

# **Offshore Diving Supervisor and Life Support Technician Certification Schemes**

## **Minimum Requirements for Certification**



**The International Marine Contractors Association (IMCA) is the international trade association representing offshore, marine and underwater engineering companies.**

IMCA promotes improvements in quality, health, safety, environmental and technical standards through the publication of information notes, codes of practice and by other appropriate means.

Members are self-regulating through the adoption of IMCA guidelines as appropriate. They commit to act as responsible members by following relevant guidelines and being willing to be audited against compliance with them by their clients.

There are two core activities that relate to all members:

- ◆ Competence & Training
- ◆ Safety, Environment & Legislation

The Association is organised through four distinct divisions, each covering a specific area of members' interests: Diving, Marine, Offshore Survey, Remote Systems & ROV.

There are also five regional sections which facilitate work on issues affecting members in their local geographic area – Asia-Pacific, Central & North America, Europe & Africa, Middle East & India and South America.

### **IMCA D 013 Rev. 3**

This latest revision reflects the continuing focus on competence of offshore diving supervisors and life support technicians and identifies changes in the examination application procedures.

In particular, it now sets out or clarifies:

- i) the criteria for becoming a trainee diving supervisor, including the need to demonstrate competence as a diver (sections 4.1.1 and 4.1.2);
- ii) the time interval allowed between successful completion of an approved training course and sitting the IMCA examination (4.2.1(d), 4.2.2(e), 4.2.3 (e));
- iii) changes to the training requirements for bell divers to be appointed as assistant LSTs (12.1)

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*The information contained herein is given for guidance only and endeavours to reflect best industry practice. For the avoidance of doubt no legal liability shall attach to any guidance and/or recommendation and/or statement herein contained.*

# IMCA Offshore Diving Supervisor and Life Support Technician Certification Schemes

## Minimum Requirements for Certification

IMCA D 013 Rev. 3 – February 2007

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# Part I – IMCA Offshore Diving Supervisor Certification Scheme

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## 1 Introduction

This document sets out the requirements of the IMCA Offshore Diving Supervisor Certification Scheme.

## 2 Scheme Background

In the early years of commercial diving in support of the oil industry in the North Sea, the diver in the water was normally supervised (i.e. watched over from the surface) by one of the other divers. As techniques and equipment developed, some of the more experienced divers became recognised as supervisors and many of those who demonstrated a capacity for this responsibility ceased to dive and became full time supervisors.

Legislation in the UK, Norway and other countries introduced since the 1970s requires that the diving supervisor be responsible for all aspects of the diving operation which he is controlling and that he must not dive himself unless another properly appointed diving supervisor is present and has taken over responsibility for the operation. It also requires that the supervisor should have been a diver with suitable experience.

The diving contractor, who in such areas is required by law to appoint the diving supervisor in writing, relied in the past upon personal assessment as the principal method of selection, although a number of offshore contractors organised in-house examinations and training courses.

In early 1984, the Association of Offshore Diving Contractors (AODC), the forerunner of IMCA, started work on developing a scheme to provide an industry-wide training and certification standard. The scheme formally commenced on 1 January 1987 and provided for a 'grandfather' period during which time existing personnel were expected to have passed the examinations. Since 1 July 1992 all candidates for the diving supervisor examinations must have progressed in accordance with the relevant training sequence set down in this document.

## 3 Scope

The IMCA Offshore Diving Supervisor Scheme covers all offshore personnel either acting as a diving supervisor or superintendent or gaining experience in order to become one. It applies to personnel supervising dives in the water using surface orientated (air) and bell diving techniques (hereinafter called 'air diving' and 'bell diving' respectively). This document also addresses the role of the diving supervisor in relation to a diving operation and the qualities required of a diving supervisor.

The basic requirements in order to commence training as a diving supervisor are laid down, together with the normal route for gaining experience, leading to appointment as a diving supervisor.

'Terminal Objectives' highlight the training needs of potential diving supervisors and the essential requirements of training courses and examination procedures provide for the certification of successful candidates.

## **4 Terminology, Responsibilities and Career Structure**

(See figures 2, 3 and 4 on pages 7-9)

### **Diving Supervisor**

The term 'diving supervisor' is legally defined in a number of countries. It refers to a person who has relevant experience and who has been formally appointed by his company.

Both offshore air and bell diving are covered. A supervisor who is qualified to take charge of an air operation only is not qualified to take charge of a bell operation. A bell diving supervisor may be qualified to take charge of both operations, depending on his previous experience and provided that his company is satisfied as to his competence.

Any person acting as a diving supervisor, whether as an assistant, relief or second supervisor, should be fully qualified under the terms and conditions of this scheme and should be appointed in writing by his company.

### **Responsibilities**

The supervisor's responsibilities are both legally defined and laid down in company procedures. In the unlikely event of any conflict between a country's diving regulations and company procedures, the diving regulations must take precedence. Diving supervisors are advised to clarify any such anomalies before the diving operation starts.

Generally speaking, the responsibilities of a diving supervisor are to:

- ◆ ensure the safety of the diving team and any other persons who may be engaged in the operation;
- ◆ complete the work to the satisfaction of the clients.

Supervisors' duties may be summarised as follows:

- ◆ to ensure that the diving operation is carried out in accordance with regulations and procedures, that all plant and equipment and suitable facilities (including emergency facilities) necessary for the safe conduct of the operation are available and properly maintained and certified;
- ◆ to ensure that the diving operation is carried out from a suitable and safe place; that the diving team consists of an appropriate number of suitably qualified personnel who are all medically fit (this includes being free from the influence of drugs and alcohol) and to take all reasonable precautions to ensure the safety of those engaged in the diving operation;
- ◆ to ensure that the members of the diving team are aware of the company's diving rules; that the divers' medical certificates are in order; and that all equipment is checked before the start of a diving operation in accordance with specific national regulations;
- ◆ to consult with the master of the vessel or installation manager about the conduct of the diving operation, maintain the diving operation logbook and sign divers' logbooks;
- ◆ to be present and in control while there is a diver in the water or under pressure and to report any accident or incident which led, or might have led, to serious injury.

### **Aim of Supervision**

The aim of supervision is to get the job done safely and to the satisfaction of both the client and the employer, to which end the diving supervisor should build a successful team by considering and developing the individuals in the team. This calls for certain management and leadership skills and, in addition to initial theoretical training and offshore practical experience, a diving supervisor will be expected to have undertaken basic leadership training aimed at identifying situations which may arise and preparing the supervisor for decision making, problem solving and general man-management.

## Responsibilities to the Company

These responsibilities will be defined in the company procedures manual and will vary from company to company. The supervisor should check these responsibilities carefully when he moves to a new company. The supervisor may report directly to the project manager or operations manager, or work under a senior diving supervisor or superintendent. Offshore, he will work closely with the client or his representative. Although the client will define the work to be done, only the supervisor may take the decision to dive.

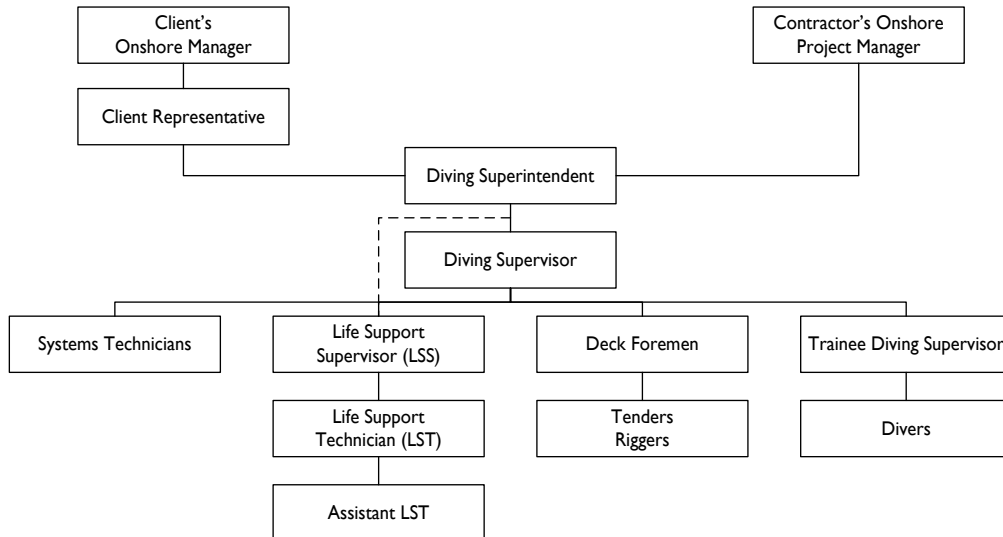


Figure 1 - Typical (but non-exclusive) Organogram

## 4.1 Trainee Diving Supervisor

This refers to a diver who has satisfactorily completed a diving supervisor training programme (designed to comply with this scheme) but who is gaining offshore experience prior to passing the IMCA theory examination(s) and subsequent formal appointment as a diving supervisor.

**Initially, a trainee diving supervisor should only be allowed to supervise for short periods and always with a properly appointed diving supervisor present. As his experience increases, these periods may be extended. However, a diving supervisor should remain in charge of the diving operation at all times and should not delegate his responsibility to the trainee.**

### 4.1.1 Trainee Air Diving Supervisor

To qualify as a trainee air diving supervisor, a candidate must meet the following minimum criteria:

- Hold an IMCA-recognised surface supplied diving qualification as set out in the IMCA International Code of Practice for Offshore Diving (IMCA D 014). Anyone who has comparable training and experience may be referred to the IMCA Schemes Administrator for a decision by the Assessment Panel.
- Have demonstrated competence as an offshore air diver in accordance with IMCA C 003 Rev.1 (Competence Assurance and Assessment) and have completed 100 offshore commercial dives.
- Have satisfactorily completed an IMCA-approved Trainee Air Diving Supervisor training course which meets the Terminal Objectives of this scheme (see page 12) and have passed the course examination. **Candidates are not eligible to attend such courses until they have complied with criteria a and b above.**

#### 4.1.2 Trainee Bell Diving Supervisor

To qualify as a trainee bell diving supervisor, a candidate must meet the following minimum criteria:

- a) Hold an IMCA-recognised closed bell diving qualification as set out in the IMCA International Code of Practice for Offshore Diving (IMCA D 014). Anyone who has comparable training and experience may be referred to the IMCA Schemes Administrator for a decision by the Assessment Panel.
- b) Have demonstrated competence as an offshore bell diver in accordance with IMCA C 003 Rev.1 (Competence Assurance and Assessment) and have completed 400 lockout hours.
- c) Have satisfactorily completed IMCA approved Trainee Air and Bell Diving Supervisor training courses which meet the Terminal Objectives of this scheme (see page 13) and have passed the course examinations. **Candidates are not eligible to attend such courses until they have complied with criteria a and b above.**

### 4.2 Diving Supervisor

This is the main grade and covers qualified and experienced personnel, the main responsibilities of which are summarised above and which may also be defined in law for the area of operation.

#### 4.2.1 Air Diving Supervisor

Having qualified as a trainee in accordance with 4.1.1 above, personnel must additionally fulfil the following minimum requirements before being appointed in writing by a diving contractor as an air diving supervisor:

- a) Have logged at least 200 panel hours (under direct supervision) offshore on a minimum of 100 surface dives over a minimum period of 60 days working as a trainee air diving supervisor.
- b) Have demonstrated competence as an offshore air diver in accordance with IMCA C 003 Rev.1 (Competence Assurance and Assessment) and have completed a total of 200 offshore commercial air dives.
- c) Have been recommended by a company following satisfactory offshore reports confirming competence in accordance with the IMCA guidance on competence assurance and assessment.
- d) Have passed IMCA examination Module 1. N.B. Application to sit the examination must be made within three years of successful completion of the training course and at least half the required panel hours should have been obtained in the two years prior to the application being made.

#### 4.2.2 Bell Diving Supervisor

Having qualified as a trainee in accordance with 4.1.2 above, personnel must additionally fulfil the following minimum requirements before being appointed in writing by a diving contractor as a bell diving supervisor:

- a) Have acted as a trainee air diving supervisor on at least 10 offshore commercial air dives.
- b) Have logged at least 350 panel hours (under direct supervision) offshore on a minimum of 50 bell runs over a minimum period of 90 days working as a trainee bell diving supervisor.
- c) Have logged at least 360 panel hours at any time working either as an LST or as an assistant LST.
- d) Have been recommended by a company following satisfactory offshore reports confirming competence in accordance with the IMCA guidance on competence assurance and assessment.
- e) Have passed IMCA examination Modules 1 and 2. N.B. Application to sit the examinations must be made within three years of successful completion of the training courses and at least half the required panel hours should have been obtained in the two years prior to the application being made.

### 4.2.3 Air Diving Supervisor to Bell Diving Supervisor

A qualified air diving supervisor who has demonstrated competence in accordance with IMCA C 003 Rev.1 (Competence Assurance and Assessment) and supervised a minimum of 100 offshore air dives and who wishes to progress to bell diving supervisor does not have to resit the air diving supervisor examination module, but must fulfil the following minimum requirements before being appointed in writing by a diving contractor as a bell diving supervisor:

- a) All aspects of 4.1.2.
- b) Have logged at least 150 panel hours (under direct supervision) offshore on a minimum of 20 bell runs over a minimum period of 45 days working as a trainee bell diving supervisor.
- c) Have logged at least 360 panel hours at any time working either as an LST or as an assistant LST.
- d) Have been recommended by a company following satisfactory offshore reports confirming competence in accordance with the IMCA guidance on competence assurance and assessment.
- e) Have passed IMCA examination Module 2. N.B. Application to sit the examination must be made within three years of successful completion of the training course and at least half the required panel hours should have been obtained in the two years prior to the application being made.

### 4.3 Senior Diving Supervisor or Diving Superintendent

This is the most senior grade and is a qualified diving supervisor with considerable experience. He is appointed by the diving contractor to be in control of a major diving operation with at least one other diving supervisor reporting to him. He has the authority to forbid the start and to order the termination of any diving operation for safety reasons.

He may only order the start of a diving operation if he is acting as the diving supervisor.

He may act as a diving supervisor for part of the operation but otherwise he normally has overall responsibility, whilst any diving supervisor on duty is legally responsible for the operation for which he has been appointed.

### 4.4 Company Responsibility

The IMCA Offshore Diving Supervisor Certification Scheme is principally concerned with the training and experience necessary to allow an experienced diver to function safely and efficiently as a diving supervisor.

Companies should ensure that trainee diving supervisors are closely monitored offshore, encouraged to seek help and given guidance to areas requiring improvement. The company should be totally satisfied that a trainee has adequate experience and is sufficiently competent to progress to diving supervisor before putting him forward for the IMCA diving supervisor examinations.

Before his first appointment as a diving supervisor, he should complete a company familiarisation programme, followed by an assessment on the company's diving rules, manuals and safety procedures. The length of such training should depend on the diving supervisor's ability and previous experience. The satisfactory completion of the assessment should be recorded and authenticated by the company in the diving supervisor's personal logbook. Such company familiarisation programmes and confirmation of their satisfactory completion are in addition to obtaining the IMCA supervisor qualification. It is important that all diving supervisors and superintendents keep up to date with technical developments and any changes in company procedures.

It is the responsibility of the employing company to ensure that diving supervisors and superintendents are kept apprised of all new regulations and guidance and are familiar with changes in safe working practices.

These requirements apply equally to trainee diving supervisors being promoted and to diving supervisors and superintendents moving from one company to another.

## Air Diver to Air Diving Supervisor

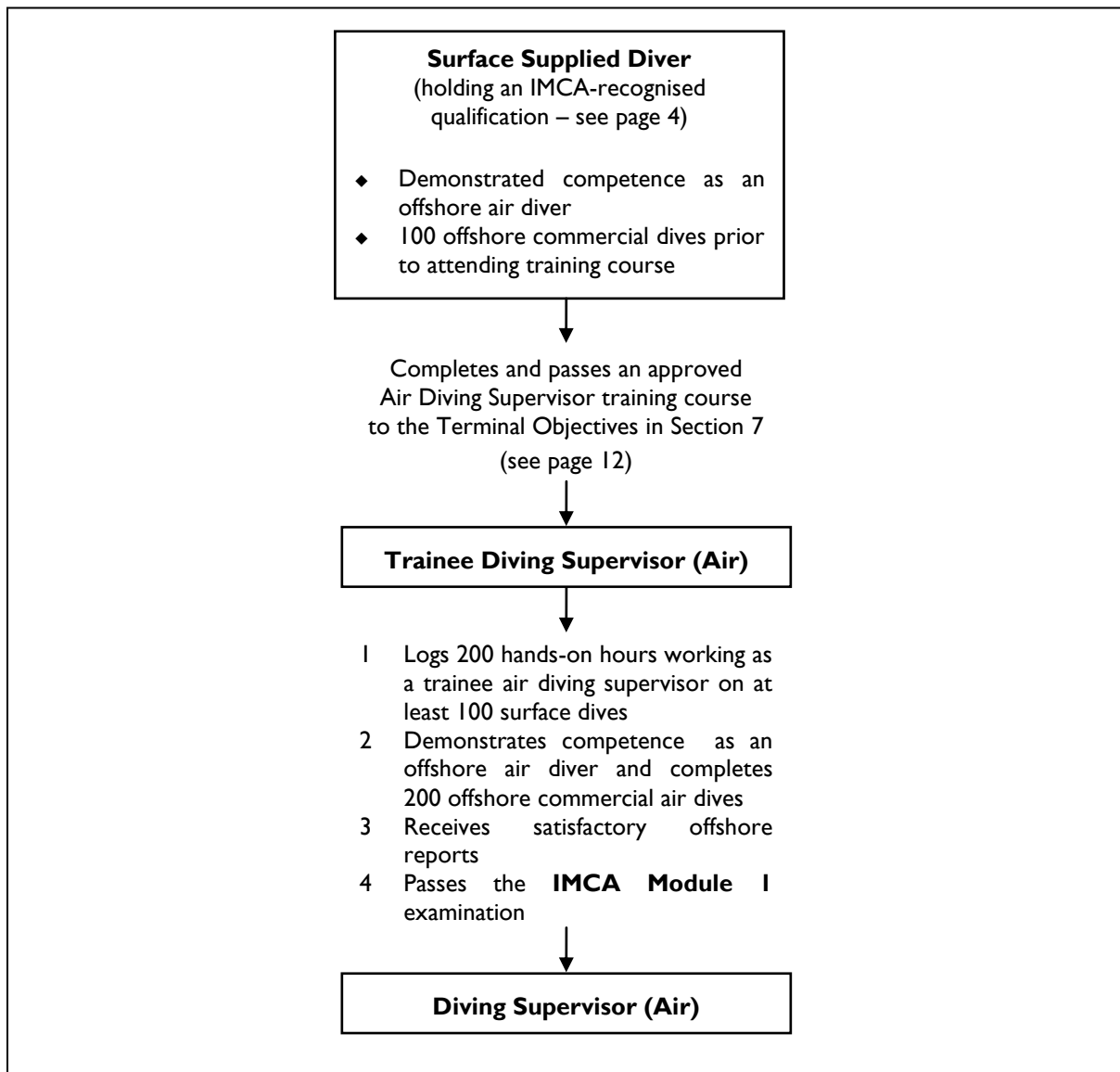


Figure 2

## Bell Diver to Bell Diving Supervisor

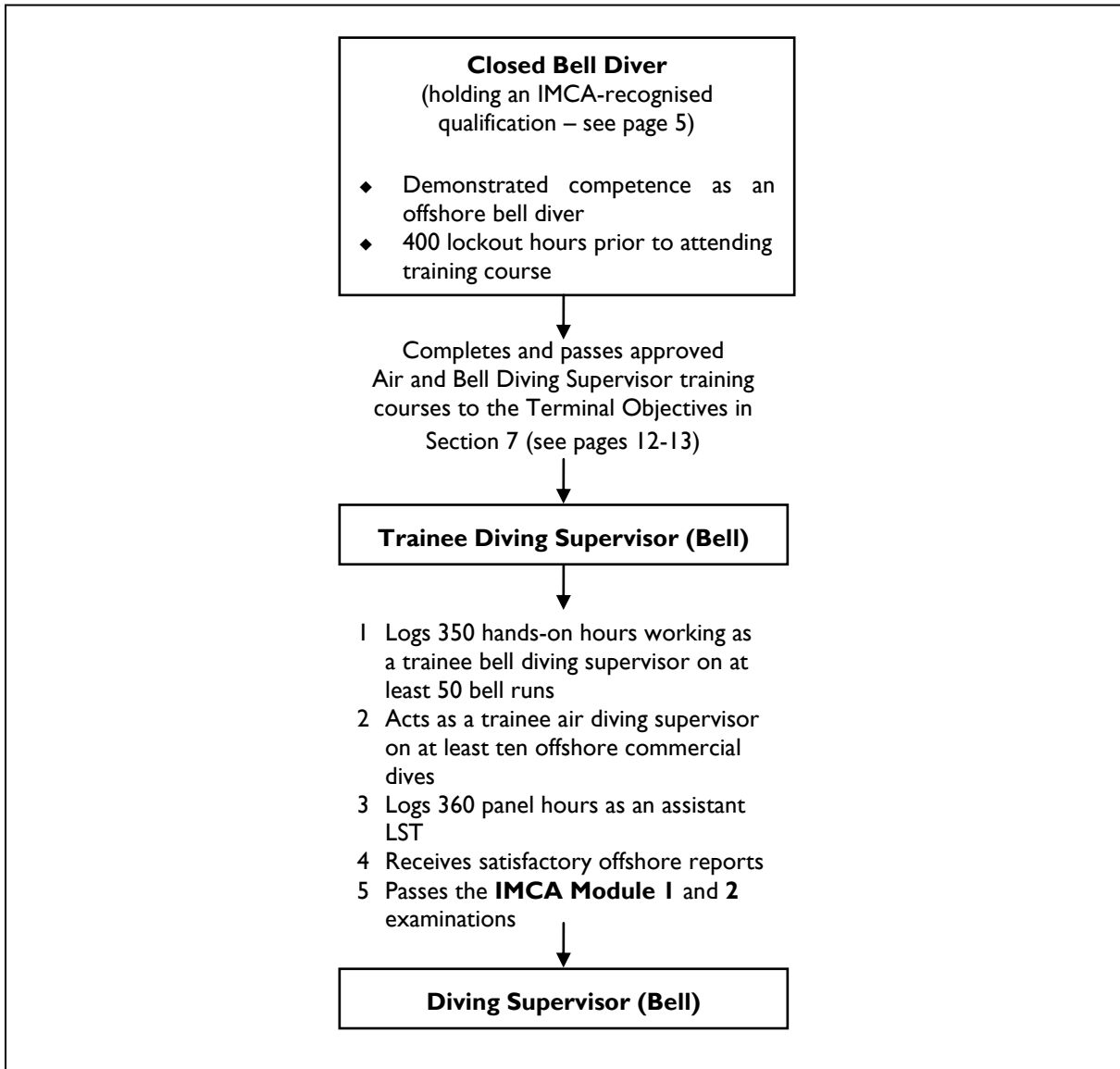


Figure 3

## Air Diving Supervisor to Bell Diving Supervisor

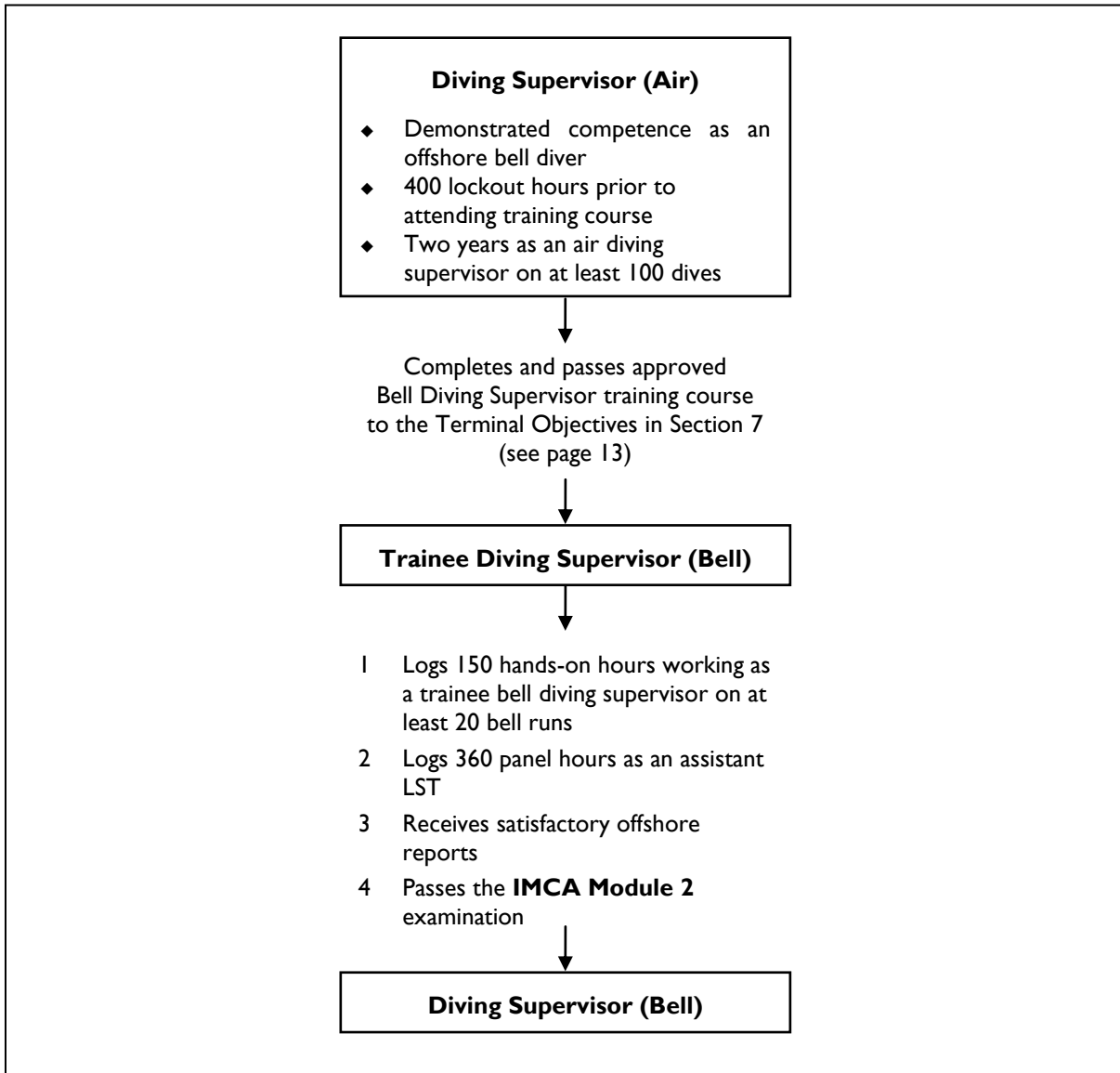


Figure 4

## 5 Diving Supervisor Examinations

Before applying to sit the IMCA examinations, candidates must meet **all** the eligibility criteria set out in section 4 above and have progressed in accordance with the scheme in the sequence set out in figure 2, 3 or 4.

### 5.1 Content

Examinations in the theoretical aspects have been devised to test personnel judged by their companies to be ready for promotion to diving supervisor. There are two compulsory examination modules:

1. Air Diving Supervisor, which includes diving physics, diving physiology and knowledge of equipment and emergency procedures. Candidates must achieve a minimum of 70% in each of the three sections and must also achieve a minimum of 75% over the whole examination.
2. Bell Diving Supervisor, which includes knowledge of life support duties, chamber, bell and handling system equipment, and emergency procedures. Candidates must achieve a minimum of 75%.

Air diving supervisors must pass Module 1 and bell diving supervisors must pass both Module 1 and Module 2 in that order. Provided he has fulfilled all the other criteria, an air diving supervisor who has qualified under this scheme must pass Module 2 in order to progress to bell diving supervisor.

Candidates for bell diving supervisor may be permitted to sit both examination modules at the same time on the strict understanding that, should they fail Module 1, Module 2 will not be marked, neither will any credit be given for a resit.

Additionally, each examination module will contain optional legislation sections (Module 1A, 2A etc.), which will relate to national legislation and may or may not be sat by a candidate, depending on the part of the world in which he wishes to work. Optional modules may be sat separately from the compulsory module if appropriate.

### 5.2 Examination Procedures and Fees

Application to sit an examination must be made in writing by the candidate's sponsoring company using the relevant application form (ADS or BDS) which must be signed by the company's nominated signatory (who will normally be the operations or safety manager or someone of equal or higher standing within that company) and be accompanied by copies of all the documents specified on that form.

Application to sit the examination must be made within three years of successful completion of the relevant training course and at least half the required panel hours should have been obtained in the two years prior to the application being made. Applicants who do not comply with these requirements may be referred to the IMCA Certification Schemes Administrator for a decision by the Assessment Panel and it should be understood that additional training and/or offshore experience may be required.

Applications must reach the IMCA Schemes Administrator at least fourteen days before the proposed date of examination. Acceptance to sit an examination is valid for one year from the date acceptance is given and, should a candidate not have sat the examination within that year, he will be required to make a fresh application. It should be understood that additional training and/or offshore experience may be required.

All candidates will be charged the current fee for each examination module and for any resit. Changes to the fees will be announced as they occur.

Supervision of examinations and the marking of papers will only be carried out by organisations or individuals approved by IMCA.

### 5.3 Examination Results

Companies will be informed as to whether their candidates have passed or failed the examinations. No marks will be revealed and under no circumstances will examination papers be returned to candidates or their sponsors after an examination.

### 5.4 Failure

A candidate who fails a module must wait 30 days from the date of examination before resitting. Should he fail a second time, he must wait a further 30 days before resitting a third time. Should he fail a third time, he must wait for at least one year before his company may apply again for him to sit that module. Such applications may only be made subject to additional supervisory experience having been gained in the intervening period and following satisfactory offshore reports confirming competence in accordance with the IMCA guidance on competence assurance and assessment.

A candidate who fails a compulsory module four times will be excluded from the scheme for a minimum period of two years from the date of the fourth failure, after which time he will have the opportunity of re-entering the scheme from scratch (i.e. as an air or bell diver) and proceeding in line with the requirements of either 4.1.1 or 4.1.2.

IMCA keeps a record of all candidates who attempt examination modules.

### 5.5 Certificates

Individually numbered IMCA certificates bearing a photograph of the holder will be issued to successful candidates as follows:

Module 1 only: Air Diving Supervisor

Modules 1 and 2: Bell Diving Supervisor

Certificates will be endorsed as necessary to show which, if any, optional legislation modules have been passed.

IMCA/AODC Air and Bell Diving Supervisor certificates issued before 31 March 1998 remain valid.

**The original certificate should be in the possession of the holder at all times whilst working as a supervisor.**

Any loss or theft of a certificate should be reported to IMCA as soon as possible after the event. A charge will be made for issuing replacement certificates.

**The certificate does not replace the formal letter of appointment which the diving contractor may be required by law to issue. Neither does it exempt the bearer from complying with the requirements and standards in force in the country in which he is working.**

## 6 Logbooks

The IMCA Diving Supervisor Logbook can be used by all trainee supervisors, supervisors and superintendents and, if maintained correctly, will give full details of an individual's experience as well as a brief daily work record. The logbook should be used to establish that required times have been spent at the relevant grades before promotion is considered.

Other logbooks may be acceptable, provided that the experience is correctly logged and can be easily interpreted.

## 7 Terminal Objectives for Trainee Diving Supervisor Courses

### 7.1 Trainee Air Diving Supervisor

The minimum course duration is 36 hours, including the course examination but excluding time spent on optional legislation module(s).

A trainee air diving supervisor should have sufficient theoretical, technical and operational experience to enable him to carry out his duties. It is expected that, having completed the course, he will have a necessary knowledge of the following:

#### a) Diving Physics

- ◆ Basic calculations for the conversion of metric and imperial units
- ◆ Basic physical units used in diving
- ◆ Boyle's Law (calculating air volumes and diver's air consumption)
- ◆ Dalton's Law (partial pressure of gases at various depths)
- ◆ Charles' Law (the relationship between pressure changes and temperature changes)
- ◆ Archimedes' Principle (calculating the buoyancy and lifting requirements of various objects)
- ◆ Henry's Law (the effect of partial pressures on the solubility of gases in liquids and the corresponding effects on decompression)
- ◆ The principles of heat transfer by conduction, convection and radiation.

#### b) Diving Physiology

- ◆ The respiratory, circulatory, basic skeletal and nervous systems of the body
- ◆ The problems of maintaining divers in thermal balance and the symptoms and treatments of hypo- and hyperthermia
- ◆ The effects of gases on the body and their limits under pressure (in particular, oxygen, carbon dioxide, carbon monoxide and nitrogen)
- ◆ The effects of pressure on the body and the principles of decompression and therapeutic procedures
- ◆ The causes and symptoms of decompression sickness and barotrauma
- ◆ The contents, requirements and maintenance of various types of diving medical kits.

#### c) Leadership and Control

He should demonstrate an understanding of the following:

- ◆ The compilation and use of diving equipment checklists
- ◆ The reporting of accidents occurring in the water or on deck
- ◆ Leadership and communication, including the role of a leader, communication and possible conflicts
- ◆ Planning and organising work, including assigning work tasks and team building
- ◆ Leadership in emergency and stress situations, including symptom recognition, preventative measures, courses of action and transfer of experience.

#### d) Air Diving Supervisor

He should be:

- ◆ Able to prepare pre- and post-dive check lists and supervise their use for all diving operations and equipment under his control
- ◆ Familiar with all relevant IMCA guidance notes affecting air diving operations
- ◆ Able to keep accurate records of all operations under his control.

He should also have a thorough knowledge of:

- ◆ Safety on the surface, including the use of tools
- ◆ Safety in the water, paying particular reference to currents and sea states etc.
- ◆ Working methods of, and safe procedures for, commonly used tools and equipment
- ◆ The responsibilities of all members of the diving team
- ◆ Construction of valves and fittings used in air diving equipment
- ◆ Control panels and chambers, use and maintenance of built in breathing systems (BIBS), operation and design of medical locks, including interlock systems
- ◆ Air and gas requirements, handling, purity, oxygen cleanliness and analysis
- ◆ Surface supplied diving procedures and emergencies
- ◆ Scuba limitations
- ◆ Wet bell procedures and emergencies
- ◆ Chamber and surface decompression procedures and emergencies
- ◆ Decompression and therapeutic procedures
- ◆ General safety requirements of dive support vessels used in air diving operation
- ◆ Air diving from dynamically positioned vessels.

## 7.2 Trainee Bell Diving Supervisor

In addition to the 36 hours spent on the trainee air diving supervisor course, the minimum course duration is 24 hours, including the course examination but excluding time spent on any optional legislation module(s).

A trainee bell diving supervisor should be capable of efficiently running all types of diving operation and of remaining in charge at all times, including emergencies. This includes a thorough knowledge of all aspects covered in a, b, c and d above; in the assistant LST training course (see page 21); and, in addition, be:

- ◆ able to supervise and have a sound working knowledge of bell launching systems, use of guide wires and weights, cross-hauling, constant tension devices, umbilicals, etc.
- ◆ familiar with the composition, uses and mixing of breathing gas mixtures and the need for their constant monitoring
- ◆ able to supervise the operation and control of diving bells, compression chambers and ancillary equipment including the bell mating trunking and medical lock
- ◆ familiar with the principles and function of inspired gas and diver heating systems
- ◆ familiar with all relevant IMCA guidance notes affecting bell diving
- ◆ conversant with all methods of diver evacuation and be able to relate them to a particular work site, both in respect of divers in a diving bell and dives under pressure in a decompression chamber.

## 7.3 Optional Legislation Modules

Trainee diving supervisors will be expected to demonstrate an understanding of the main points of current legislation in the country concerned which is relevant to diving and to:

- ◆ the main duties of employer and employee ;
- ◆ the specific duties and responsibilities of all members of the diving team;
- ◆ the requirements of and procedures for testing, examining and certifying equipment;
- ◆ the requirements of diving operation logs;

and of all relevant codes, guidance notes, safety notices and memoranda published by the relevant national governing bodies.

## 8 Country-Specific Requirements

These IMCA schemes are recognised by the Diving Inspectorate of the United Kingdom Health & Safety Executive (HSE) Offshore Safety Division (OSD) and are in conformity with the requirements of the Norwegian Petroleum Safety Authority (PSA) and NORSOK for the training and examination of diving supervisors, who are appointed in writing to control diving operations on the UK and Norwegian continental shelves; and life support technicians.

### 8.1 Special Requirements for Diving Supervisors in Norwegian Waters

Trainee Diving Supervisors should be aware that the NORSOK Standards for Manned Underwater Operations (U-100), revised in August 1999, set out the details of experience, which are slightly different from those of IMCA. They also call for additional training modules not included in the IMCA syllabus.

a) The main differences are as follows:

- ◆ for Norwegian operations, all trainee diving supervisors must have the following experience of working from dynamically positioned vessels as a diver:
  - 25 air dives from a vessel on dynamic positioning for a trainee air diving supervisor
  - 25 bell dives from a vessel on dynamic positioning for a trainee bell diving supervisor
- ◆ for Norwegian operations, all diving supervisors must have taken an approved course in advanced first aid and have received management (leadership) training;
- ◆ for Norwegian operations where a DP vessel is directly engaged in the dive operation, all supervisors must have undergone an introductory DP course.

b) The minor differences are as follows:

- ◆ NORSOK requires an air diving supervisor to have spent one year as an active trainee air diving supervisor, including 200 logged hours on the panel;
- ◆ IMCA requires an air diving supervisor to have spent at least 60 days working as a trainee air diving supervisor, including logging 200 hours on the panel.

Aspiring air diving supervisors intending to work in Norway are recommended to keep a careful log of hours spent as a trainee and, if made up to supervisor within a period of one year, to continue to log activities for the full year for the purpose of satisfying Norwegian guidelines.

## Instructions to Candidates for Examinations

- 1 Answer all questions by circling the letter of the answer you judge to be correct.
  - 2 If you circle an answer in error, you may circle another answer but the original circle must be clearly crossed out. No marks will be given to any question not showing a single clear answer.
  - 3 Any calculations may be made on the reverse side of the examination paper. No 'rough' paper for calculations will be allowed.
  - 4 You may not ask the person who is supervising the examination any question about the examination paper.
  - 5 Enter your name and sponsoring company on the top sheet of the examination paper.
  - 6 You may use a **non-programmable** calculator during the examination. Other books, documents and programmable calculators are not permitted in the examination room. Use of such aids will result in instant failure of the examination.
  - 7 Questions defaced with comments or qualifications will be disallowed even if the correct answer is selected.
  - 8 Any form of communication between candidates during an examination will result in disqualification of the candidates involved.
  - 9 You will be given a time warning approximately 15 minutes before the end of the examination. If you wish to leave as soon as you have finished, please hand your paper to the invigilator and ensure that you do not disturb the other candidates.
  - 10 At the end of the examination, all sheets must be handed to the invigilator, whether they are complete or not. Any candidate whose examination paper is found to have pages missing after the examination will fail and will be disqualified from sitting another examination for 12 months.
- 11 Any infringement of these instructions will result in immediate failure of the examination.**

## Part 2 – IMCA Life Support Technician Certification Scheme

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### 9 Introduction

This document sets out the requirements of the IMCA Life Support Technician Certification Scheme.

### 10 Background

Divers living in saturation conditions require constant monitoring and control by trained personnel outside the deck compression chamber. The oxygen content of their breathing gas, the concentration of carbon dioxide in the atmosphere, the pressure, temperature and humidity of their environment all need to be monitored regularly and functions such as catering and sanitary disposal need to be controlled from the outside.

The history of commercial diving saw a very rapid expansion in the use of saturation diving techniques, with increasingly sophisticated equipment and larger chamber complexes being developed to meet the need for large numbers of divers to work at greater depths.

This greatly increased the responsibilities of those who control the chamber environment and, consequently, the knowledge that they should have of the physics, physiology and medical aspects of supporting personnel in high-pressure environments.

In the past, when there were small numbers of divers diving to relatively shallow depths for short periods of time, other divers normally controlled chamber complexes under the overall control of the diving supervisor. Many of them had naval training and a good basic understanding of the needs, disciplines and requirements of the work. In the 1970s and 1980s, the rapid expansion in offshore oil exploration and production created a demand for more divers, at greater depths, for longer periods of time. This led to the development of a group of personnel commonly called life support technicians, who operate the saturation chamber complex under the control of a diving or life support supervisor.

Life support technicians come from a variety of different backgrounds, including highly skilled technicians from other industries, qualified nurses, former divers and some specially trained for the role. No industry-wide standard existed when AODC (the forerunner of IMCA) started work in 1983 on a scheme to regularise this section of the underwater industry. The scheme formally commenced on 1 August 1984 and provided for a 'grandfather' period, during which time all existing LST personnel were expected to pass the AODC examination. This period ended on 31 July 1986, since when the administrative arrangements for the LST scheme have been brought into line with the Diving Supervisors Certification Scheme.

### 11 Scope

The scheme covers all personnel engaged on life support duties from new entrants through to the most senior grade. It also applies to certain onshore-based life support personnel.

A career progression is laid out, with promotion to senior grades based on experience and ability.

## **12 Terminology, Responsibilities and Career Structure**

The term 'Life Support Technician' has been chosen as being descriptive of the wide range of duties and responsibilities undertaken by these personnel. Other terms such as Chamber Operator or Panel Operator are used by some companies. Alternatives can be used, provided that the terminology is easily understood and that the responsibilities defined for the different grades are similar to those described below

### **12.1 Assistant Life Support Technician**

This is the most junior grade and refers to a person gaining experience.

Divers holding an IMCA-recognised closed bell diving qualification who completed diver training prior to 1 November 2006 can be appointed assistant LSTs. Closed bell divers who trained after 1 November 2006 must pass the training establishment Assistant Life Support Technician examination before they can be appointed assistant LSTs.

Before being sent offshore as an assistant LST, all other entrants must:

- a) undergo an IMCA approved basic course to the Terminal Objectives set down in Section 15, either at a training school or in a company; and
- b) produce documentary evidence of satisfactorily completing such a course.

An assistant LST should not be allowed to carry out any tasks unless properly supervised.

After working for at least 2400 logged panel hours as an assistant LST, a person may be nominated by his company to sit the IMCA theory examination (Module 3). Closed bell divers with IMCA-recognised certificates (see page 5) who have sat and passed an Assistant Life Support Technician examination set by an approved training establishment would only be required to log 360 panel hours, provided that they produce signed logbooks verifying their diving experience and have demonstrated competence as an offshore closed bell diver in accordance with IMCA C 003 Rev.1 (Competence Assurance and Assessment). Passing the Module 3 examination will indicate that an assistant LST has the basic theoretical knowledge necessary for promotion to LST, but he should only be promoted if his company is satisfied as to his competence in accordance with the provisions of the IMCA guidance on competence assurance and assessment. N.B. At least half the required panel hours should have been obtained in the two years prior to the application to sit the examination being made.

### **12.2 Life Support Technician**

This is the main grade and covers qualified and experienced personnel.

An LST should have demonstrated his practical capabilities as an assistant LST (as in 12.1 above) and should have passed the IMCA Life Support Technician examination (Module 3).

He is able to carry out all the normal tasks of a life support nature, but there should always be a diving or life support supervisor on duty and in control.

### **12.3 Life Support Supervisor**

This is the most senior grade. Before becoming eligible for promotion to life support supervisor, an LST should, since having qualified as such, have demonstrated competence as a life support technician in accordance with IMCA C 003 Rev.1 (Competence Assurance and Assessment), have logged at least 2400 panel hours working as an LST, and have received training in aspects of leadership.

He should be appointed in writing by his company on the basis of his experience, character and ability to accept responsibility. A bell diving supervisor is also qualified to act as a life support supervisor, although he may not have previously worked as a life support technician.

He should have specific responsibility for the control of the saturation complex.

Dependent on national regulation and the management structure of the company, he may be subject to direct supervision by a more senior person.

## 12.4 Onshore-Based Life Support Personnel

An assistant LST who has only worked in an onshore hyperbaric centre may be considered eligible to sit the IMCA Life Support Technician examination (Module 3) provided that he has completed at least 90% of the required 2400 panel hours (i.e. 2160 hours) in operation of an occupied chamber when under pressure.

Only those life support personnel who have experience using mixed gas will be eligible to sit the IMCA Module 3 examination.

### LST Career Structure

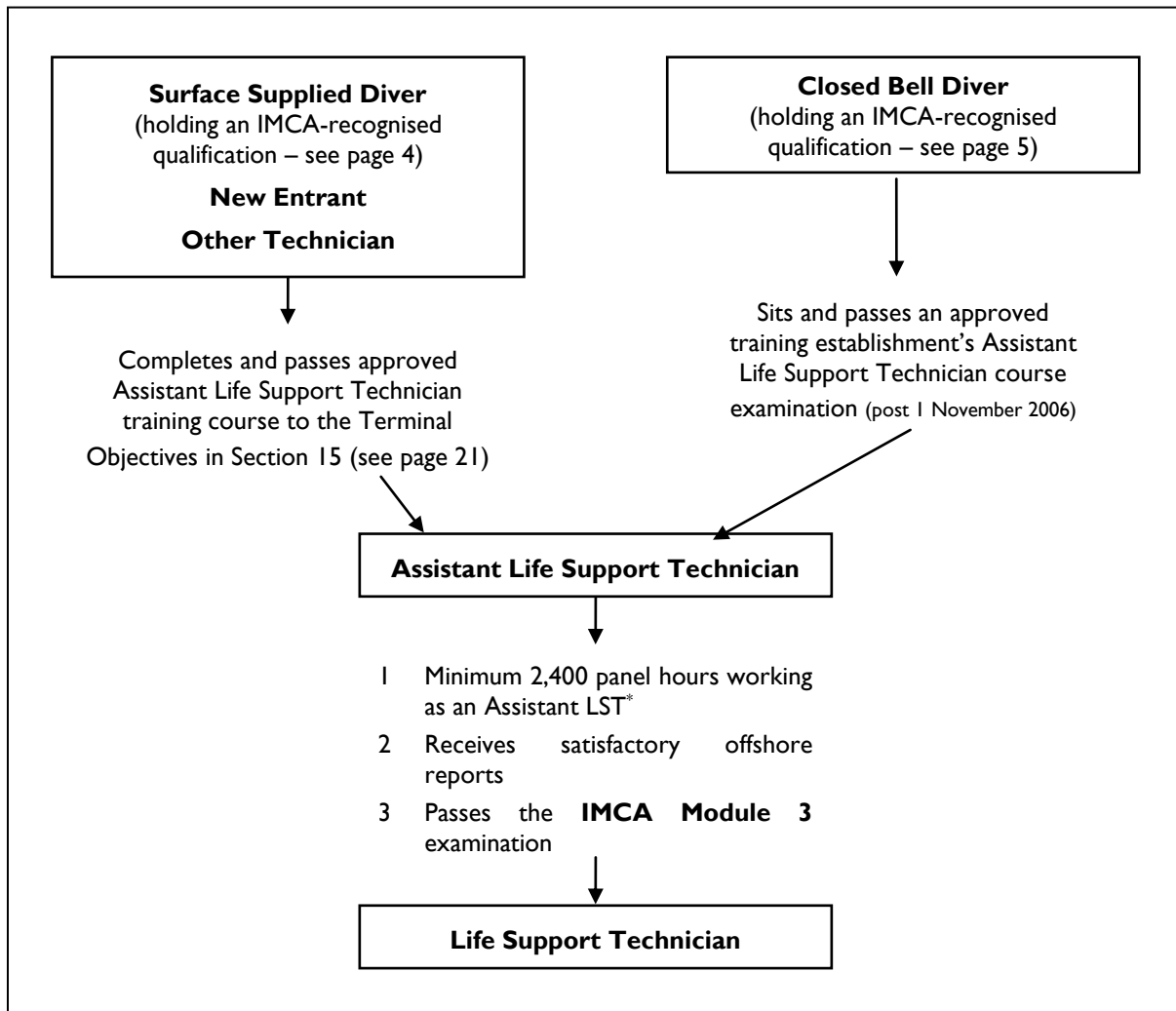


Figure 5

\*If entry is as a closed bell diver with an IMCA-recognised certificate and an approved ALST certificate, who has signed logbooks verifying diving experience and who has demonstrated competence as an offshore closed bell diver in accordance with IMCA C 003 Rev. 1 (Competence Assurance and Assessment), the minimum is 360 panel hours working as an Assistant LST.

## **13 Life Support Technician Examination**

Before applying to sit the examination, candidates must meet all the eligibility criteria set out in 12 above and have progressed in accordance with Figure 5 of this document.

### **13.1 Content**

An examination in the theoretical aspects of life support has been devised to test personnel judged by their company to be ready for promotion to life support technician. The compulsory examination is made up of three sections:

- a) Plant and equipment
- b) Physiology
- c) Gas systems

Additionally, the examination will contain optional legislation sections (Module 3A, 3B etc.), which will relate to national legislation and may or may not be sat by a candidate, depending on the part of the world in which he wishes to work. Optional modules may be sat separately from the compulsory module if appropriate. Candidates must achieve a minimum of 75%.

### **13.2 Examination Procedures and Fees**

Application to sit an examination must be made in writing by the candidate's sponsoring company using the relevant application form (LST) which must be signed by the company's nominated signatory (who will normally be the operations or safety manager or someone of equal or higher standing within that company) and be accompanied by copies of all the documents specified on that form.

At least half the required panel hours should have been obtained in the two years prior to the application being made. Applicants who do not comply with these requirements may be referred to the IMCA Certification Schemes Administrator for a decision by the Assessment Panel and it should be understood that additional training and/or offshore experience may be required.

Applications must reach the IMCA Certification Schemes Administrator at least fourteen days before the proposed date of examination. Acceptance to sit an examination is valid for one year from the date acceptance is given and, should a candidate not have sat the examination within that year, he will be required to make a fresh application.

All candidates will be charged the current fee for each examination module and for any resit. Changes to the fees will be announced as they occur.

Supervision of examinations and the marking of papers will only be carried out by organisations or individuals approved by IMCA.

### **13.3 Examination Results**

Companies will be informed as to whether their candidates have passed or failed the examinations. No marks will be revealed and under no circumstances will examination papers be returned to candidates or their sponsors after an examination.

### **13.4 Failure**

A candidate who fails the examination must wait 30 days from the date of examination before resitting. Should he fail a second time, he must wait a further 30 days before resitting a third time. Should he fail a third time, he must wait for at least one year before his company may apply again for him to sit that module. Such applications may only be made subject to additional experience having been gained in the intervening period and following satisfactory offshore reports confirming competence in accordance with the IMCA guidance on competence assurance and assessment.

A candidate who fails a compulsory module four times will be excluded from the Scheme for a minimum period of two years from the date of the fourth failure, after which time he will have the opportunity of re-entering the scheme from scratch (i.e. as a diver, new entrant or other technician) and proceeding in line with the requirements of 12.1.

IMCA keeps a record of all candidates who attempt examinations.

### **13.5 Certificates**

Individually numbered IMCA certificates bearing a photograph of the holder will be issued to successful candidates.

Certificates will be endorsed as necessary to show which, if any, optional legislation modules have been passed.

IMCA/AODC Life Support Technician certificates issued up until 31 March 1998 remain valid.

**The original certificate should be in the possession of the holder at all times whilst working as a Life Support Technician.**

Any loss or theft of a certificate should be reported to IMCA as soon as possible after the event. A charge will be made for issuing replacement certificates.

**The certificate does not exempt the bearer from complying with the requirements and standards in force in the country in which he is working.**

### **14 Logbooks**

The IMCA Life Support Technician Logbook can be used by all grades of life support personnel and, if maintained correctly, will give full details of an individual's experience as well as a brief daily work record. The logbook should be used to establish that required times have been spent at the relevant grades before promotion is considered.

Other logbooks may be acceptable, provided that the experience is correctly logged and can be easily interpreted.

## 15 Terminal Objectives for Assistant Life Support Technician Courses

On entering the industry, an individual should undergo an IMCA approved training course which includes at least the items in a-d below. The minimum course duration is 60 hours, including the course examination but excluding time spent on any optional legislation module(s). It is suggested that prior assessment of the candidates is necessary to establish their capability to benefit from the course, and also to measure improvement after it.

It is expected that, having completed the course, an assistant life support technician will be conversant with the basic terminology of diving and the theory of various diving techniques. He should also have a necessary knowledge of the following:

### a) Plant and Equipment

- ◆ The construction and purpose of valves, fittings, gauges, regulators, hoses and pipework and how to carry out normal operations, maintenance and basic repairs.
- ◆ This includes the difference between various thread forms and the reasons for their use.
- ◆ The principles of chamber life support systems with priority on pre-operational checklists, monitoring during use, routine maintenance and basic repairs. This includes understanding the possible emergencies which could occur and what actions should be taken.
- ◆ The operation, function testing and selection of gas supplies of BIBS and dump systems, including routine maintenance and repairs.
- ◆ Pre and post dive checks of a chamber complex using checklists.
- ◆ The safe operation and design of hyperbaric sanitary systems, in particular safety interlock systems.
- ◆ The operation and design of medical locks, including various types of interlocks and safety devices. The correct procedures to be used and dangers involved with TUP.
- ◆ The principles of operation of various items of equipment used in a typical diving system, such as compressors, gas reclaim systems and transfer pumps.
- ◆ The use of various types of fire suppression systems including regular maintenance and checks.
- ◆ The various substances and materials which are prohibited inside a chamber, such as medical preparations, combustible materials, etc.

### b) Physiology

- ◆ The respiratory, circulatory, basic skeletal and nervous systems of the body.
- ◆ The problems of maintaining divers in thermal balance and in particular the symptoms and treatment of hypo- and hyperthermia.
- ◆ The effects on the body and limits of various gases under pressure, in particular oxygen and carbon dioxide.
- ◆ The effects of pressure on the body and the principles of decompression and therapeutic procedures.
- ◆ The causes and symptoms of decompression sickness, barotrauma and HPNS.
- ◆ The need for hygiene during saturation, the problems of bacterial growth in a chamber and methods of control, detection and treatment.
- ◆ The contents, requirements and maintenance of various types of diving medical kits.

### c) Gas Systems

- ◆ The physical properties of liquids and gases and specifically the relationship as appropriate between depth, volume, pressure, temperature, partial pressure and solubility of gases.
- ◆ The need for purity of gases and the effects of impurities.
- ◆ Typical gas schematics including symbols, logic and functions.
- ◆ Carrying out chamber operational procedures by calculation.
- ◆ The principles of gas mixing and changes of mixture for heliox and nitrox.
- ◆ The basic properties of gases and potential problems encountered in their use.
- ◆ The principles and use of various types of gas analysers.

- ◆ Methods of identifying gas impurities likely to be found in hyperbaric atmospheres.
- ◆ The importance of oxygen cleanliness and the methods used to achieve it.
- ◆ Chamber emergency problems.
- ◆ The reasons for gas stratification and methods used to prevent it.

#### **d) Documentation and Record Keeping**

Demonstrate an ability to:

- ◆ Explain typical pressurisation and decompression procedures covering various options.
- ◆ Explain typical tables for saturation, bounce and air diving.
- ◆ Understand the need for, and help to prepare, procedures for chamber operations and life support systems.

#### **e) Practical Experience under Direct Supervision**

- ◆ Maintain a legible and accurate record of all aspects of a saturation dive.
- ◆ Maintain a gas status board showing gas reserves and mixtures.
- ◆ Analysis of stored gases and chamber atmosphere with various types of equipment.
- ◆ Calibration of gas analysers.
- ◆ Transferring diving gases around a system and putting diving gases on line to chambers and control panels including the BIBS.
- ◆ Monitoring the chamber for depth, temperature and humidity using various types of equipment. Calibrating the equipment.
- ◆ Effective operation of helium speech unscramblers, telephone emergency signals and other communications systems.
- ◆ Compression and decompression of a diving system using different schedules.
- ◆ Operating a system of chamber management and housekeeping including routine schedules (such as meals, sanitation systems, medical locks, etc.).

### **15.1 Optional Legislation Modules**

Assistant life support technicians will be expected to demonstrate an understanding of the main points of current legislation in the country concerned which is relevant to diving; the main duties of employer and employee; the specific duties and responsibilities of all members of the diving team; the requirements of and procedures for testing, examining and certifying equipment; the requirements of diving operation logs; and of all relevant codes, guidance notes, safety notices and memoranda published by the relevant national governing bodies.

## Instructions to Candidates for Examinations

- 1 Answer all questions by circling the letter of the answer you judge to be correct.
- 2 If you circle an answer in error, you may circle another answer but the original circle must be clearly crossed out. No marks will be given to any question not showing a single clear answer.
- 3 Any calculations may be made on the reverse side of the examination paper. No 'rough' paper for calculations will be allowed.
- 4 You may not ask the person who is supervising the examination any question about the examination paper.
- 5 Enter your name and sponsoring company on the top sheet of the examination paper.
- 6 You may use a **non-programmable** calculator during the examination. Other books, documents and programmable calculators are not permitted in the examination room. Use of such aids will result in instant failure of the examination.
- 7 Questions defaced with comments or qualifications will be disallowed even if the correct answer is selected.
- 8 Any form of communication between candidates during an examination will result in disqualification of the candidates involved.
- 9 You will be given a time warning approximately 15 minutes before the end of the examination. If you wish to leave as soon as you have finished, please hand your paper to the invigilator and ensure that you do not disturb the other candidates.
- 10 At the end of the examination, all sheets must be handed to the invigilator, whether they are complete or not. Any candidate whose examination paper is found to have pages missing after the examination will fail and will be disqualified from sitting another examination for 12 months.
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