyperbaric physiology of immersion  | B | C  |                                    |                 |                       |
| 1.4 Pathophysiology of decompression  | B | C  |                                    |                 |                       |
| 1.5 Acute dysbaric disorders: a brief introductory section  | B | C  |                                    |                 |                       |
| 1.6 Chronic dysbaric disorders (long term health effects)   | B | C  |                                    |                 |                       |
| 1.7 HBO basics – physiology and pathology   | - | B  |                                    |                 |                       |
| 1.8 Oxygen toxicity   | A | C  |                                    |                 |                       |
| 1.9 Pressure and inert gas-effects  | A | C  |                                    |                 |                       |
| 1.10 Medication under pressure  | B | C  |                                    |                 |                       |
| 1.11 Non-dysbaric diving pathologies  | A | C  |                                    |                 |                       |
| <b>2 Diving technology and safety</b>   |   |    |                                    |                 |                       |
| 2.1 Basic safety planning   | B | B  |                                    |                 |                       |
| 2.2 Compressed air work   | B | B  |                                    |                 |                       |
| 2.3 Diving procedures   | B | C  |                                    |                 |                       |
| 2.4 Characteristics of various divers   | B | B  |                                    |                 |                       |
| 2.5 Diving equipment  | B | B  |                                    |                 |                       |
| 2.6 Diving tables and computers   | B | B  |                                    |                 |                       |
| 2.7 Regulations and standards for diving  | A | B  |                                    |                 |                       |
| 2.8 Saturation diving   | B | C  |                                    |                 |                       |
| <b>3 Fitness to dive</b>  |   |    |                                    |                 |                       |
| 3.1 Fitness to dive criteria and contraindications (for divers, tunnel workers and HBOT patients and chamber personnel) | C | C  |                                    |                 |                       |
| 3.2 Fitness to dive assessment  | C | C  |                                    |                 |                       |
| 3.3 Fitness to dive standards (professional and recreational)   | C | C  |                                    |                 |                       |
| <b>4 Diving accidents</b>   |   |    |                                    |                 |                       |
| 4.1 Diving incidents and accidents  | A | C  |                                    |                 |                       |
| 4.2 Emergency medical support (with no chamber on site)   | - | C  |                                    |                 |                       |
| 4.3 Decompression illness   | A | C  |                                    |                 |                       |
| 4.4 Immediate management of decompression illnesses: recompression tables and strategies                                | A | C  |                                    |                 |                       |
| 4.5 Rehabilitation of disabled divers   | - | A  |                                    |                 |                       |
| 4.6 Diving accident investigation   | - | A  |                                    |                 |                       |

| Topic  | I | 2D | Applicant's reference and comments | Complies Yes/No | DMAC/EDTCmed Comments |
|--|---|----|------------------------------------|-----------------|-----------------------|
| <b>5 Clinical HBO</b>  |   |    |                                    |                 |                       |
| 5.1 Chamber technique (multiplace, monoplace, transport chambers, wet recompression) | - | B  |                                    |                 |                       |
| 5.2 HBO: Mandatory indications   | - | A  |                                    |                 |                       |
| 5.3, HBO: Recommended indications  | - | -  |                                    |                 |                       |
| 5.4 HBO: Experimental and anecdotal indications                                      | - | -  |                                    |                 |                       |
| 5.5 Data collection/statistics/evaluation  | - | B  |                                    |                 |                       |
| 5.6 General basic treatment (nursing)  | - | B  |                                    |                 |                       |
| 5.7 Diagnostic, monitoring and therapeutic devices in chambers                       | - | C  |                                    |                 |                       |
| 5.8 Risk assessment, incidents monitoring and safety plan in HBO chambers            | - | B  |                                    |                 |                       |
| 5.9 Safety regulations   | - | C  |                                    |                 |                       |
| <b>6 Miscellaneous</b>   |   |    |                                    |                 |                       |
| 6.1 Research standards   | - | A  |                                    |                 |                       |
| 6.2 Paramedics teaching programme  | - | B  |                                    |                 |                       |
| 6.3 Management/organisation of HBO facility  | - | A  |                                    |                 |                       |
| <b>7 Practical training</b>  |   |    |                                    |                 |                       |
| 7.1 Fitness of course participants   | + | +  |                                    |                 |                       |
| 7.2. Practical revision of examination skills  | + | +  |                                    |                 |                       |
| 7.3 Practice in HBO-T (including pressure test and experience of nitrogen narcosis)  | - | +  |                                    |                 |                       |
| 7.4a CPR   | - | +  |                                    |                 |                       |
| 7.4 Practice in field first aid (diving accidents)                                   | - | +  |                                    |                 |                       |
| 7.5 Underwater experience  |   |    |                                    |                 |                       |
| – (Level I) – recommended  | + | +  |                                    |                 |                       |
| – (Level 2D) – exceptions possible, if important reasons or unfitness to dive        |   |    |                                    |                 |                       |
| 7.6a Demo: Professional diving   | + | +  |                                    |                 |                       |
| 7.6b Demo: HBO-T   | - | +  |                                    |                 |                       |

**Levels of competence:**

- A Basic (Aware of subject)
- B Need to know (Familiar with subject)
- C Expert (Detailed understanding of subject)

**Requirement:**

- Optional
- + Required

## ECHM-EDTC Standards for Course Organisation and Certification

### Teaching Courses

The standards do not prescribe the status of the teaching institution, but it is strongly recommended that courses are university-based, are approved for such training courses by national health authorities, speciality training boards or are under the auspices of the national scientific society for diving medicine and/or hyperbaric medicine.

How a course is to be organised is not prescribed in these standards. Evenings, weekends or full weeks are possible. Distance and web-based learning can be considered. For clinical teaching, an internship or residency may be appropriate. The acknowledgement of a high teaching standard is based on a credible final test of the candidates.

### Modules and Course Organisation

The actual organisation and conduct of the modules will be influenced by local factors and so it is proposed that these details can be decided on a national basis and probably left to the individual course directors. The following proposal indicates the total teaching hours considered necessary to achieve appropriate competencies in the following jobs:

- ◆ Level I Medical examiner of divers 25 lecture hours + 3 hours practical
- ◆ Level 2D Diving medicine physician 80 learning hours\*

\*The 80 learning hours may be divided in contact hours (lectures) and individual study hours as e.g. web-based training.

If a training programme is considered sufficient for a combined Level I and Level 2D approval, the amount of training should at least include the sum of hours listed above.

In order to take into account the development of modern educational techniques a credit system can be used with a conversion rule ensuring that all content of the DMAC/EDTCmed syllabus will be presented to the students regardless of the method.

### Certificate of competence as diving medicine physician or medical examiner of divers

The "Educational and Training Standards for Physicians in Diving and Hyperbaric Medicine by EDTC-ECHM" 2011 defines the volume and training objectives of Level I and Level 2D courses as described above. The respective certificates attest that the candidate has got the knowledge base according to the training level of diving medicine. After further practical training, diving medicine physicians can apply for a certificate of competence. The motivation to introduce such an upgraded level was that the industry needs diving medical physicians with a combination of skills and experience required for the medical support of diving or compressed air operations. The amount of additional training as well as the procedure for final assessment to get the certificate, as "Diving Medical Advisor for occupational divers and compressed air workers (DMA)" are described in a standard by EDTC ("EDTC competence standards for physicians of occupational diving and tunnelling companies"), specified and implemented by the certifying board IDMEB (see [www.edmd.eu](http://www.edmd.eu)).

Certificates of competence have a limited period of validity and need to be renewed according to the continuous professional development (CPD) conditions, specified by IDMEB.

This upgrade certification is not the responsibility of DMAC and therefore not part of the DMAC 29 guidance.

[Note that DMAC only approves courses in diving medicine and such approval will be given for a limited period but does not limit the period of validity for individual diplomas awarded to the students after such courses].

### Continuing Education

In most countries, the conditions for maintaining the active status of an individual are defined by a system of continuing medical education credits or professional development (CME or CPD). ECHM and EDTC defined the minimum requirement for this in a flexible way that provides enough freedom for other bodies to establish a more

detailed system. The certificate for approved Medical Examiner of Divers (MED) and Diving Medicine Advisor (DMA) have a limited time of value, thus need renewal, while the diploma of the training course 1 and 2D do not require a refresher as they do not certify a competency. A system for reapproval based on a CPD-Logbook for approved MEDs and occupational DMAs has been developed by IDMEB (see [www.edmd.eu](http://www.edmd.eu)).

The recommendations are the following:

◆ **Job 1 (MED)**

A minimal activity of ten medical assessments of professional divers' fitness per year is expected from the MED plus attendance of a refresher course (usually two days) at least once every 5 years. Alternatively, reactivation after a lapse needs participation in two two-day refresher courses or a repeat of the full basic course.

◆ **Job 2D (DMP)**

Continuing experience in the field of professional diving (e.g. advising a professional diving contractor or some equivalent activity) and participation in a course or congress previously approved by the national co-ordinator. The various activities are validated according to an agreed score. The activities are therefore monitored in a logbook. Reactivation after a lapse should be on the basis of a specifically approved course. Where this cannot be achieved, the candidate should submit an alternative training programme to the national co-ordinator for approval.

### **The Joint Medical Subcommittee of ECHM and EDTC**

This committee operates as an editing group on the basis of the tasks outlined in the training standards for diving and hyperbaric medicine ECHM-EDTC as outlined at [www.edtc.org](http://www.edtc.org). In order to supervise the national training programs, certification procedures and the status of course directors, each country nominates a national coordinator. This coordinator may be an EDTC or ECHM representative or they may delegate this task to a national health and safety authority or any representative scientific body covering all aspects of hyperbaric medicine. National coordinators are an integral part of the European Diving Medical Databank (EDMD) under supervision of IDMEB (see [www.edmd.eu](http://www.edmd.eu)) and they will liaise with the chairman of DMAC when appropriate.

## Course Curriculum – Formatting Requirements

### Description of Individual Lectures

DMAC/EDTCmed requires each lecture to be uniquely identified and contents to be described in sufficient detail to allow the assessors to review the content. For each lecture, the minimum description should include:

- ◆ A unique identifier (e.g. a serial number);
- ◆ Lecture title;
- ◆ Objective (what is expected to be learnt);
- ◆ A listing of the major topics to be discussed/presented/practised;
- ◆ Cross reference to the relevant section of the curriculum checklist;
- ◆ Training time (exact with pauses excluded);
- ◆ Trainer/lecturer competency;
- ◆ Location of training (e.g. classroom, medical office, recompression chamber) and particular requirements for equipment.

A sample of a theoretical training lecture and a practical demonstration is presented below. The order does not have to comply with the examples given, but the topics listed above should be included.

### Example I

#### *Civilian occupational and recreational diving*

#### **Lecture unique ID#**

2

#### **Objective**

Present training and operational application of civilian occupational and recreational diving

#### **Trainer competency**

Instructor with in-depth knowledge of civilian diving. Medical qualification not required

#### **Time**

40 min

#### **DMAC/EDTC cross reference**

2.1; 2.2; 2.3; 2.4; 2.5

#### **Detailed content**

##### Recreational diving:

Main training organisations (CMAS, NAUI, PADI)

Training levels

Diving equipment applicable for recreational diving

Annual certification number

Safety estimates: mortality and DCS incidence

##### diving:

Training, training standards, training level (recreational diving instructors, archaeological divers, scientific divers, conventional occupational scuba and light surface supplied diving, hard hat diving, saturation diving)

Diving equipment and diving methods (scuba, surface supplied, SurD O<sub>2</sub>, mixed gas, saturation)

**Location/training equipment**

Classroom training, conventional AV equipment. Video showing recreational and/or occupational diving optional.

**Example 2****Demonstration – Diving equipment****Lecture unique ID#**

3

**Objective**

Present (demonstrate) basic diving equipment used in recreational, military and occupational diving

**Trainer competency**

Instructor with in-depth knowledge of occupational diving. Medical qualification not required

**Time**

40 min

**DMACIEDTC cross reference**

2.5; 7.6

**Detailed content**

The students should be presented (hands-on training) conventional diving equipment including at least:

Mask, snorkel, fin

Diving suit

Tank, regulator

Full-face mask

KMB mask or similar

Diver communication

“Diving station” with gas distribution panel

Dive computer, hot-water suit and hard hat rig to be explained unless physically available on site

**Location/training equipment**

Preferably at a diving site, but equipment garage or classroom acceptable as long as the students get “hands-on” experience inspecting and possibility to try (dry) the equipment.

## Specification of Training – Level I Courses

### Background

The review/assessment of applications of Level I courses has identified limitations of the course curriculum specification as listed in the 'Curriculum checklist' above. Based on this, DMAC has decided to further identify minimum theoretical and practical training in some areas considered essential for medical examiners of divers who are involved with working divers. DMAC would like to ensure that courses approved as Level I courses actually provide the training necessary to conduct a proper medical examination of professional diver. This Appendix focuses on the training related to the Fitness to Dive Examination.

### Extent of Training

As for the theoretical part, DMAC requires the applicant to describe in detail how the training requirements in Appendix A, Curriculum checklist and section 3 ('Fitness to dive') are met. The applicant should describe the theoretical/classroom training in sufficient detail for DMAC to ensure that the student achieves detailed knowledge of the health requirements for professional diving.

An absolute minimum of 5 (five) lecture hours related to fitness to dive examinations are required for a course to be approved. At least 3 (three) lecture hours should be dedicated to the practical clinical aspects of such examination. To be approved as a Level I course the applicant must demonstrate how these parts of the training are provided:

- ◆ Spirometry: proper execution, common errors, interpretation of results (including flow-volume curves), follow-up procedures depending on results; practical demonstration of spirometry operation during the course is required;
- ◆ Audiometry: proper execution, common errors, interpretation of results, follow-up routines, specialist referral criteria; practical demonstration of audiometry during the course is useful when possible but not essential;
- ◆ Neurological examination: proper execution, interpretation of results, follow-up routines; practical demonstration of neurological examination during the course is required;
- ◆ ECG: proper execution, common errors, interpretation of results, follow-up procedures; practical demonstration of ECG during the course is not required;
- ◆ Ergometry: assessment of work capacity through formal testing (indirect or direct assessment of maximum VO<sub>2</sub> or other standardised test). Practical demonstration during the course is not required.

Though it is a requirement to include all these topics (listed in bullets above) in the training, it is not required that each student should practise the techniques during the course. However, the course provider should explain how such training is provided during the course.

Although valuable, time spent on visiting diving sites/schools, related videos and case presentations should not be to the detriment of teaching time which would ensure that the candidates are competent in the above clinical topics by the end of the course.

### Case Studies

A minimum of one lecture hour is expected to be composed by case discussions related to FTD examinations. The students should be exposed to a minimum of ten cases during their training, a minimum of five of these should be presented in virtual or formal classrooms allowing students to discuss them in groups.

### Occupational Medicine, Risk Assessment, Health Surveillance

The application should describe how the principles and concept of health risk assessment is presented and discussed with the students. The application should describe how students are taught the differences between medical assessment of fitness to dive based on health risk assessments of work place hazards.

The principles of occupational health surveillance need to be explained so that the students are adequately aware.

The possible legal implications for employers of divers of the occupational medical aspects of diving needs to be explained so that students would be become adequately aware what their limitations are from an occupational medical perspective and when to involve the expertise of a diving physician who is also trained in occupational medicine.