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IMCA The International Marine Contractors Association
Represents offshore, marine and underwater engineering companies.

DEPT. OF TRANSPORTATION DOCKET SECTION

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21 September 1998

Docket Management Facility (USCG-1998-37861) -37
US Department of Transportation
Room PL-40 1
400 Seventh Street SW
Washington DC 20590-00 1
USA

Attn: Joseph J Angelo

Dear Sir

Commercial Diving Operations

I am responding to the invitation to respond to the Advance notice of proposed rule-making.

IMCA, as was its forerunner the Association of Offshore Diving Contractors (AODC), is an international industry association representing offshore Diving and offshore Construction Contractors operating in 30-plus countries. It issues guidance to its members on safe diving practices and safe operation of DP vessels. This guidance is based on 20-plus years' diving experience from 50-plus diving support vessels.

The notice addressed two issues on which IMCA members have considerable expertise:

i) diving from dynamically positioned vessels
ii) diving supervisors.

The enclosed copy of IMCA Guidance document DO10 – 'Diving Operations from vessels operating in dynamic positioning mode' – relates to the first. This is the third version of our guidance on this topic – the most recent revision was prompted by a fatal accident on the UK Continental Shelf. The US Coastguard might like to consider the advice contained therein should it decide to regulate in this area.

cont/....

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Incorporating AODC and DPVOA

A copy of the IMCA offshore diving supervisor and life support technician schemes is also enclosed. This scheme, which is operated worldwide, involves a prescribed syllabus, specific periods of diving experience prior to undertaking supervisor duties, and an externally set and marked exam. The qualification is recognised by a number of authorities and oil company clients worldwide.

Should a licensing scheme be established by the US Coastguard, IMCA would urge that the holding of an IMCA Diving Supervisor certificate be one route to obtaining such a licence.

IMCA has recently consolidated its guidance into a one-volume IMCA International Code of Practice for Offshore Diving, which references other more detailed IMCA/AODC guidance – a copy of the Code and a catalogue of our publications which lists the supporting guidance are also enclosed. Should the Coastguard wish to have copies of specific documents or the three-volume complete set, this can be arranged.

Yours faithfully

Anthony D Read
Chief Executive

IMCA

DIVING DIVISION

GUIDANCE NOTE
NO: IMCA D 010 Rev 1

DIVING OPERATIONS FROM VESSELS OPERATING IN DYNAMICALLY POSITIONED MODE

JANUARY 1998

The International Marine Contractors Association
Incorporating AODC and DPVOA
Carlyle House, 235 Vauxhall Bridge Road, London, UK, SW1V 1EJ

CONTENTS

EXPLANATION

Since the 1970s it has been common practice to carry out diving operations from vessels operating on dynamic positioning (DP).

During this time a number of documents have been published to give guidance on ways of achieving safe operations using this system. (see Bibliography)

A number of accidents and incidents have occurred world-wide resulting in injury and death of divers and IMCA considers that a comprehensive document is required giving guidance on aspects of diving operations from DP vessels.

This document supersedes the Guidance Note number AODC 050 published in August 1988 and gives advice which is applicable anywhere in the world and to any type of diving operation. In certain countries there may be regulatory requirements which should always be complied with first, followed by the advice in this document.

This document replaces IMCA D010, which was published in November 1996.

DIVING OPERATIONS FROM VESSELS OPERATING IN DYNAMICALLY POSITIONED MODE

1. INTRODUCTION

1.1 Scope

This guidance addresses the operational aspects of air, nitrox or saturation diving activities performed from a dynamically positioned (DP) vessel. It does not address marine matters that are the subject of other guidance, i.e. *Guidelines for the design and operation of dynamically positioned vessels'*. Where diving and marine operations interface, information is repeated in this document for the convenience of users.

1.2 Objectives

The objectives are to ensure that:

(a) valid and reliable controls are in place

(b) personnel are competent to discharge their responsibilities in a safe and effective manner.

This document is designed to achieve these objectives by providing diving contractors, vessel masters and clients with operational guidance that is based on sound safety principles and which highlights the need for:

- an adequate safety management system
- hazard identification and an appropriate level of risk assessment
- approved working procedures
- adequate briefings before operations begin.

The guidance covers all aspects of diving operations within the scope (see Section 1.1) and also takes into account other relevant guidance and the current status of vessel and operational technology.

1.3 Application

This guidance is applicable world-wide, and should be used in addition to any relevant National Regulations.

1.4 Variations

It may be necessary or appropriate to vary the guidance given here for operational reasons, e.g. to cater for different vessel characteristics, or to meet the objectives in a more effective way, for example, to exploit technological advances. All variations should, however, embrace the general safety principles reflected in this guidance, and should always be evaluated and agreed by all relevant parties before implementation.

1.5 Bibliography

A bibliography of relevant documents is provided. It is the responsibility of all parties to work with the current issue of any document.

2. RESPONSIBILITY AND AUTHORITY OF PERSONNEL

The legislation that gives authority to the masters of merchant vessels or the supervisory staff of diving operations, projects and offshore installations takes precedence over this guidance. It is, however, fundamentally important that the responsibility and authority of each person involved with the management of diving operations from DP vessels be clearly defined.

Detailed responsibilities, other than those defined in legislation, should be defined by the relevant ship owner/operator, diving contractor and client. The guidance provided below should be interpreted for each individual.

2.1 Vessel masters

The master of a vessel is ultimately responsible for the safety of the vessel and all personnel working on or from it. He can veto the start, or order the termination, of a diving operation through the diving supervisor.

2.2 DP operators

The DP operator (dynamic positioning control system operator) in charge of the DP system must be suitably trained and experienced'. The DP operator is responsible for the station-keeping of the vessel, and must keep the other relevant control centres of the vessel informed of changes in operational conditions and circumstances, e.g. dive control (see Section 5).

2.3 Senior diving supervisors and diving superintendents

Some diving projects will have a senior diving supervisor or diving superintendent who is an experienced diving supervisor. He will normally act as an offshore project manager, and will ensure that the specifications of the diving project are met. He will also liaise with the vessel master and the customer's representative. Other diving supervisors report to the senior diving supervisor or diving superintendent, but they retain the responsibility for the start, operation and termination of the dive that they are supervising.

2.4 Diving supervisors and life support supervisors

The supervisor on duty is responsible for all the safety aspects of the part of the diving operation for which he is appointed, i.e. diving or life support, including the condition and operation of all relevant equipment. He must be issued with a letter of appointment that details his specific functions.

Diving supervisors and life support supervisors are responsible for the effective and timely conduct of diving and chamber operations as appropriate. They report to the diving superintendent or senior diving supervisor, if one is appointed.

The diving supervisor is the only person who may order the start of a diving operation.

The diving supervisor is also responsible for advising the DP operator of any status change in the diving operation.

2.5 Client's representative

The client's on-board representative is responsible to the client for ensuring that the project specification is carried out in accordance with the diving procedures as detailed by the diving contractor, and he should liaise with the contractors' senior representative on-board accordingly. He may request, but not order, the start of diving operations, and has the authority to veto the start. or order the termination of diving operations through the diving supervisor.

3. SAFETY MANAGEMENT

Modem safety management is based on work being effectively evaluated, planned and assessed for hazards before it begins. This principle is widely enforced by legislation, which, in some geographic areas, can be interpreted and applied with the aid of guidance and codes of practice.

Guidance and codes of practice should be used when setting up and implementing a safety management system. The system should also include the following steps, which must be completed before an offshore diving operation begins.

- Evaluation, planning and risk assessment should be carried out by the vessel master, the diving superintendent and other specialist personnel as appropriate. The workscope should be considered and provisions made for all foreseeable emergencies, e.g. DP failure, diver rescue, etc.

- The significant findings of the risk assessment should be recorded either in writing or electronically, and they should be readily accessible and effectively communicated to all personnel involved.

- There should be a system in place to manage procedural changes at the worksite. The effects of any change should be evaluated against the original risk assessment to ensure that the proposed change is practical and that new risks are not being introduced. Both the evaluation and the change should be recorded in writing or electronically.

- The safety critical principles given within this guidance should be incorporated into the risk assessment (see also Section 1.4). Other important factors that should be considered are listed below, but it should be noted that this list is only an aid and is not definitive.

  The interface between contractor, client, installation or other vessels.

  Simultaneous operations, e.g. different contractors working within the same field, working within the 500 m zone, etc.

  Use of ROV`s during diver intervention[3].

  Safe access to and egress from the water by the divers and the deployment device.

4. MARINE INTERFACE

4.1 General principles

All DP diving support vessels should comply with this guidance and with the following:

Guidelines for the design und operation of dynumically positioned vessels'. particularly Section 1 - Principles for all DP vessels, and Section 2 - Diving support vessels.

Guidelines for vessels with dynamic positioning systems? These International Marine Organisation (IMO) guidelines apply to new vessels constructed on or after 1 July 1994, and are compatible with classification society requirements and the more definitive guidelines mentioned above.

These two documents emphasise the importance of carrying out a risk assessment and defining the time necessary to recover divers to a safe location. The equipment class of the vessel required for a particular operation (1, 2 or 3) should be agreed between the owner of the vessel and the client, and should be based on a risk assessment of the consequence of losing position. Alternatively. the local administrative body or the coastal state may decide the equipment class for the particular operation.

The class of a vessel is noted in the flag state verification and acceptance document (FSVAD) which is contained in the IMO document" and explained in IMCA guidelines?

4.2 Isolation of thrusters or propellers

The feasibility of improving operational safety by deselecting or isolating relevant thrusters or propellers should be considered as part of the risk assessment. This can only be decided by the vessel master. If this is considered to be a viable procedure, the workscope should take account of the reduced capability. and arrangements should be made to ensure that thruster units and/or propellers, which have been isolated or stopped, remain stopped and isolated whenever divers are in the water.

4.3 Resumption of diving activities

When diving operations have been temporarily interrupted, the DP operator must complete the appropriate checks and confirm that DP status is satisfactory before the diving supervisor orders the recommencement of diving operations.

4.4 Vessels in close proximity

When operating in close proximity, DP vessels may be subject to mutual interference including:

- thruster wash, which may affect the hull and taut wires
- acoustic and radio interference, which may affect the position reference sensors
- intermittent shielding from wind and waves.

These factors should be allowed for when planning such operations, for example by expecting less accurate position-keeping tolerance than normal. Co-ordination is essential to prevent interference with the vessel and the position reference.

The risk to divers from other vessels that may enter the vicinity should also be considered as part of the risk assessment.

5. DP ALERT RESPONSES

On initiation of alert levels by the DP operator, diving operational responses should be carried out as defined in this section. (NOTE: The response to the yellow alert given below has been amended from earlier guidance to provide increased flexibility while at the same time maintaining safety.)

5.1 Green - normal operational status

Full DP diving operations can be undertaken.

5.2 Yellow - degraded operational status

Where a yellow alert is signalled by a flashing light and an audio alarm, the audio component in dive control should be capable of cancellation.

The diving supervisor should instruct the divers to suspend operations and, where practical in terms of speed and safety, make safe any work or items of equipment that could offer a further hazard before moving to an agreed safe location".

After consulting with the diving supervisor, the DP operator should decide on any necessary further action. This may involve the divers returning to the deployment device and preparing to return to the surface, or returning to the worksite.

If the DP operator is unable to provide clear advice, the diving supervisor should instruct the divers to return to the deployment device and/or prepare to return to the surface as appropriate.

The divers' safety is paramount. If there is any doubt about the appropriate course of action, the DP operator and diving supervisor should both act to provide the greatest protection for the divers.

5.3 Red - emergency status

The diving supervisor must instruct the divers to return immediately to the deployment device and/or prepare to return to the surface. After considering any potential hazards, e.g. fouling of adjacent anchor wires, jacket members. etc., the deployment device and/or the divers should be recovered as soon as possible.

The DP operator must use all available means to limit vessel-position loss during the recovery of the divers.

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[a] A safe location is a place that affords the diver a measure of protection as agreed by the diving supervisor, the vessel master and the diver before the dive begins. This location will vary for each worksite and may, for example, involve the diver in retreating all or part of the way towards the deployment device or returning to the clump weight if a bell is used. This is an interim measure that allows the nature of the alert to be properly assessed before recalling the divers to the surface.

6. VESSEL MOVEMENT LIMITATIONS

A diving support vessel under stable DP control may execute changes to a previously agreed position or heading without recalling the divers to the deployment device, provided all relevant personnel have been advised, and that the DP operator and the diving supervisor are both satisfied with the following criteria:

- the move can be executed safely
- umbilicals and other diving-related work lines (see Section 7.2) are clear and will remain so during the move
- divers understand the move and are not endangered by it
- divers can easily reach the deployment device
- three position references will be on-line throughout the move
- the move is executed at low speed
- change of heading and position are not carried out simultaneously
- the move can be stopped at any time
- the move will not exceed the scope of any one of the three position references
- the move will be stopped if one position reference has to be repositioned and this results in only two position reference systems being on-line
- the DP operator will verify the move input before execution
- due account has been taken of the selected centre of rotation when heading is to be changed.

If the DP operator has any doubts about the safety of the move, he should instruct the diving supervisor to recall the divers to the deployment device and stop the move to reassess the safety of proceeding.

7. UMBILICALS

7.1 Safety principles

The guidance given in Section 3 should be implemented. Planning should ensure that all deployed umbilicals, i.e. those of the diver, the bellman, and the in-water standby diver or tender (where there is one), are physically prevented from coming into contact with any hazard identified in the risk assessment either during the planned workscope or during a foreseeable emergency rescue.

It should be noted that the guards sometimes provided on thrusters and propellers to prevent damage by large items or debris, are not necessarily capable of protecting divers or equipment.

7.2 Identification of hazards

A diagram specific to each vessel should be provided in both DP and dive control to enable the DP operator and the diving supervisor to visualise the relative position of the vessel, the deployment device and the divers in relation to the worksite, and to plan operations accordingly. This should include:

- thruster / bell configuration diagram showing the bell at various depths. at 10 metre increments, and distance to the nearest thruster. The distance will need to be measured from the centreline of the bell trunking to the outer moving part of the thruster envelope. For practical purposes, safe umbilical lengths will be the above figure less 5 metres.

- all other hazardous areas into which umbilicals (main and excursion) must not be allowed to stray, e.g. propellers, seawater intakes, and any subsea hull obstruction that could affect the safety of diving operations

- the position of nearby mooring lines, if appropriate (see Section 9.6)

This diagram should also be available in other appropriate areas.

In DP control, the position of ground-based reference systems and their status should also be recorded.

In dive control. there should also be an indication of the reference systems used and the various diving-related working lines that have been deployed, e.g. deployment devices, downlines, cranes, winches, hydraulic and electric lines, taut wires and acoustic transponder locations. A method of visualising and recording their status, i.e. at the surface or under water. should also be available.

The transverse position of thrusters should be painted on the hull above the water line and on the deck, and, if possible, on the bulwark or handrail, for the benefit of tenders operating from the deck.

7.3. Main umbilical safety

The main umbilical from the surface to the deployment device may need to be secured to the bell wire at regular intervals along its length to prevent it entering the thrusters. Where this is not appropriate, the risk assessment should identify the maximum safe length of umbilical which can be deployed in relation to the depth of the bell.

A means of identifying how much umbilical has been paid out is required to avoid deploying excess.

7.4 Excursion umbilical safety

7.4.1 Point of tending

Divers' umbilicals must be securely tended at all time during routine operations and during any foreseeable emergency intervention.

The tending point is defined as the surface or in-water point from which the diver's excursion umbilical can be securely tended. Where the planned excursion is such that the diver could be brought within range of any of the physical hazards identified by the risk assessment (such as vessel thrusters, propellers, water intakes, etc.), his umbilical must be physically restrained at the tending point to prevent it from coming within 5 m of such hazards.

Tending can be achieved safely by employing:

- A tender located on the vessel from which the diver is deployed.
- A tender located in an additional device deployed from the DSV, either on or above the surface, such as a stage or gondola (see Section 7.5).
- A bellman located in the deployment device from which the diver is deployed.
- An in-water standby diver or tender located mid-water or near the seabed in a separate device deployed from the vessel, in addition to the bellman (see also Section 7.4.3). This tending point must be able to hold position in relation to the vessel if DP failure occurs.
- Any of the above in conjunction with an appropriate mechanical restraint, provided that any such restraint is designed and used such that it does not impede the recovery of the diver.
- An unmanned in-water tend point, provided that the criteria set out in 7.7 can be met.

When the depth of the worksite puts the diver beyond the physical hazards identified by the risk assessment and no restriction on umbilical length is necessary, other than consideration of bail-out capacity, an in-water tending point may be considered to enhance the safety of a diver using an extended umbilical, accessing a structure or working deep within a jacket.

7.4.2 Standby diver

The standby diver's umbilical should be two metres longer than the diver's umbilical to provide manoeuvrability in an emergency. It must be prevented from coming into contact with any identified hazard during a foreseeable emergency rescue (see Section 7.1). This applies whether the standby diver is located on the surface. in mid-water, or in a diving bell.

7.4.3 Additional in-water standby diver or tender

Where an in-water standby diver or tender is deployed in addition to a bellman (see Section 7.4.1). his umbilical must also be prevented from coming into contact with any identified hazard during a foreseeable emergency rescue (see Section 7.1). In addition, the risk assessment (see Section 3) should consider the relative functions of the bellman and the in-water standby in the event of an emergency.

7.5 Deployment of the excursion umbilical

The length of umbilical deployed should be kept to a minimum to prevent it becoming snagged and to permit easier recovery of a diver in an emergency, particularly when currents are present. At the same time, allowance should be made for vessel movement within the DP footprint.

Umbilicals should be marked at least every ten metres.

In certain circumstances, a diver may secure himself under water in order to achieve stability. In such cases, a recommended "weak link" should be used". The means by which the diver's umbilical is prevented from coming into contact with a hazard should not be dependent on this weak link.

The diver, tender and bellman should monitor the marking and relative position of the umbilical, and immediately inform the supervisor of any concern regarding its safety.

In some air-range operations, the diver's point of entry may be some way from the deck (either in terms of distance or depth). In such cases, it may be appropriate, subject to suitable risk assessment (see Section 3), to position a tender at an intermediate point on or above the waterline by means of a basket, light craft or other appropriate means. If this form of intermediate tendering is employed. the device containing the tender should be monitored and effective communications maintained.

7.6 Use of negatively buoyant umbilicals

The use of negatively buoyant umbilicals may provide an inherently safer operation in certain circumstances but any relaxation of standard operating procedures and safeguards due to the use of negatively buoyant umbilicals should be subject to a thorough task specific risk assessment.

7.7 Deployment of divers using an unmanned in-water tend point

Tending can be achieved using an unmanned in-water tend point provided the following criteria are met:

- The tend point is held in position relative to the vessel

- Any length of diver umbilical is restrained such that it cannot come within 5 metres of any physical hazards (such as thrusters, propellers etc.)

- The following constraints apply to the safe working distance for the umbilical:

  Cmax = D – 5 metres **OR**
  Cmax = A – 5 metres, depending which distance is shorter

  AND B = D – 10 metres

  Where:

  A distance from the diving bell to the nearest physical hazard
  B distance from the diving bell to the unmanned in-water tend point
  C distance from the unmanned in-water tend point to the diver
  D distance from the unmanned in-water tend point to the nearest physical hazard

- The diver's umbilical is secured to a swim line fixed between the bell and the unmanned in-water tend point.

- The bellman's umbilical and that of any standby diver is also secured to a swim line between the bell and the unmanned in-water tend point.

- A task specific risk assessment is carried out and all appropriate additional measures identified are provided.

- Suitable procedures should be in place, based on the particular circumstances of the diving operation, to permit recovery of a diver in an emergency.

8. SHALLOW WATER

8.1 Limitations

In relation to vessel safety, the only limit on a DP vessel in shallow water is draught, assuming that the requirements regarding vessel capability and position reference are fulfilled (see Section 8.2 and 8.3). The safety of the divers can be affected by other factors, however. For example, the proximity of thrusters may endanger their umbilicals, or the flow of water to and from the thrusters, which will vary with depth, may affect visibility. These factors will need to be addressed by evaluation, planning and risk assessment (see Section 3).

8.2 Vessel draught

The vessel master, in consultation with the senior diving supervisor, will need to determine the appropriate clearance between the divers' deployment device (where appropriate) and the keel or lowest thruster, taking into account all relevant factors, e.g. weather forecast, tides, vessel motion, the presence of subsea obstructions, etc.

Where the direction of escape is limited by adjacent shallower water. great care should be exercised in monitoring the tide and determining safe routes to deeper water.

8.3 Vessel capability

DP vessel capability plots do not give limiting environmental conditions for shallow water, and operators should expect higher thruster and generator loads than for the same weather conditions in deeper water. This may result in diving support operations being terminated earlier than expected. For vessels with a consequence analysis warning, the reduced capability will be taken into account automatically because the alarm will be raised when the worse-case single failure would cause the vessel to lose position. albeit very slowly. based on thruster utilisation.

8.4 Position references

The major difference between diving support operations in shallow and deep water is the distance the vessel is able to move while maintaining on-line position references based on the seabed. This distance will be reduced further if the accuracy of the position references is poor.

There should be a minimum of three position references on-line when divers are in the water. one of which should be a radio or surface-position reference. In certain circumstances. it may be acceptable to have only two reference systems, preferably one surface and one subsea. This would be appropriate. for example, in open water where there are no adjacent hazards to the vessel. the deployment device or the divers. This will need to be determined by evaluation, planning and risk assessment (see Section 3).

The shallower the water depth, the smaller the scope for movement before seabed position reference sensors need relocating. In particular, as the water becomes shallower:

- The range of angle of vertical taut wires is reduced, unless the suspension point is significantly above the surface of the water.

- Acoustics are more susceptible to interference from the vessel.

- The peak natural excursion of the vessel may exceed the scope of the bottom position reference.

Surface reference systems may offer greater reliability because they are not susceptible to water depth. They may have other limitations, however, and these should be assessed: for example, the range of Artemis may be too limited for accurate bearing information.

For more information see Section 2.5 of Ref. 1.

8.5 Divers' excursion umbilicals

In shallow-water bell diving, thruster proximity can be as much of a concern as in surface-orientated diving. The guidance given in Section 7 should be implemented in both cases as appropriate. Umbilicals should be made negatively buoyant whenever practical.

8.6 Environmental conditions

Diving operations in shallow water are more sensitive to weather than those in deeper water', and this should be considered when planning such operations. For example, shallow waters are often associated with strong, rapidly changing currents that can affect operations. Any consequent reduction in underwater visibility may affect the diver's ability to identify and avoid taut wires. etc. The closeness of the vessel may also cause vessel noise to affect operations.

9. DIVING WITHIN AN ANCHOR PATTERN

Diving within an anchor pattern restricts the movement of the vessel and may introduce additional hazards. Special consideration should be given to emergency and contingency procedures during the evaluation, planning and risk assessment of this type of operation (see Section 3).

9.1 Mooring line identification

When supporting divers from a position inside the mooring pattern of another vessel, drill rig or offshore installation, it is essential that anchor positions are confirmed by the other vessel, drill rig or installation and the position of the mooring lines by two independent means, one of which may be by calculation. If such calculations place the mooring lines more than 250 m from the divers' deployment device, the second means of identification may be waived.

If a vessel returns to the same location, there is no need to recheck these positions provided the vessel, rig or installation has not moved, the moorings have not been adjusted, and no major change in the moorings because of the weather is likely to have taken place.

9.2 Mooring line adjustments

If the risk assessment (see Section 3) has indicated that a mooring line can be safely lowered to the seabed, it is still necessary for the position of the line to be identified, for example, by low tension at the installation, ROV inspection, etc.

The other vessel, rig or installation must not move or ad-just mooring line tension or position during the diving operation without the DP vessel master, and through him the DP operator, being informed by the offshore installation manager (OIM). If necessary the OIM should also inform the vessel master of any draught changes that will affect the catenaries of mooring lines.

The DP operator must be able to monitor the other vessel. rig or installation from which the mooring lines are deployed at all times, either with radar or by radio. Diving operations should be stopped immediately if both radar and radio contact is broken.

9.3 Permit-to-work and reporting procedures

A reporting procedure should be established between the vessel master and the OIM to relay relevant information, such as the operation of other vessels in the area. There should also be an interface between the permit-to-dive procedure on the vessel and the permit-to-work system on the other vessel, rig or installation concerning mooring line adjustment, dumping potentially hazardous substances such as drill mud, and other operations that might adversely affect the diving operation.

9.4 Minimum operation clearance

A horizontal clearance of at least 50 m should normally be maintained between a suspended mooring line and a deployed bell or basket. In addition, the vessel should consider allowing an additional margin of capability as defined by the risk assessment (see Section 3) when the environmental forces are coming from the opposite direction.

If the DP vessel master, the Diving Superintendent, the Diving Supervisor and the Client agree that a clearance of less than 50 m is essential for executing the work, the following should be adhered to:

- The position of the mooring line should be plotted, and remain traceable throughout the operation. This can be achieved with an ROV-mounted transponder or other suitable means.
- The time spent with a clearance of less than 50 m should be minimised.
- Where twin bell systems are to be deployed simultaneously within the 50 m envelope, emergency provision for the loss of one or both bells should be considered during the evaluation, planning and risk assessment (see Section 3).

Movement at the touch-down point of the mooring line is inevitable, and can result in poor seabed visibility and entrapment of a diver and/or his umbilical. This should be addressed during the evaluation, planning and risk assessment (see Section 3).

9.5 Position references

Care should be taken to prevent position reference wires from coming into contact with the mooring lines because this will result in the loss of the seabed position reference. If it is technically feasible, a radio or surface position reference should always be used.

9.6 Operational plots

The thruster configuration diagram (see Section 7.2) should include the position of mooring lines in an easy-to-assimilate form. The vessel should also have on-board diagrams showing the catenaries and touch-down points for various mooring-line tensions.

10. SUBSEA STRUCTURES AND WELLHEADS

Diving within the vicinity of pipelines is the subject of separate guidance*.

When a DP vessel is close to a fixed underwater structure or obstruction which is totally or almost totally submerged, diving from a deployment device is potentially hazardous because there are few, if any, visual references on the surface. Special consideration should be given to emergency and contingency procedures for such operations during the evaluation, planning and risk assessment (see Section 3).

The structure's location should be recorded in the operational plot (see Section 9.6) and consideration given to providing a reference point to verify its location, e.g. ROV, marker buoys.

Subsea wellheads are frequently enclosed by a protective structure with access gained by one or two doorways. Alternatively the wellhead may be partially enclosed by a substantial bumper framework. Accessing such structures can be hazardous for divers, and the following guidance should be employed.

The location of the deployment device in relation to the subsea structure should be determined following evaluation, planning and risk assessment (see Section 3) and should take account of: environmental conditions, the height of the structure, the diver's entry point, the vessel footprint, available position reference systems, and the diver's upward and downward excursion limits.

Sufficient umbilical should be reserved in the deployment device to allow for minor vessel movement. Divers making an excursion deep within a totally enclosed structure should be tended at the entry point by a second diver (see Section 7.4.1).

The position of the vessel and the deployment device will be governed by a number of factors including the type of structure, but both should be protected from any hazards identified in the risk assessment. For example, if leakage of hydrocarbons or other noxious substances is possible, the deployment device should be positioned to the side of the structure to prevent the prevailing current carrying any such substances into the deployment device. Consideration should also be given to ways of minimising or preventing such substances from affecting the divers or impeding their abilities.

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5 Guidelines to the issue of a Flag State Verification Acceptance Document, DPVOA 127 (1995).

6 Diver attachment to structures by means of a “weak link”, AODC 058, (1993).

7 Diving when there is poor surface visibility, AODC 034, (1985).

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IMCA

DIVING DIVISION

GUIDANCE NOTE
NO: IMCA D 013

IMCA OFFSHORE DIVING SUPERVISOR AND LIFE SUPPORT TECHNICIAN SCHEMES

(Minimum Requirements for Certification)

APRIL 1998

This document supersedes AODC Guidance Notes 042, 043, 046
053 and 053 Rev 1 which are now withdrawn

The International Marine Contractors Association
Incorporating AODC and DPVOA

PREFACE

On **1** April **1995,** the Association of Offshore Diving Contractors (AODC) joined with the Dynamic Positioning Vessel Owners Association (DPVOA) to form the International Marine Contractors Association (IMCA).

The AODC Scheme Document, numbered AODC 053 (Rev. 1) has been revised and updated to take account of this change of identity and in order to reflect IMCA's growing international role. The examination procedure has been modified and optional national legislation examinations are now included alongside the compulsory examination Modules (see Pages 14 and 32).

These Schemes are recognised by the Diving Inspectorate of the United Kingdom Health and Safety Executive Offshore Safety Division (OSD) and are in conformity with the requirements of the Norwegian Petroleum Directorate 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.

IMPORTANT ADVICE

SPECIAL REQUIREMENTS FOR DIVING SUPERVISORS l-N NORWEGIAN WATERS

Trainee Diving Supervisors should be aware that the "Guidelines on the Qualifications for Personnel Engaged in Manned Underwater Operations in Petroleum Activities" issued by the Norwegian Petroleum Directorate on 11 June 1990 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 diving supervisors must have taken an approved course in advanced first aid;
- for Norwegian operations, all 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 an air diving supervisor

  25 bell dives from a vessel on dynamic positioning for a bell diving supervisor

b) The minor differences are as follows:

- NPD require evidence that an Air Diving Supervisor has spent one year as an active Trainee Air Diving Supervisor including 200 logged hours on the panel;
- the IMCA Scheme requires 200 hours offshore as a Trainee Air Diving Supervisor over a minimum period of 60 working days.

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.

There are two parts to this document.

Part I	Offshore Diving Supervisor Scheme
Part II	Life Support Technician Scheme

PART I OFFSHORE DIVING SUPERVISOR SCHEME

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PART II **LIFE SUPPORT TECHNICIAN SCHEME**

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SECTION 1

INTRODUCTION

Diving Supervisor Scheme

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 the responsibility ceased to dive and became full time Supervisors.

Legislation in the UK, Norway and other countries introduced in 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 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 Training and Medical Committee of AODC, assisted by the Safety and Technical Committee, 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 of eighteen months (later extended to twenty-one months) during which time existing personnel were expected to have passed the examinations. After 1 October 1988, all personnel working as Diving Supervisors and Superintendents have been required to have passed the necessary examinations and be in possession of an AODC/IMCA certificate confirming this.

To take account of growing interest in the Scheme in countries where clients had begun to insist on certification, the training sequence was relaxed for certain experienced supervisors who met all the requirements of the Scheme. After 1 July 1992, however, all candidates for the Diving Supervisor examinations must have progressed in accordance with the relevant training sequence set down in this document.

SECTION 2

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 mixed gas/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.

SECTION 3

TERMINOLOGY. RESPONSIBILITIES AND CAREER STRUCTURE

(See Figures 2, 3 and 4 on pages 11 - 13)

Diving Supervisor

The term DIVING SUPERVISOR is legally defined in the UK, Norway and other 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, whereas a BELL Diving Supervisor is qualified to take charge of both.

Any person who is acting as a Diving Supervisor, whether as an Assistant, Relief or Second Supervisor, must be fully qualified under the terms and conditions of this Scheme and must be appointed in writing by his company.

Legal 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;

- to complete the work to the satisfaction of the clients.

Some governments impose specific responsibilities on the Diving Supervisor which, in the case of the UK and Norway, 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 log book 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 must 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
(Figure 1 on Page 7 refers)

These responsibilities will be defined in the company procedures manual and will vary from company to company. The Supervisor must 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.

3.1 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 must remain in charge of the diving operation at all times and must not delegate his responsibility to the Trainee.

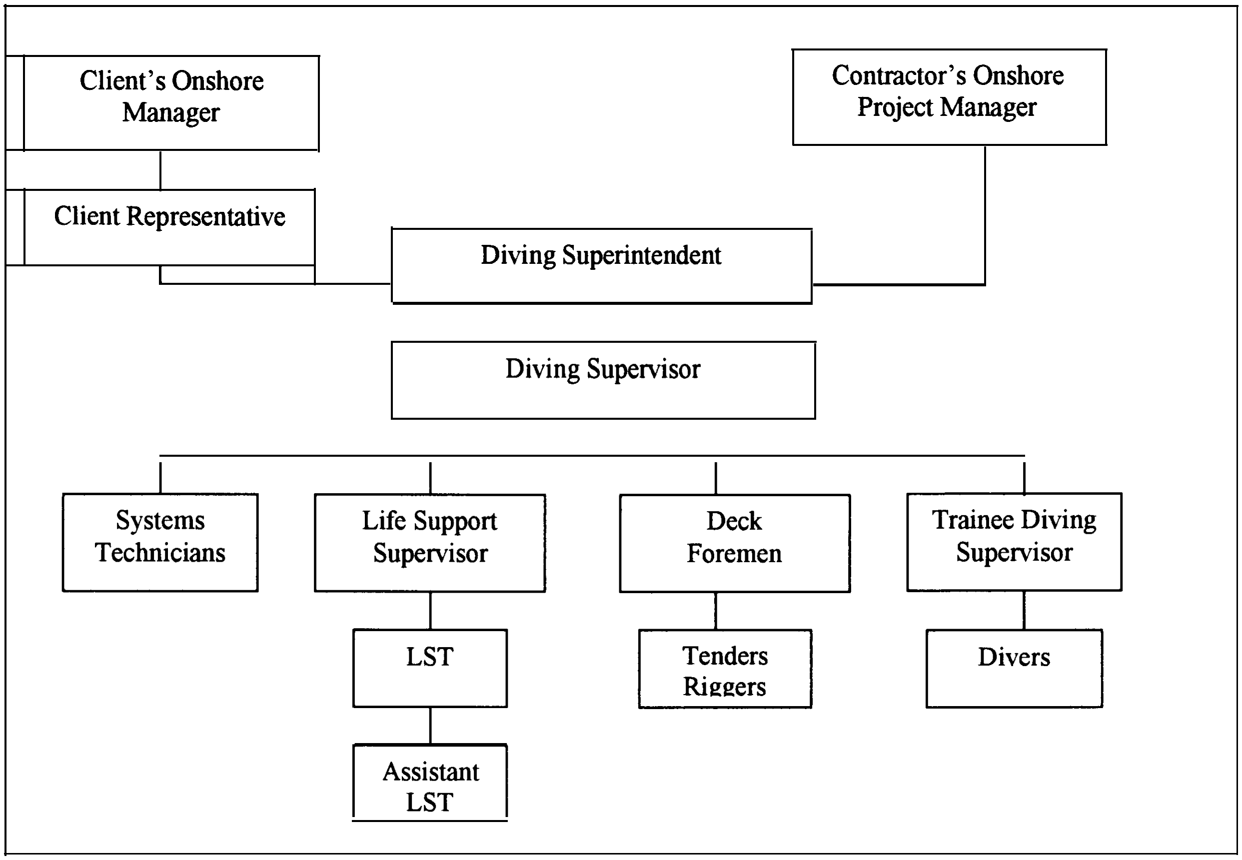

Figure 1 TYPICAL (BUT NON-EXCLUSIVE) ORGANOGRAM

3.1.1. Trainee Air Diving Supervisor

To qualify as a Trainee Air Diving Supervisor, a candidate must meet the following minimum criteria:

a. Be qualified to either UK HSE Part 1 or the Norwegian Standard. Those with comparable training and experience should be referred to the IMCA Scheme Administrator for a decision by the Assessment Panel.

b. Be a minimum of 24 years of age.

c. Have spent at least 2 years as an offshore air diver and have completed 100 offshore commercial dives.

d. Have satisfactorily completed an IMCA approved Trainee Air Diving Supervisor training course which meets the Terminal Objectives of this Scheme (see Page 17) and have passed the course examination. **Candidates are not eligible to attend such courses until they have complied with criteria a, b and c above.**

3.1.2 Trainee Bell Diving Supervisor

To qualify as a Trainee Bell Diving Supervisor, a candidate must meet the following minimum criteria:

a. Be qualified to either UK HSE Part II or the Norwegian Bell Diver Standard. Those with comparable training and experience should be referred to the IMCA Scheme Administrator for a decision by the Assessment Panel.

b. Be a minimum of 24 years of age.

c. Have spent at least 3 years as a bell diver and have completed 400 lock-out hours.

d. Have satisfactorily completed an IMCA approved Trainee Bell Diving Supervisor training course which meets the Terminal Objectives of this Scheme (see Page **19)** and have passed the course examination. **Candidates are not eligible to attend such courses until they have complied with criteria a, b and c above.**

3.2 Diving Supervisor

This is the main grade and covers qualified and experienced personnel, the responsibilities of which are clearly defined in law.

3.2.1 Air Diving Supervisor

Having qualified as a Trainee in accordance with 3.1.1 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 hours offshore over a minimum period of 60 working days as a Trainee Air Diving Supervisor.

b. Have achieved in total at least 3 years experience as an offshore air diver and have completed a total of 200 offshore commercial air dives.

c. Have been recommended by a company following satisfactory offshore reports.

d. Have passed IMCA examination Module 1.

3.2.2 Bell Diving Supervisor

Having qualified as a Trainee in accordance with **3.1.2** 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 hours offshore over a minimum period of 90 working 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.

e Have passed IMCA examination Modules 1 and 2.

3.2.3 Air Diving Supervisor to Bell Diving Supervisor

An Air Diving Supervisor who has qualified under this Scheme 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 3.1.2

b. Have logged at least 150 hours working offshore over a minimum period of 45 working days 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.

e. Have passed IMCA examination Module 2.

3.3 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 not order the start of a diving operation unless 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.

3.4 Company Familiarisation Programme

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

Before his first appointment as a Diving Supervisor, he should complete a Company Familiarisation Programme, followed by an examination 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 and passing of the examination 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 appraised of all new regulations and guidance and that they 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.

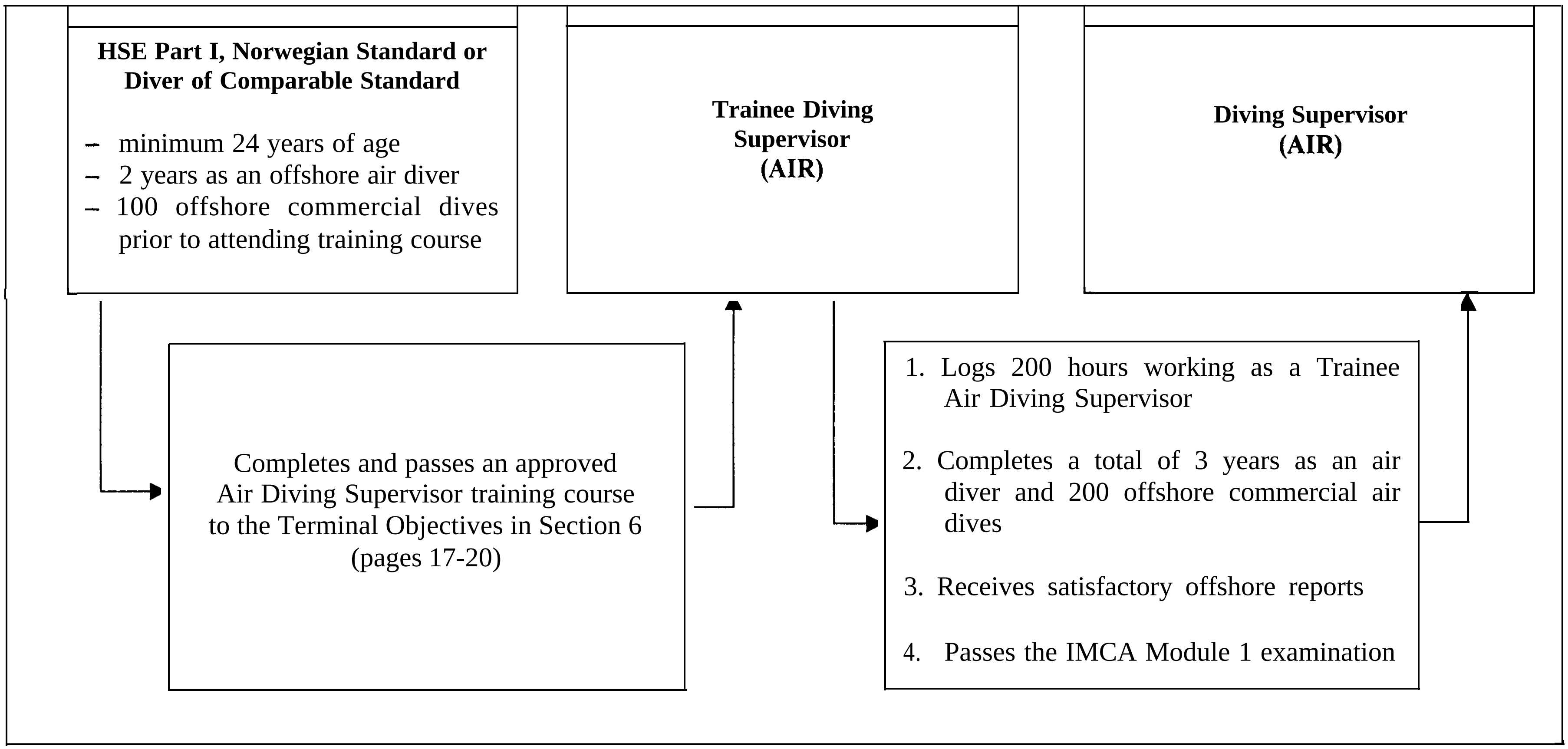

Figure 2 AIR DIVER TO AIR DIVING SUPERVISOR

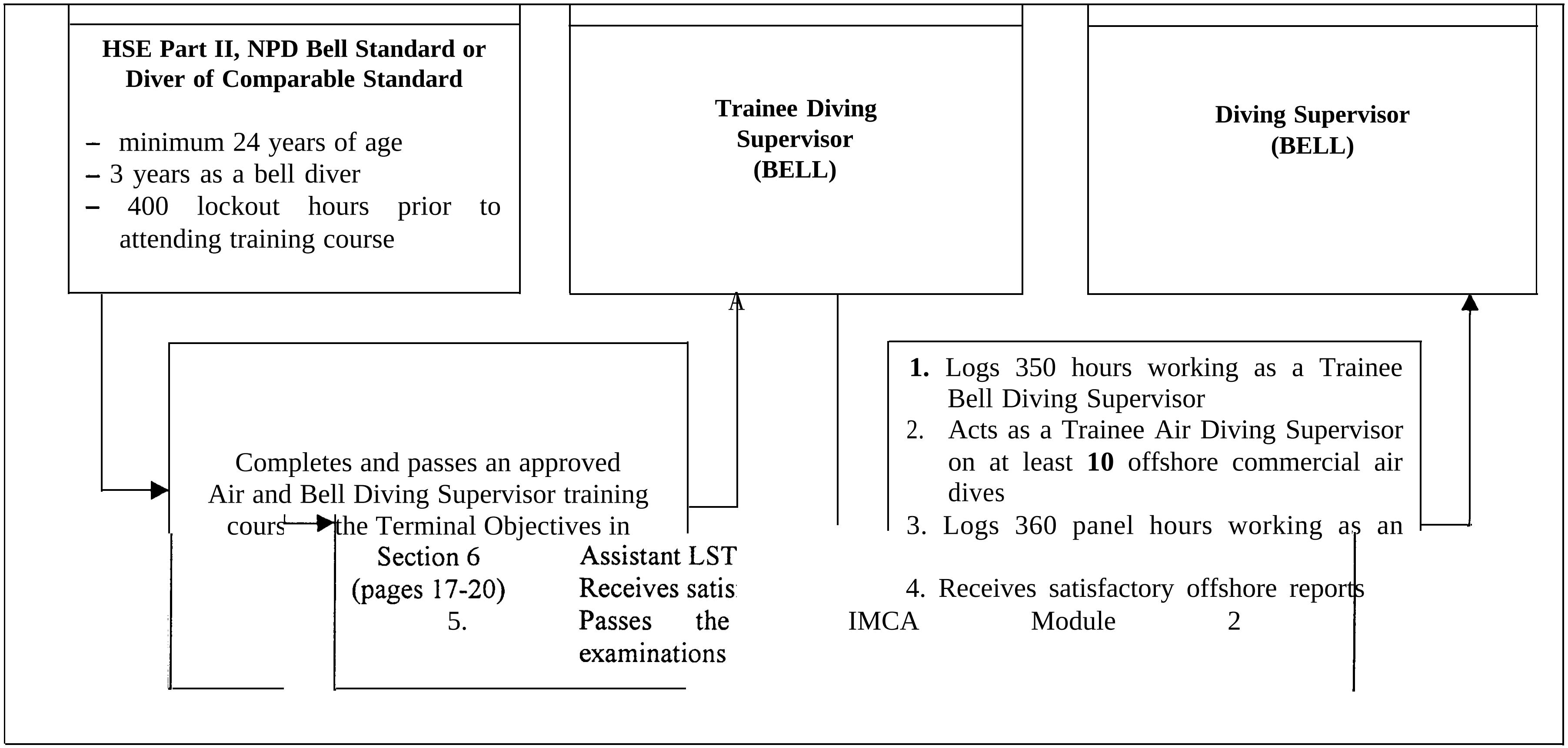

Figure 3 BELL DIVER TO BELL DIVING SUPERVISOR

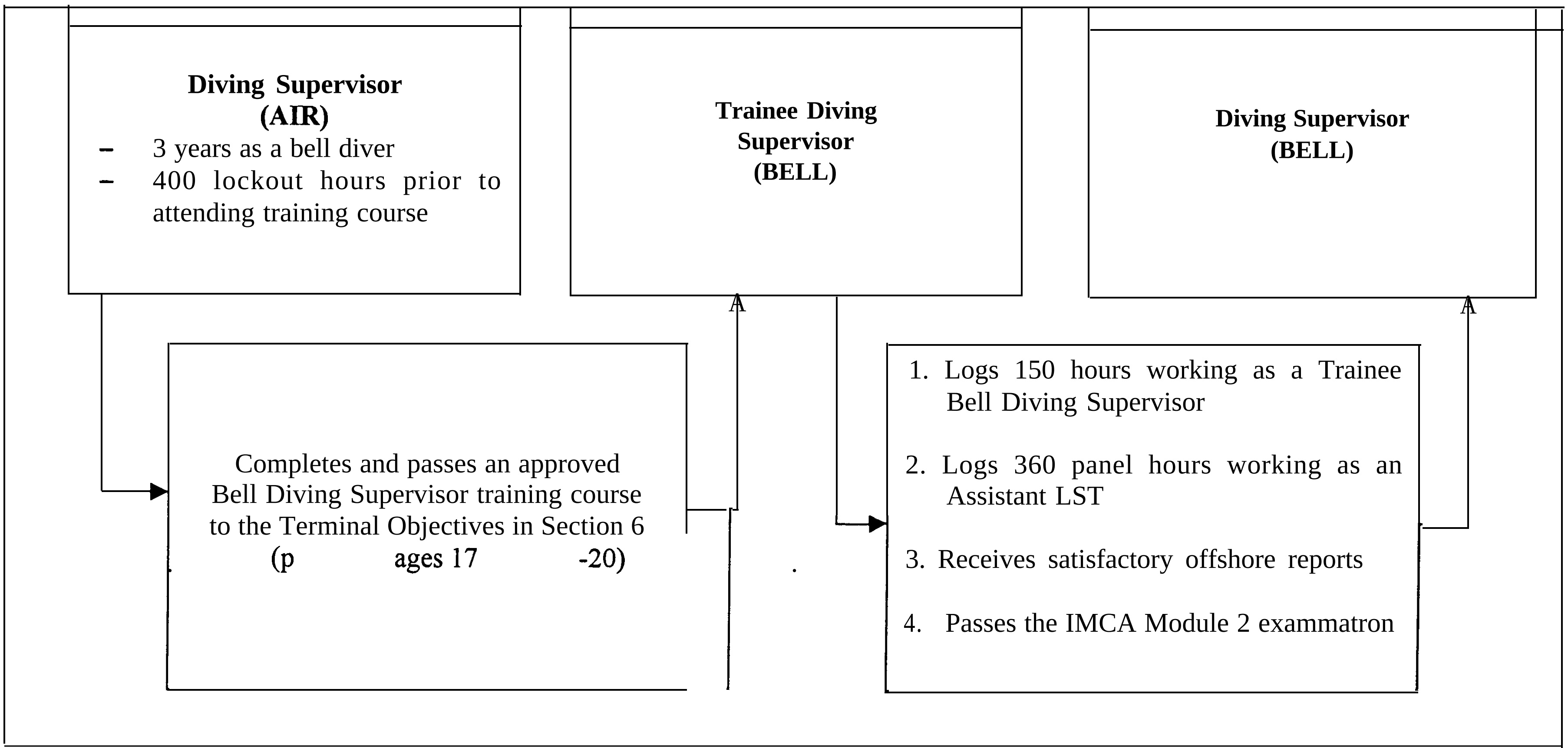

Figure 4 AIR DIVING SUPERVISOR TO BELL DIVING SUPERVISOR

SECTION 4

DIVING SUPERVISOR EXAMINATIONS

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

4.1 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,

and

2. Bell Diving Supervisor, which includes knowledge of life support duties, chamber, bell and handling system equipment, and emergency procedures.

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 1 A, 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.

4.2 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 (A.D.S. or B.D.S.) 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. Applications must reach the IMCA Scheme Administrator at least fourteen days before the proposed date of examination.

All candidates will be charged the current fee for each examination Module and for any resit. Examinations sat outside the United Kingdom will be charged at a higher rate in order to compensate for administrative, invigilation and postage costs. Some examination centres impose their own additional administration fees and, where appropriate, candidates will be informed of these when examination dates are set. 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 who have been approved by IMCA.

4.3 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 or discussed with candidates or their sponsors after an examination.

4.4 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 second 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.

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

4.5 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 must be in the possession of the holder at all times whilst working as a Supervisor.

Any loss or theft of a certificate must 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 IS REQUIRED BY LAW TO BE ISSUED BY THE DIVING CONTRACTOR. NEITHER DOES IT EXEMPT THE BEARER FROM COMPLYING WITH THE REQUIREMENTS AND STANDARDS IN FORCE IN THE COUNTRY IN WHICH HE IS WORKING.

SECTION 5

LOGBOOKS

The IMCA logbook for DIVING SUPERVISORS 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.

SECTION 6

TERMINAL OBJECTIVES FOR TRAINEE DIVING SUPERVISOR COURSES

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 must 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, conversion 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 must 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 published Codes, Guidance Notes, Safety Notices or Memoranda affecting air diving operations
- Able to keep accurate records of all operations under his control.

He must 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 BIBS systems, 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

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 must be capable of efficiently running <u>all</u> 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 35); and, in addition, be:

- Able to supervise and have a sound working knowledge of bell launching systems, use of guidewires 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 published Codes, Guidance Notes, Safety Note or Memoranda 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.

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 Notes or Memoranda published by the relevant national governing bodies.

APPENDIX I

SAMPLE APPLICATION FORM A.D.S

IMCA OFFSHORE DIVING SUPERVISORS CERTIFICATION SCHEME!

EXAMINATION APPLICATION FORM - AIR DIVING SUPERVISOR

Note: This form must be completed in full by the sponsoring Company (i.e. the candidate's current or most recent employer) and signed by that Company's nominated authorised signatory. All specified attachments must be enclosed with the form and it shall be understood that additional documentation may sometimes be requested.

All applications must be accompanied by three passport photographs of the applicant and the relevant examination fee (made payable to IMCA).

1. Applicant's: Surname ....

Forenames ....

Address ....
....
....

Date of Birth: ....

2. Offshore air diver experience: ......,.... years

Diver Training certificate: No. .... Issuing Authority ....

Attach photocopy of Certificate

No. of offshore commercial air dives: ....

continued. . .

3. Trainee Air Diving Supervisor experience:

Course date: .... Place: ....

Attach photocopy of Course Completion certificate

Date of first appointment (following course): ....

Attach photocopies of all Letters of Appointment

Total days worked as Trainee Air Diving Supervisor (since course): ....

Total hours logged as Trainee Air Diving Supervisor (since course): ....

4. Optional Legislation Modules applied for: UK .... Norway ....

5. TO BE COMPLETED BY THE COMPANY'S NOMINATED SIGNATORY (I.E. SAFETY MANAGER OR PERSON OF SIMILAR OR HIGHER STANDING WITHIN THE COMPANY)

I confirm that I have personally seen the applicant's logbook(s) and the originals of the attached documents and that I can verify that the information set out above is correct. On the basis of satisfactory offshore reports, I recommend that

....

is a suitable candidate for Air Diving Supervisor.

Signed: .... Position: ....

Company: ....

Address: ....
....
....
.... Date:. ....

APPENDIX II

SAMPLE APPLICATION FORM B.D.S

IMCA OFFSHORE DIVING SUPERVISORS CERTIFICATION SCHEME

EXAMINATION APPLICATION FORM - BELL DIVING SUPERVISOR

Note: This form must be completed in full by the sponsoring Company (i.e. the candidate's current or most recent employer) and signed by that Company's nominated authorised signatory. All specified attachments must be enclosed with the form and it shall be understood that additional documentation may sometimes be requested.

All applications must be accompanied by three passport photographs of the applicant and the relevant examination fee (made payable to IMCA).

1. Applicant's: Surname ....

Forenames ....

Address ....

....

....

Date of Birth ....

2. Offshore bell diver experience: .... years Lockout hours: ....

Diver Training certificate: No. .... Issuing Authority ....

Attach photocopy of Certificate

3. Trainee Air Diving Supervisor experience:

IMCA/AODC Air Diving Supervisor certificate No. (if appropriate) ....

Attach photocopy of Certificate

If applicant is not an IMCA/AODC qualified Air Diving Supervisor:

Course date: .... Place: ....

Attach photocopy of Course Completion certificate

No. of offshore commercial air dives supervised: ....

Attach photocopy of Letter(s) of Appointment

Continued...

4. <u>Trainee Bell Diving Supervisor experience</u>:

Course date: .... Place: ....

Attach photocopy of Course Completion certificate

Date of first appointment (following course): ....

Attach photocopies of all Letters of Appointment

Total days worked as Trainee Bell Diving Supervisor (since course): ....

Total hours logged as Trainee Bell Diving Supervisor (since course): ....

5. <u>LST experience</u>: Total hours logged working as an Assistant/LST: ....

or IMCA/AODC certificate No: ....

Attach photocopy of Certificate

6. <u>Optional Legislation Modules applied for</u>: UK .... Norway ....

7. TO BE COMPLETED BY THE COMPANY'S NOMINATED SIGNATORY (I.E. SAFETY MANAGER OR PERSON OF SIMILAR OR HIGHER STANDING WITHIN THE COMPANY)

I confirm that I have personally seen the applicant's logbook(s) and the originals of the attached documents and that I can verify that the information set out above is correct. On the basis of satisfactory offshore reports, I recommend that

....

is a suitable candidate for Bell Diving Supervisor.

Signed: .... Position: ....

Company: ....

Address: ....
....
....
.... Date: ....

APPENDIX III

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 the rules will result in immediate failure of the examination.**

PART II LIFE SUPPORT TECHNICIAN SCHEME

CONTENTS PAGE

SECTION 7

INTRODUCTION

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 feeding and sewage disposal need to be controlled from the outside.

The history of commercial diving has seen 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 has greatly increased the responsibilities of those who control the chamber environment and, consequently, the knowledge that they must have of the physics, physiology and medical aspects of supporting man in high pressure environments.

In the past, when there were small numbers of divers excurting 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 exploitation 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's Safety and Technical Committee started work in 1983 on a scheme to regularise this section of the underwater industry. With the formation of a separate AODC Training and Medical Committee in early 1984, the work was passed over to that Committee.

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 3 1 July 1986, since when the administrative arrangements for the LST Scheme have been brought into line with the Diving Supervisors Certification Scheme.

SECTION 8

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.

SECTION 9

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. Whilst these are based on the accepted position in the North Sea, they apply equally in other parts of the world.

9.1 Assistant Life Support Technician

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

Divers qualified to the UK HSE Part II Standard, Norwegian Bell Diver Standard or comparable standard are trained in Life Support techniques as part of their Diver Training and 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 **12** (Page 34), either at a training school or in a company,

   and

b. produce documentary evidence of satisfactorily completing such a course.

An Assistant LST must 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). (As UK HSE Part II, Norwegian Bell and divers of a comparable standard have experience of Life Support duties, the minimum period of 2400 panel hours working as an Assistant LST may, in their case, be relaxed to 360 logged panel hours since qualifying as UK HSE Part II, Norwegian Bell or comparable divers.) In addition, they must have had at least 5 years total diving experience, of which a minimum of 3 years must have been as a UK HSE Part II, Norwegian Bell or comparable diver.

Passing the Module 3 examination will indicate that an Assistant LST has the basic theoretical knowledge which is necessary for promotion to LST, but he should only be promoted if his company is satisfied as to his practical capabilities and temperament.

9.2 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 9.1 above) and must 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 must always be a Diving or Life Support Supervisor on duty and in control.

9.3 Life Support Supervisor

This is the most senior grade. Before becoming eligible for promotion to Life Support Supervisor, an LST must, since having qualified as such, have logged at least 2400 panel hours working as an LST, have a minimum of 4 years in the diving industry and have received training in aspects of leadership. Such promotion is not automatic and will depend on satisfactory reports indicating that he is able to assume responsibility and has a suitable temperament to cope with emergencies. He must 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.

9.4 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.

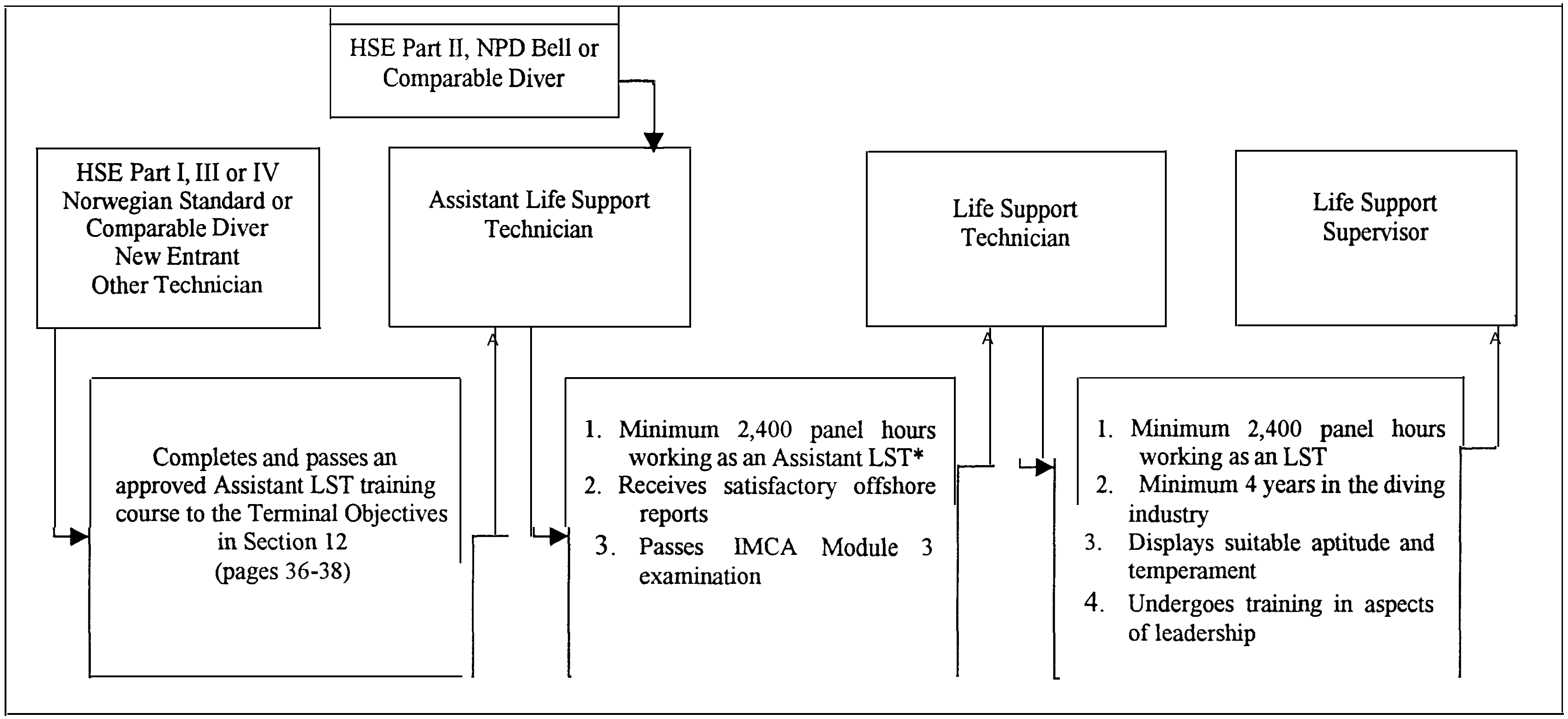

Figure 5 <u>LST CAREER STRUCTURE</u>

*If entry is as an HSE Part II, Norwegian Bell or Comparable Diver with at least 5 years experience, the minimum is 360 panel hours working as an Assistant LST plus 3 years as an HSE Part II, Norwegian Bell or Comparable Diver

SECTION 10

LIFE SUPPORT TECHNICIAN EXAMINATION

Before applying to sit the examination, candidates must meet all the eligibility criteria set out in Section **9** above and have progressed in accordance with Figure 5 of this document.

10.1 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.

10.2 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. Applications must reach the IMCA Scheme Administrator at least fourteen days before the proposed date of examination.

All candidates will be charged the current fee for each examination Module and for any resit. Examinations sat outside the United Kingdom will be charged at a higher rate in order to compensate for administrative, invigilation and postage costs. Some examination centres impose their own additional administration fees and, where appropriate, candidates will be informed of these when examination dates are set. 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 who have been approved by IMCA.

10.3 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 or discussed with candidates or their sponsors after an examination.

10.4 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 second 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.

IMCA keeps a record of all candidates who attempt examinations.

10.5 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 3 1 March 1998 remain valid.

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

Any loss or theft of a certificate must 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.

SECTION 11

LOGBOOKS

The IMCA logbook for LIFE SUPPORT TECHNICIANS 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.

SECTION 12

TERMINAL OBJECTIVES FOR ASSISTANT LIFE SUPPORT TECHNICIAN COURSES

On entering the industry, an individual must 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 Svstems

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. <u>Documentation and Record Keeping</u>

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. <u>Practical Experience under Direct Supervision</u>

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 online to chambers and control panels including the BIBS systems.

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.).

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 Notes or Memoranda published by the relevant national governing bodies.

APPENDIX IV

SAMPLE APPLICATION FORM L.S.T

IMCA LIFE SUPPORT TECHNICIAN CERTIFICATION SCHEME

EXAMINATION APPLICATION FORM - LIFE SUPPORT TECHNICIAN

Note: This form must be completed in full by the sponsoring Company (i.e. the candidate's current or most recent employer) and signed by that Company's nominated authorised signatory. All specified attachments must be enclosed with the form and it shall be understood that additional documentation may sometimes be requested.

All applications must be accompanied by three passport photographs of the applicant and the relevant examination fee (made payable to IMCA).

1. Applicant's: Surname ....

Forenames ....

Address ....

....

....

Date of Birth ....

2. **ONLY TO BE COMPLETED FOR HOLDERS OF UK HSE PART II, NORWEGIAN BELL DIVER OR COMPARABLE CERTIFICATES ONLY**

Diver Training certificate: No. ....

Issuing Authority ....

Attach photocopy of Certificate

Number of years commercial diving experience: ....

Number of years bell diving experience: ....

Panel hours logged working as an Assistant LST: ....

Continued. . .

3. <u>TO BE COMPLETED FOR ALL OTHER APPLICANTS</u>

Assistant LST training course: Place: ....

Date: ....

Attach photocopy of Course Completion certificate

Date of first appointment (following course): ....

Panel hours logged working as an Assistant LST: ....*......

4. TO BE COMPLETED BY THE COMPANY'S NOMINATED SIGNATORY (I.E. SAFETY MANAGER OR PERSON OF SIMILAR OR HIGHER STANDING WITHIN THE COMPANY)

I confirm that I have personally seen the applicant's logbook(s) and the originals of the attached documents and that I can verify that the information set out above is correct. On the basis of satisfactory offshore reports, I recommend that

....

is a suitable candidate for Life Support Technician.

Signed: .... Position: ....

Company: ....

Address: ....
....
....
.... Date: ....

APPENDIX V

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 the rules will result in immediate failure of the examination.**

IMCAINTERNATIONAL
CODEOFPRACTICEFOR
OFFSHOREDMNG

IMCA D 014

APRIL 1998

IMCA International Code of Practice for Offshore Diving

IMCA

The International Marine Contractors Association (IMCA) is the international trade association representing offshore, marine and underwater engineering companies. It was formed in April 1995 from the amalgamation of AODC (the International Association of Underwater Engineering Contractors) and DPVOA (the Dynamic Positioning Vessel Owners Association).

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.

It is organised through four distinct divisions each covering a specific area of members interests: Diving, Marine, Offshore Survey, Remote Controlled Systems and ROVs.

The Diving Division is concerned with all aspects of the equipment, operations and personnel of offshore diving operations (including atmospheric diving systems).

AUTHORS

This Code was prepared for IMCA under the direction of their Diving Division Management Committee by Crawford W. Logan.

IMCA

IMCA INTERNATIONAL CODE OF PRACTICE FOR OFFSHORE DMNG

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CONTENTS

1 INTRODUCTION

1.1 General

The offshore commercial diving industry, while providing services to the oil and gas industry, can be the subject of various regulations and standards imposed by National Governments of a particular area, the Clients who wish the work carried out, the Insurers of the Diving Contractor or other outside bodies.

While offshore diving in some areas, such as in European or Northern American waters is heavily regulated, there are other areas of the world where there may be little or no outside control of diving activities. In such areas the diving contractors themselves are left to establish their own internal controls by means of their Company manuals and procedures.

In the absence of local regulations there can be instances where some clients attempt to impose the regulatory standards of another area. This can cause confusion as many national regulations are based on local environmental and social conditions, which simply may not apply in other parts of the world.

The document is intended to assist the following, among others:

- Personnel involved in diving operations
- Client's staff involved in the preparation of bid documents and contracts
- Client and Contractor Representatives
- Vessel owners and marine crews involved with diving operations
- Installation and Rig Managers using divers
- All personnel involved in QA and Safety

IMCA has included recommendations in areas where there is a difficult balance between commercial considerations and safety implications. It is recognised however that safety must never be compromised for any reason. In particular there is a need for Clients and Contractors to recognise and accept the importance of providing sufficient appropriately qualified personnel to conduct operations safely at all times. This includes periods of routine preventative maintenance or repairs.

In order to provide a "level playing field" for diving contractors, this Code of Practice seeks to lay down minimum standards which all IMCA members should follow.

1.2 Status of the Code

This Code offers examples of good practice. It gives advice on ways in which diving operations can be carried out safely and efficiently.

The Code has no direct legal status but many courts, in the absence of specific local regulations, would accept that a company carrying out diving operations in line with the recommendations of this Code, was using safe and accepted practices.

It is also recognised that other Codes or standards exist, such as the ADC Consensus Standards which are widely used throughout the United States and elsewhere. In the absence of specific local regulations, companies carrying out diving operations are free to use the IMCA Code or any other suitable standard as the basis for their activities.

1.3 Work Covered by the Code

This Code is intended to provide advice and guidance in respect of all diving operations carried out anywhere in the world being :

- Outside the territorial waters of most countries (normally 12 miles or 19.2 5 kilometres from shore)
- Diving using mixed gas, closed bell or saturation techniques.
- Inside territorial waters where offshore diving, normally in support of the oil and gas industry, is being carried out. Specifically excluded are diving operations being conducted in support of civil, inland, inshore or harbour works or in any case where operations are not conducted from an offshore structure, vessel or barge that is normally associated with offshore oil and gas industry activities.

1.4 National and Other Regulations

A number of countries in the world have National Regulations which apply to offshore diving operations taking place within waters controlled by that country. In such cases National Regulations **MUST** take precedence over this Code and the contents of this Code should be used only where they do not conflict with the relevant National Regulations.

Any person carrying out offshore diving operations should establish whether there are any National Regulations applying in the area that diving will take place, remembering that a number of countries have regulations which apply anywhere in the world to diving taking place from vessels registered in that country. (The flag state)

There may also be International Regulations, Codes or standards (such as IMO [International Maritime Organisation] documents) that diving contractors either have to comply with or take serious note of.

1.5 Diving Contractor Manuals and Procedures

All companies carrying out offshore diving operations should prepare standard diving manuals and procedures covering their operations and any foreseeable emergencies. If the specific task they are undertaking is not standard then they should prepare specific procedures for that work.

This Code is not meant to be a substitute for company manuals and procedures.

1.6 Implementation

It is recognised that there will be aspects of the Code, such as those dealing with personnel qualifications, where the full requirements may not be able to be met at the time of publication. However, full implementation of the requirements in all aspects should be achieved as from 1 May 1999.

1.7 Updating Arrangements

This Code is a dynamic document and the advice given in it will change with developments in the industry. It is intended that this Code shall be periodically reviewed and any necessary changes or improvements made.

Any person with suggested improvements is invited to forward these, in writing, to IMCA, Carlyle House, 235 Vauxhall Bridge Road, London, SW1V 1EJ, United Kingdom

2. GLOSSARY OF TERMS

A number of specialised terms are used in this document. It is assumed that readers are familiar with most of them however a number of them, although they have been in use for many years, could be misunderstood. These terms are defined below to ensure that readers understand what is meant by them in this document.

COMPANY MEDICAL ADVISER
A nominated diving medical specialist appointed by a diving contractor to provide specialist advice.

COMPETENT
Having sufficient training or experience (or a combination of both) to be capable of carrying out a task safely and efficiently,

COMPRESSION CHAMBER
A pressure vessel for human occupancy which does not go under water. Also called recompression chamber, decompression chamber or deck chamber.

DIVING BELL
A pressure vessel for human occupancy which is used to transport divers under pressure either to or from the underwater work site.

DIVING MEDICAL SPECIALIST
A doctor who is competent to manage the treatment of diving accidents, including where appropriate mixed gas and saturation diving accidents. Such a doctor will have undergone specialised training and have demonstrated experience in this field.

DSV
A ship or other vessel whose primary role is the support of diving operations.

DYNAMIC POSITIONING
A system whereby external reference systems are used to maintain a vessel in a predetermined position. Normally relies on computer control and built in redundancy levels.

LIFT BAG
A bag which is filled with air or gas to provide uplift to an underwater object. Often used for lifting purposes by divers.

LOCK OFF TIME
The time at which a diving bell under pressure is disconnected from the compression chamber(s) on deck.

LOCK ON TIME
The time at which a diving bell under pressure is reconnected to the compression chamber(s) on deck.

MEDICAL EXAMINER OF DIVERS
A doctor who is trained and competent to perform the annual assessment of fitness to dive for divers. They may not possess knowledge of the treatment of diving accidents.

RISK ASSESSMENT
The process by which every perceived risk is evaluated and assessed before an operation commences. The findings will be documented.

ROV
Remotely operated vehicle.

STANDBY DIVER
A diver other than the working diver(s) who is dressed and with equipment immediately available to provide assistance to the working diver(s) in an emergency.

WET BELL
A basket with a closed top section which is capable of containing a dry gaseous atmosphere to provide a refuge for the divers. It is not a pressure vessel. A main supply umbilical will come from the surface to the wet bell with the divers having their own separate umbilicals which terminate at the wet bell. A supply of spare gas will be carried on the wet bell. Also called an open bottom bell.

3 DUTIES, RESPONSIBILITIES and RELATIONSHIPS

On any diving project there needs to be one company in overall control of the diving operations. This will normally be the company who employs the divers. If there is more than one company employing divers then there will need to be a written agreement as to which of these companies is in overall control.

3.1 Diving Contractor

The company in control is called the Diving Contractor. The name of the diving contractor should be clearly displayed and all personnel, clients and others involved in the diving operation should be aware who the diving contractor is.

The diving contractor will need to define a management structure in writing. This should include arrangements for a clear handover of supervisory responsibilities at appropriate stages in the operation, again recorded in writing.

The diving contractor's responsibilities should include provisions to ensure that:

- Risk assessments have been carried out.
- The place from which operations are to be carried out is suitable and safe.
- There are sufficient personnel of the required grades in the diving team.
- The personnel are qualified and competent.
- Suitable plant and equipment is supplied.
- The plant and equipment is correctly certified and properly maintained.
- A suitable plan is prepared which includes emergency and contingency plans. This should be signed and dated by the person preparing it.
- Suitable site specific safety and familiarization training is provided to all members of the dive team.
- Project records are kept of all relevant details of the project, including all dives.
- Adequate arrangements exist for first aid and medical treatment of personnel.
- There is a clear reporting and responsibility structure laid out in writing.
- Supervisors are appointed in writing and the extent of their control documented.
- All relevant regulations are complied with.

The level of detail or involvement required of the diving contractor, and information on how to meet the responsibilities, are given in the relevant sections of this Code.

3.2 **Others**

The actions of others can have a bearing on the safety of the diving operation even though they are not members of the team. These others include:

(i) The client who has placed a contract with a Diving contractor for a project. The client will usually be the operator or owner of a proposed or existing installation or pipeline where diving work is going to take place, or a contractor acting on behalf of the operator or owner. If the operator or owner appoints an on-site representative then such a person should have the necessary experience and knowledge to be competent for this task.

(ii) The main contractor carrying out work for the client and overseeing the work of the diving contractor according to the contract. If the main contractor appoints an on-site representative then such a person should have the necessary experience and knowledge to be competent for this task.

(iii) The Installation or Offshore Manager who is responsible for the area inside which diving work is to take place.

(iv) The master of a vessel (or floating structure) from which diving work is to take place who controls the vessel and who has overall responsibility for the safety of the vessel and all personnel on it.

These organizations or personnel will need to consider carefully the actions required of them. Their duties should include:

- Agreeing to provide facilities and extend all reasonable support to the diving supervisor or contractor in the event of an emergency. Details of the matters agreed should form part of the planning for the project.

- Considering whether any underwater or above-water items of plant or equipment under their control may cause a hazard to the diving team. Such items include water intakes or discharge points causing suction or turbulence, gas flare mechanisms that may activate without warning, or equipment liable to start operating automatically. [Ref 1] The diving contractor will need to be informed of the location and exact operational details of such items in writing and in sufficient time to account for them in the risk assessments.

- Ensuring that sufficient time and facilities are made available to the diving contractor at the commencement of the project in order to carry out all necessary site specific safety and familiarization training.

- Ensuring that other activities in the vicinity do not affect the safety of the diving operation. They may, for example, need to arrange for the suspension of supply boat unloading, overhead scaffolding work, etc.

- Ensuring that a formal control system, for example, a permit-to-work system, exists between the diving team, the Installation Manager and/or the master.

- Providing the diving contractor with details of any possible substance likely to be encountered by the diving team that would be a hazard to their health, e.g. drill cuttings on the seabed. They will also need to provide relevant risk assessments for these substances. This information will need to be provided in writing and in sufficient time to allow the diving contractor to carry out the relevant risk assessments.

- Keeping the diving supervisor informed of any changes that may affect the diving operation, e.g. vessel movements, deteriorating weather etc.

The following have additional responsibilities.
The client will need to ensure, as far as it is reasonable, that the diving contractor has the appropriate plant and equipment, personnel and operating procedures to meet any relevant regulations before work begins.

When diving from a dynamically positioned (DP) vessel, the responsible person on the DP control panel will need to inform the diving supervisor of any possible change in position-keeping ability as soon as it is known. It is a requirement that a set of DP alarms are repeated in the diving control centre.

3.3 **Diving Supervisor**

Supervisors are responsible for the operation that they have been appointed to supervise and they should only hand over control to another supervisor appointed in writing by the diving contractor. Such a handover will need to be entered in the relevant operations log book.

Supervisors can only supervise as much of a diving operation as they can personally control, both during routine operations and if an emergency should occur.

The supervisor with overall responsibility for the operation is the only person who can order the start of a dive, subject to appropriate work permits etc. Other relevant parties, such as a ship's master or the installation manager, can, however, tell the supervisor to terminate a dive for safety or operational reasons.

There will be times, for example, during operations from a vessel using dynamic positioning techniques, that the supervisor will need to liaise closely with other personnel, such as the vessel master or the DP operator. In such circumstances, the supervisor must recognize that the vessel master has responsibility for the overall safety of the vessel and its occupants.

The supervisor is entitled to give direct orders in relation to health and safety to any person taking part in, or who has any influence over, the diving operation. These orders take precedence over any company hierarchy. These orders could include instructing unnecessary personnel to leave a control area, instructing personnel to operate equipment, etc.

To ensure that the diving operation is carried out safely, supervisors will need to ensure that they consider a number of points including:

- They should satisfy themselves that they are competent to carry out this work, and that they understand their own areas and levels of responsibility and who is responsible for any other relevant areas. Such responsibilities will need to be contained in the relevant documentation. They should also ensure that they are in possession of a letter from the diving contractor appointing them as a diving supervisor.

- They will need to satisfy themselves that the personnel they are to supervise are competent to carry out the work required of them. They should also check, as far as they are reasonably able, that these personnel are fit and in possession of a valid medical certificate of fitness.

- They will need to check that the equipment they propose to use for any particular operation is adequate, safe, properly certified and maintained. They can do this by confirming that the equipment meets the requirements set down in this Code. They should ensure that the equipment is adequately checked by themselves or another competent person prior to its use. Such checks will need to be documented, for example, on a pre-prepared checklist, and recorded in the operations log for the project.

- When the operation uses, or plans to use, complex or potentially hazardous equipment, they will need to ensure that the possible hazards have been evaluated and are fully understood by all relevant parties and that, if required, training is given. This will be carried out as part of the risk assessment during the planning of the operation and will need to be documented. If the situation changes, however, further risk assessment will need to be considered. Supervisors will meet their responsibilities by ensuring the documentation exists and following any guidance contained in the documentation, for example, manufacturer's instructions.

- They will need to ensure that the operation they are being asked to supervise complies with the requirements of this Code. Detailed advice on how they can ensure this is given in various sections of this Code.

- They will need to establish that all involved parties are aware that a diving operation is going to start or continue. They will also need to obtain any necessary permission before starting or continuing the operation, normally via a "permit-to-work' system.

- The supervisor will need to have clear audible and, if possible, visual communications with any personnel under their supervision. For example, a supervisor will be able to control the raising and lowering of a diving bell adequately if there is a direct audio link with the winch operator, even though the winch may be physically located where the supervisor cannot see it or have ready access to it.

- During saturation or bell diving operations, supervisors will need to be able to see the divers inside the bell or compression chamber. This will normally be achieved on the surface by means of direct viewing through the view ports but when the bell is under water this will need to be by means of a camera.

- The supervisor will need to have direct communications with any diver in the water at all times, even if another person needs to talk to, or listen to, the diver. [Ref 2]

4 EQUIPMENT

4.1 Equipment Location and Integrity

The choice of equipment location will be determined by the type of installation (a fixed structure may differ from a vessel), the detail of the type of diving equipment involved, the integrity of any handling system with respect to lifting points or load bearing welds, and structures etc. In this respect it should be ensured that in-date test certificates for all equipment are available where required.

In some applications the diving system may be required to operate in a hazardous area (ie An area in which there is the possibility of danger of fire or explosion from the ignition of gas, vapour or volatile liquid) All diving equipment used in such an area must comply with the safety regulations for that area.

Diving supervisors should also comply with any specific site requirements and where required obtain an appropriate permit-to-work before conducting diving operations.

Equipment location is often dependent on available deck space however if it is possible then placing the diving deployment system close to a ship's centre of gravity will minimize motion.

The power source for the diving system may be independent of the surface platform or vessel's power supply. If this is by aseparate generator, the positioning of this should be governed by the following factors: vibration, noise, exhaust, weather, length of cable required, possible shutdown phases, fire protection and ventilation.

Before welding any part of the diving system to a ship's or installation's deck, the position of fuel tanks and any other possible problem should be ascertained.

Normal practice will be to prepare a deck layout or plan prior to mobilisation in order that a suitable equipment location and the service connections required are clear to all parties.

4.2 Gases

Gases stored in cylinders at high pressure are potentially hazardous. The dive plan needs to specify that the gas storage areas need to be adequately protected by, for example, the provision of fire deluge systems and guards against dropped objects. All gases used offshore will need to be handled with appropriate care.

4.2.1 Storage Cylinders

Gas cylinders will need to be suitable in design, fit for purpose and safe for use. Each cylinder needs to be tested and have appropriate certification issued by a competent person. Cylinders used for diving within the scope of this Code may be subjected to special conditions, such as use in salt water, and will therefore need special care. [Ref 3,4,5]

4.2.2 Marking and Colour Coding of Gas Storage

Fatal accidents have occurred because of wrong gases or gas mixtures being used in a diving project. The diving contractor will need to ensure that all gas storage units comply with a recognised and agreed standard of colour coding and marking of gas storage cylinders, quads and banks. [Ref 6] Where appropriate, pipework will also need to be colour coded. (All gases should be analysed before use in any case.)

4.2.3 Divers' Breathing Gas Supply

The correct use of breathing gases for divers and the continuity of their supply is vital to divers' safety and health. Total or partial loss or interruption of a diver's breathing gas supply can be fatal. Equipment will therefore be needed to supply every diver, including the standby diver, with breathing gas of the correct composition, suitable volume, temperature and flow for all foreseeable situations, including emergencies. In particular, the supply will need to be arranged so that no other diver (including the standby) is deprived of breathing gas if another diver's umbilical is cut or ruptured. [Ref 7]

Each diver in the water will need to carry a reserve supply of breathing gas that he can quickly switch into the breathing circuit in an emergency. This should have sufficient capacity to allow the diver to reach a place of safety.

An in-line oxygen analyser with an audible Hi-Lo alarm will need to be fitted to the diver's gas supply line in the dive control area. This will prevent the diver being supplied with the wrong percentage of oxygen even if the breathing medium is compressed air. In addition, a carbon dioxide analyser will need to be fitted in all saturation operations using gas reclaim equipment.

4.2.4 Emergency Air Cylinders

When a diving basket is used by surface-supplied divers, emergency breathing gas cylinders will need to be supplied in the basket in a standard, agreed layout. This enables the divers to access the cylinders rapidly in an emergency. [Ref 8]

4.2.5 Oxygen

Pressurised oxygen can fuel a serious fire or cause an explosion, but can be used safely if stored and handled correctly. Any gas mixture containing more than 25% oxygen by volume will need to be handled like pure oxygen. It should not be stored in a confined space or below decks but out in the open, although protected as detailed in section 4.2.

Any materials used in plant which is intended to carry oxygen will need to be cleaned of hydrocarbons to avoid explosions. Formal cleaning procedures for such equipment will need to be provided by the diving contractor, together with documentary evidence that such procedures have been followed. [Ref 9]

4.3 Communications

All divers in the water will need a communication system that enables direct, two way, voice contact with the supervisor on the surface . Speech processing equipment will be needed for divers who are breathing gas mixtures containing helium, which distorts speech.

All such communications will need to be recorded, and the recording kept until the dive is successfully completed. If an incident occurs during the dive, the communication record will need to be retained for any subsequent investigation.

Experience has shown that medical incidents may not become apparent for some hours after the actual dive is completed. It is therefore recommended that recordings are kept for 24 hours before being erased.

4.4 Diving bells

4.4.1 Breathing Mixture Supply

The main umbilical system of a diving bell will need to be fitted with suitable protective devices that will prevent uncontrolled loss of the atmosphere inside the diving bell if any or all of the components in the umbilical are ruptured. [Ref 10]

4.4.2 Emergency Recovery

The dive plan needs to specify that adequate equipment and procedures are needed to enable the diving bell to be rescued if the bell is accidentally severed from its lifting wires and supply umbilical. [Ref 11]

The bell will need to be equipped with a relocation device using the internationally recognized frequency to enable rapid location if the bell is lost. It should also be fitted with the internationally agreed common manifold block for attachment of an emergency umbilical. [Ref 11, 12]

The bell will need to be capable of sustaining the lives of trapped divers for at least 24 hours. [Ref 11, 13]

The bell will need an alternative way to return to the surface if the main lifting gear fails.
This is normally by means of the guide wires and their lifting equipment or could be by means of an ROV attaching a new lift wire. However if weight shedding is employed, the weights will need to be designed so that the divers inside the bell can shed them. This design will need to ensure that the weights cannot be shed accidentally. [Ref 14]

4.4.3 Equipment Level

Closed diving bells used for saturation or bounce diving, will need a minimum level of equipment and facilities.

Divers will need to be able to enter and leave the bell without difficulty. Lifting equipment will need to be fitted to enable a person in the bell to lift an unconscious or injured diver into the bell in an emergency. Divers will also need to be able to transfer under pressure from the bell to a surface compression chamber and vice versa.

The bell will need doors that open from either side and that act as pressure seals.

Valves, gauges and other fittings (made of suitable materials) will be needed to indicate and control the pressure within the bell. The external pressure will also need to be indicated to both the divers in the bell and the diving supervisor.
Adequate equipment, including reserve facilities, will be needed to supply an appropriate breathing mixture to divers in, and working from, the bell.

Equipment will be needed to light and heat the bell.

Adequate first-aid equipment will be needed.

Lifting gear will be needed to lower the bell to the depth of the diving project, maintain it at that depth, and raise it to the surface, without the occurrence of excessive lateral, vertical or rotational movement.

4.5 Emergency Markings on Hyperbaric Rescue Systems

In an emergency, it is possible that personnel with no specialised diving knowledge will be the first to reach a hyperbaric rescue system. To ensure that rescuers provide suitable assistance and do not accidentally compromise the safety of the occupants, an IMO standard set of markings and instructions has been agreed. [Ref 15] Such markings will need to be clearly visible when the system is afloat.

4.6 Electricity

Divers, and others in the dive team, are required to work with equipment carrying electric currents, which presents the risk of electric shock and burning. Procedures have been developed for the safe use of electricity under water, and any equipment used in a diving operation will need to comply with this guidance. [Ref 16]

Recharging lead-acid batteries generates hydrogen that can provide an explosion hazard in confined spaces. [Ref 17] Care will need to be taken to provide adequate ventilation.

4.7 Suitability

The diving contractor will need to be satisfied that the equipment provided for the diving project is suitable for the use to which it will be put, in all foreseeable circumstances on that project. Suitability can be assessed by the evaluation of a competent person, clear instructions or statements from the manufacturer or supplier, physical testing, or previous use in similar circumstances.

New, or innovative equipment will need to be considered carefully, but should not be discounted because it has not been used before.

4.8 Certification

The standards and codes used to examine, test and certify plant and equipment, and the requirements of those who are competent to carry out such examinations, tests and certification, have been established. [Ref 18] All equipment and plant supplied for use in a diving operation will need to comply with at least these standards. Suitable certificates (or copies) will need to be provided at the worksite for checking.

4.9 Man-riding Handling Systems

Particular safety standards will need to be applied when using lifting equipment to carry personnel because serious injury may result from falling. Such handling systems should be designed with a suitable minimum safety factor on the load. Alternative design factors may be considered if based on detailed analysis, such as computer modelling of support ship motions, etc.

4.5). 1 Winches

Both hydraulic and pneumatic winches will need suitable braking systems, providing primary and secondary protection. They are not to be fitted with a pawl and ratchet gear in which the pawl has to be disengaged before lowering.

4.9.2 Diving Baskets and Open-Bottom Bells

A basket or open-bottom bell, used in support of surface-supplied diving, will need to be able to carry at least two divers in an uncramped position. It will need to be designed with a chain or gate at the entry and exit point to prevent the divers falling out, and with suitable hand holds for the divers. The design will also need to prevent spinning or tipping.

4.9.3 Lift Wires

Particular selection criteria will need to be used for man-carrying lift wires, including wires intended for secondary or back-up lifting. These wires will need to have an effective safety factor of 8: 1, be non-rotating, and be as compact as possible to minimise the space requirements of their operating winches.

4.10 Medical / Equipment Locks and Diving Bell Trunks

The inadvertent release of any clamping mechanism holding together two pressurised units under internal pressure may cause fatal injury to personnel both inside and outside the units. All such clamps will need pressure indicators and interlocks to ensure that they cannot be released while under pressure.

4.11 Therapeutic Recompression

No diving operation within the scope of this Code is to be carried out unless a two-compartment chamber is at the worksite, or in its close vicinity, to provide suitable therapeutic recompression treatment.

4.12	**Maintenance of Diving Equipment**	Diving plant and equipment is used under extreme conditions, including frequent immersion in salt water. It therefore requires regular inspection, maintenance and testing to ensure it is fit for use, e.g. that it is not damaged or suffering from deterioration.
4.12.1	Periodic Examination, Testing and Certification	Detailed guidance exists on the frequency and extent of inspection and testing required of all items of equipment used in a diving project, together with the levels of competence required of those carrying out the work. [Ref 18]
4.12.2	Planned Maintenance System	The diving contractor will need to establish a system of planned maintenance for plant and equipment to demonstrate compliance with these regulations. Such a system may be based on either passage of time or amount of use, but ideally will be based on a combination of both.
		For each major unit, the system will need to identify the frequency with which each task is to be undertaken and who should do the work. The individual involved will then need to complete a record of the work, either on paper or computer.
4.12.3	Equipment Register	An equipment register will need to be maintained at the worksite, with copies of all relevant certificates of examination and test. It will need to contain any relevant additional information, such as details of the materials used to construct diving bells and surface compression chambers. It will also need to contain details of any applicable design limitations, for example, maximum weather conditions for use, if applicable.
4.12.4	Cylinders Used Under Water	Divers' emergency gas supply cylinders (bail-out bottles) and cylinders used under water for back-up supplies on diving bells and baskets can suffer from accelerated corrosion. Particular care will need to be taken to ensure that they are regularly examined and maintained. [Ref 3, 4, 5]
4.12.5	Diving Bell and Basket Lift Wires	Frequent immersion in salt water, shock loading from waves, passing over multiple sheaves, etc., can cause wear and deterioration to the lift wires of diving bells and baskets if they are not properly maintained. Specialised advice on maintenance exists, and will need to be followed to ensure that wires remain fit for purpose.
4.12.6	Lift Bags	Special requirements for the periodic examination, test and certification of lift bags have been established. Manufacturers' maintenance instructions and testing requirements will need to be followed. [Ref 19]
4.13	**Lifting Equipment Design, Periodic Test and Examination Requirements**	All lifting equipment should be examined by a 'competent person' before the equipment is used for the first time, after installation at another site and after any major alteration or repair. Regular examination every six months is also recommended. Any additional testing specified should be at the discretion of the 'competent person.

Any lifting cable or wire should be provided with a test certificate confirming its Safe Working Load (SWL). The SWL should never be exceeded during operations and should include the deployment device, the number of divers to be deployed (with all their equipment) and any components that hang from the lifting cable (including cable weight in air). The condition and integrity of the cable should be checked at six monthly intervals, or more frequently as circumstances dictate.

The lifting and lowering winch should be rated by the manufacturer for a safe working load at least equal to the weight of the deployment device plus divers in air plus any additional components. An overload test of the winch's lifting and braking capacity should be undertaken after:

- All permanent deck fixings are in place;
- NDT on relevant welds have been completed.

All lifting gear, such as sheaves, rings, shackles and pins should have test certificates when supplied and be examined at six monthly intervals thereafter. The certificates should show the SWL and the results of load tests undertaken on the components to 2 x SWL.

5 PERSONNEL

This section refers to the number of divers and support personnel, their grades, competence and qualifications, and their ability to run the planned dive safely, including carrying out contingency and emergency plans.

5.1 TRAINING AND COMPETENCE

To work safely, efficiently and as a member of a team, personnel need to have a basic level of competence of the task they are being asked to carry out.

Competence may not be the same as qualification. A person who has a particular qualification, such as a diver training certificate, should have a certain level of competence in that area but the diving contractor and the diving supervisor will need to satisfy themselves that the person has the detailed competence necessary to do the specific task required during the particular diving operation.

This will normally mean establishing that the person has had sufficient training coupled with experience. In some cases experience alone will indicate competence even if no formal training has been undertaken.

The different members of the diving team will require different levels and types of competence.

5.1.1 Tenders

Tenders are there to help the divers. They should therefore be competent to provide the level of assistance that the diver expects and needs.

Competence is required of tenders in that :

- They should understand the diving techniques being used. This includes a detailed knowledge of the emergency and contingency plans to be used.
- They will need to be fully familiar with all of the diver's personal equipment.
- They should understand the method of deployment being used and all of the actions expected of them in an emergency.
- They should understand the ways in which their actions can affect the diver.

Some tenders will be fully qualified, but less experienced divers. In such cases their competence will be able to be verified easily In cases where the tender is not a diver however, and may in fact be a member of the deck crew, then his competence will need to be established on the basis of previous experience supplemented, where appropriate, with any additional training which the diving contractor or supervisor feel is necessary.

5.1.2 Divers

Most divers will possess a formal training certificate showing that they have attended a recognised school or have been trained in some other way.

All divers at work should hold a diving qualification suitable for the work they intend to do. They will need to have the original certificate in their possession at the site of the diving project – copies should not be accepted.

A suitable diving qualification is not required by people such as medical staff who may be exposed to pressure in chambers but who are not divers: they will, however, need to pass the diver's medical restricted for exposure to pressure in a chamber. In an emergency however, such medical staff requested to enter a chamber may do so, without a valid medical certificate.

Only two grades of diver are allowed to work within the scope of this Code: surface-supplied divers and closed bell divers. A number of internationally accepted certificates and qualifications are recognised for the two grades:

Surface-supplied diver certificates

- HSE Surface Supplied (with offshore top up)
- HSE Part I
- Transitional Part I (issued between 1/7/81 – 31/12/81)
- TSA or MSC Basic Air Diving
- Norwegian NPD surface diver
- Dutch Part 1 – Surface Dependent Diver
- French Class 2
- Australian Diver Accreditation Scheme Part 3
- Canadian Category 1 Diver
- Canadian Surface Supplied Mixed Gas Diver to 70m
- Canadian Unrestricted Surface Supplied Diver to 50m
- New Zealand Part I
- South African Class II
- IMCA Surface Supplied Diver

Closed bell diver certificates

- HSE Part II
- HSE Closed Bell
- Transitional Part II (issued between 1/7/81 – 31/12/81)
- TSA or MSC bell diving
- Norwegian NPD Bell Diver
- Dutch Part 2 – Bell Diver
- French Class 3
- Australian Diver Accreditation Scheme Part 4
- Canadian Category 2 Diver
- Canadian Category 3 Diver

- Canadian Bell Diver
- New Zealand Part 2
- South African Class I
- IMCA Bell Diver

Those with one of the Closed Bell certificates listed above are also qualified to undertake surface-supplied activities.

Divers who have been trained in the USA will not normally possess one of the certificates listed above. The US training system is based on a diver receiving basic training at a diving school followed by experience gained in the field under a form of 'apprenticeship'. Within this framework, a system is in existence whereby five US based schools are **recognised** by the Association of Commercial Diving Educators (ACDE) as giving a minimum standard of training to US Standard **ANSI/ACDE-01-1993** [note that this standard is being updated and will become **ANSI/ACDE-01-1998]**. These schools are:

- The Ocean Corporation, Houston, Texas
- Divers Academy of the Eastern Seaboard Inc, Camden, New Jersey
- College of Oceaneering, Los Angeles, California
- Divers Institute of Technology Inc, Seattle, Washington
- Santa Barbara City College, Santa Barbara, California

These schools are independently audited and certificates from them can be accepted as showing suitable basic training. Subsequent diving experience needs to be demonstrated by log book entries.

Other Certificates

The US Trade Association, ADC Inc. is in the process of establishing a certification scheme for US trained divers and this scheme, once finalised, may also provide evidence of basic training.

Military diving qualifications will not normally be suitable qualifications for diving within the scope of this Code, although some countries do train divers to advanced standards.

Other schools and training organisations award certificates to divers, some of which are said to be 'equivalent' to **HSE/NPD** or similar. **IMCA** is unable to say that these certificates are suitable, since the training and the standards of qualification are not controlled by Government Bodies or **IMCA**, as is the case with the certificates listed above.

If an employer or supervisor is presented with a certificate by a diver such as described above, then detailed checks will have to be made as to the actual level of competence possessed by the diver before he is used offshore.

Sport diving certificates, such as BSAC or PADI, are not acceptable qualifications for offshore commercial diving.

None of these certificates in themselves prove overall competence, since the standards of training may vary considerably, but evidence of training, coupled with subsequent experience, will allow a reasonable decision to be made about a person's competence.

Competence is required of a diver in several different areas simultaneously:

- The diver will need to be competent to use the diving techniques being employed. This includes breathing gas, personal equipment and deployment equipment.

- They will need to be competent to work in the environmental conditions. This will include wave action, visibility and current effects.

- They will need to be competent to use any tools or equipment they need during the course of the dive.

- They will need to be competent to carry out the tasks required of them. This will normally require them to understand why they are doing certain things and how their actions may affect others.

Even tasks which are apparently very simple, such as moving sandbags under water, require a degree of competence, both to ensure that the pile of sandbags created is correct from an engineering viewpoint and also to ensure that the diver lifts and handles the bags in such a way that they do not injure themselves.

Previous experience of a similar task is one demonstration of competence but care should be taken to ensure that a diver is not claiming or exaggerating experience in order to obtain work or appear knowledgeable to their superiors. If there is any doubt about the validity of experience then the individual should be questioned in detail to establish their exact level of knowledge.

Where a diver has not carried out a task before, or where a task may be new to every member of the diving team, competence can be gained by detailed review of drawings and specifications, the equipment to be operated under water, the area to be worked in and any other relevant factors.

The time required for this review, the depth of detail reviewed and the checks necessary to confirm competence, will depend on the complexity of the task involved and the hazards associated with the operation.

For instance, an experienced inspection diver asked to use a new measuring tool may well be competent to carry out this operation after a few minutes handling the tool on deck and reading an instruction manual. However, a team of divers who are required to install a complex new type of unit on the seabed may need not only instruction, but also actual trials under water in using the unit. The diving contractor will need to establish the level of competence required for a particular application.

It should be recognised that inexperienced divers require to gain competence in a work situation and it is correct to allow this provided it is recognised by the other members of the team that the individual is in the process of gaining experience and competence. In such a case it would be expected that the other team members and particularly the supervisor, would pay particular attention to supporting the person gaining competence.

5.1.3 Deck Crew / Riggers

Divers rely heavily on the support given to them from the surface by the deck crew. The actions of the people on deck can have a major impact on the safety and efficiency of the work being carried out under water.

The deck crew will need to have competence in a number of areas:

- They will need to understand and be familiar with good rigging practice and seamanship. This will include relevant knots, slinging, correct use of shackles etc.

- They will need to be familiar with safe working loads and safety factors.

- They should understand the task that the diver is being asked to carry out under water

- They should understand the limitations of a diver in relation to the work they can carry out. For example they will need to understand that a diver cannot normally lift an item under water which it took two men to carry on deck.

- They should understand the various ways in which equipment can be prepared on deck to ease the task of the diver under water.

Often the deck crew will be made up in large part of experienced divers who are not actually diving. In such a case, competence can be established quickly. In most cases it will be necessary for the diving supervisor, or someone acting on his behalf, to give at least a short explanation to the deck crew prior to each job, such that competence is assured.

with a larger deck crew it will not be necessary for all members of the crew to have the same level of competence, provided they are closely overseen by a competent and experienced person.

5.1.4 Life Support Personnel

On many larger projects involving saturation or closed bell diving techniques, specialised personnel will be used to look after stored high pressure gases and to carry out the operations on and around the deck compression chambers in which the divers are living. Such personnel are often called Life Support Technicians.

A certification scheme for LSTs has been running for some years, administered by the AODC (now the IMCA). [Ref 20] This scheme issues formal certification to individuals who meet the necessary requirements. It is thus simple to establish if a person holds a qualification as a Life Support Technician.

The US Trade Association, ADC Inc., is currently setting up a similar system for the examination and certification of US trained life support personnel. Once finalised this scheme should provide suitable certification for such personnel.

5.1.5 Supervisors

There is only one person who can appoint a supervisor for a diving operation and that is the Diving contractor. The supervisor should be appointed in writing.

The Diving contractor should consider a number of factors when appointing a supervisor.

Regarding qualifications, it is relatively simple to establish if a person is suitably qualified to act as a Supervisor. A recognised certification scheme for the main grades of supervisor has been running for some years, administered by the AODC (now the IMCA). [Ref 20] This scheme issues formal certification to individuals who meet the necessary requirements.

The US Trade Association, ADC Inc., is currently setting up a similar system for the examination and certification of US trained diving supervisors. Once finalised this scheme should provide suitable certification for such personnel.

For offshore diving there are currently, under the IMCA scheme, three possible levels of certificate available and any person being considered for appointment as a supervisor will need to be in possession of the relevant certificate.

An Air Diving Supervisor will have passed the relevant modules of the certification scheme and be qualified to supervise all surface diving operations including decompression in a deck chamber. Care will need to be taken that such an individual has the necessary competence if they are asked to supervise surface mixed gas diving operations, since the examination and training for air diving supervisor does not include surface mixed gas diving techniques.

A Bell Diving Supervisor will have passed both air diving and bell diving modules of the certification scheme and be qualified to supervise all diving operations, including those in deck chambers.

A Life Support Technician will have passed the LST module of the certification scheme and, once they have completed a further 200 days working offshore at this grade, and are considered competent by the Diving contractor, will be qualified to supervise divers living in, or being compressed or decompressed in a deck chamber.

Supervisors do not normally need to be qualified in first aid, however the diving contractor should consider the role and requirements of the supervisor during a medical emergency.

If a diving operation is being planned, which does not fall clearly in to the areas normally undertaken by that Diving contractor, then detailed consideration will need to be given to the most suitable qualification for the supervisors to be selected.

Clearly the issue of competence is more subjective and the diving contractor needs to consider the operations being planned and the competence of any individual being considered for appointment as a supervisor.

The possession of the necessary qualification does not in itself demonstrate competence for any specific operation.

The Diving contractor will need to consider the details of the planned operation, such as the complexity of the part of the operation the person is going to supervise, the equipment and facilities which will be available to the supervisor, the risks which the supervisor and divers may be exposed to and the support which would be available to the supervisor in an emergency After such consideration, a decision will need to be made whether one supervisor can be responsible for all that is intended or whether more supervision is required.

Relevant previous experience supervising similar operations will demonstrate a suitable level of competence however if this has been gained with a different diving contractor then checks should be made to establish the veracity of the claimed experience. For this purpose the log book maintained by the supervisor can be consulted and if necessary, the details checked with previous diving contractors.

If relevant previous supervisory experience of similar operations cannot be demonstrated, due to unique features of the planned operation, or to the limited previous experience of the individual being considered, then the diving contractor should asses the relevant information available, consider the possible risks involved and make a decision as to the competence of the individual concerned.

It is possible that in the future, particularly on very large operations, a diving contractor may wish to appoint individuals as supervisors for parts of the operation, which do not fall neatly into the categories identified above. In such a case, the diving contractor will need to consider the most suitable qualifications available and in particular establish the competence of the individual for that position.

5.2 **Numbers of Personnel / Team Size**

The diving contractor will need to specify the size of team based on the details of the project. For safe operation, this may need to include additional deck support personnel and other management or technical support personnel, such as project engineers or maintenance technicians. The diving contractor will normally need to provide a sufficient number of competent and qualified personnel to operate all the equipment and to provide support functions to the diving team, rather than relying on personnel provided by others for assistance (e.g. clients, ship crews, etc.).

If personnel who are not employed by the diving contractor are to be used in the diving team for any reason they will need to be carefully considered for competence and suitability before being included. Such personnel can create a hazard to themselves and others if they lack familiarity with the contractor's procedures, rules and equipment.

There will be exceptions to this requirement, for example, when a diving system is installed long term on a DSV and there are suitable technicians employed by the vessel owner. In such circumstances, these personnel, whose principal duties may be associated with the diving or ships equipment, may form part of the diving team. Such an arrangement will need to be confirmed in writing, together with the responsibilities of these individuals.

The team size and composition must always be sufficient to enable the diving operation to be conducted safely and effectively. This means that a number of eventualities should be considered when deciding team size and make up including the following:

- type of task;
- type of equipment (air, saturation etc.);
- deployment method;
- location;
- water depth;
- operational period (eg. 12 or 24 hours per day).
- handling of any foreseeable emergency situations.

The overriding factor must always be the safety of personnel during operation and maintenance. It is the absolute responsibility of the diving contractor to provide a well-balanced, competent team of sufficient numbers to ensure safety at all times.

When a dive is taking place, either a diving supervisor or a life support supervisor (for chamber operations only) will need to be in control of the operation at all times. For large projects, more than one supervisor may be needed on duty

Each supervisor will only be able to provide adequate supervision of a defined area of operations, including dealing with foreseeable contingencies or emergencies.

For umbilicals that are tended from the surface, at least one tender is required for each diver in the water. For umbilicals tended from a bell or basket, one tender is required for every two divers in the water.

A standby diver will need to be in immediate readiness to provide any necessary assistance to the diver, whenever a diver is in the water. The standby diver will need to be dressed to enter the water, but need not wear a mask or helmet. This equipment will, however, need to be immediately to hand.

There will need to be one standby diver for every two divers in the water. For surface-supplied diving, the standby diver will remain on the surface.

When using a closed bell, the standby diver will remain inside the bell. Another diver will need to be on the surface with equipment suitable for intervention within the surface diving range. This diver need not be dressed for diving provided the equipment is available, and may undertake other duties within the dive team while the bell is under water.

Competent and qualified personnel providing life support will be needed to look after divers living in saturation. When divers are in saturation, normally two life support personnel will need to be on duty at all times, although one may be absent for short periods such as toilet and refreshment breaks.

A separate life support supervisor may need to be appointed in writing by the diving contractor if the life support control is remote from the diving control. Saturation diving supervisors are qualified to act as life support supervisors.

The controls of a surface compression chamber (SCC) can be operated by any competent person under supervision. All divers are trained to operate an SCC and are thus competent, as are qualified life support technicians (LSTs).

It should be understood that the great variance in the types of tasks for which divers are employed, together with advances in technology, make it hard for this document to offer anything more than general advice. Furthermore, it is not the aim of this document to remove the responsibility for safe operations from the contractor. Actual team sizes will need to be decided after completion of a risk assessment.

With regard to safe working practices, a single person should not work alone when dealing with:-

- high voltage;
- heavy lifts;
- high pressure machinery;
- potential fire hazards – welding, burning,
- epoxy fumes etc.

The absolute minimum required to conduct a safe surface-supplied dive within the scope of this Code is five – supervisor, working diver, standby diver, tender for working diver, tender for standby diver. Additional personnel may be needed to operate or maintain specialised equipment, such as winches, and to assist in an emergency.

An absolute minimum closed bell project requires two operations. One when the divers are in the bell or in the water under the control of a diving supervisor, and a second under a life support supervisor when the divers are in the saturation chambers. The absolute minimum team will be seven –

diving supervisor, life support supervisor, life support technician, two divers inside the bell, one diver on the surface, and a tender for the surface diver.

Individuals in a diving team will often carry out more than one duty, provided they are qualified and competent to do so and that their different duties do not interfere with each other. Overlapping functions will need to be clearly identified in procedures.

Trainees will often form part of the team but will not normally be allowed to take over the functions of the person training them unless that person remains in control, is present to oversee their actions, and the handover does not affect the safety of the operation.

On large projects, dedicated personnel may be required to provide safe management control. These personnel are often called senior supervisors or superintendents, and may or may not perform "hands-on" duties as part of the dive team.

5.3 **Working Periods**

It is recognized that long hours are sometimes required, but such circumstances should be exceptional and never planned. It should be remembered that accidents are more likely when personnel work long hours because their concentration and efficiency deteriorate and their safety awareness is reduced.

Work should be planned so that each person is normally asked to work for a maximum of 12 continuous hours, and is then given a 12-hour unbroken rest period between shifts.

Members of the diving team will not be asked to work for more than 12 hours without having at least 8 hours of unbroken rest during the previous 24 hours. Similarly, the longest period a person will be asked to work, and only in exceptional circumstances, will be 24 hours before being given 8 hours unbroken rest. This may be, for example, where a diving team has been on standby, but not diving, for a number of hours before diving is needed. In such cases, extreme care will need to be taken and allowance will need to be made for the effects of fatigue.

In saturation diving, the divers will not be asked to undertake a bell run exceeding 8 hours from seal to seal. They will then need to be allowed at least 12 hours of unbroken rest.

Extended work periods offshore without a break can reduce safety awareness. Work will therefore need to be planned so that personnel do not work offshore for long periods without being allowed time onshore. These times may need to vary to suit operational needs or exceptional circumstances, but personnel should be given a reasonable onshore break related to the period spent offshore.

No person will be expected to work a 12-hour shift without a meal break taken away from their place of work. Personnel also need toilet and refreshment breaks during their shifts.

To allow for these breaks, the diving contractor will need to ensure that the planned work either has natural breaks (for example, during periods of strong tide) or that qualified and experienced personnel are available to act as reliefs during breaks. This is particularly important in relation to supervisors whose responsibilities are often onerous and stressful. Any such handovers of responsibility should be recorded in writing in the operations log.

5.4 Training

It is necessary that diving contractors ensure that their personnel receive safety and technical training in order to allow them to work safely and in line with any relevant legislation, or to meet specific contractual conditions or requirements.

5.4.1 Safety Training

Safety Training should include the following:

(i) courses on survival, first aid and fire fighting;

(ii) an installation or vessel-specific safety induction course on the hazards to be found at work and while responding to emergencies;

(iii) further task-specific safety training outlining any special hazards associated with the tasks being worked on;

(iv) refresher training at regular intervals.

5.5 Communications

In an emergency, personnel tend to revert to their own language. If team members do not speak the same language this can cause an obvious hazard. The dive plan should state the language to be used during the project, and all team members will need to be able to speak to each other fluently and clearly at all times, particularly during emergencies.

6 MEDICAL

6.1 Medical Equipment

A minimum amount of medical equipment will need to be at a diving site to provide first aid and medical treatment for the dive team. This minimum will depend on the type of diving, but a standard list has been agreed. [Ref 21] Diving medical specialists will then know what equipment and supplies are available when giving advice to a worksite.

Particular problems exist if a diver becomes seriously ill or is injured while under pressure. Medical care in such circumstances may be difficult and the diving contractor, in conjunction with their medical adviser, will need to prepare contingency plans for such situations. Recommendations are available concerning the specialised equipment needed. [Ref 22]

The location of first-aid equipment will need to be identified by the international sign of a white cross on a green background.

6.2 Suitable Doctors

The physiology of diving and the problems encountered by an ill or injured diver are not subjects which most doctors understand in detail. For this reason it is necessary that any doctor who is involved in any way with examining divers or giving medical advice in relation to divers has sufficient knowledge and experience to do so. [Ref 23]

The medical examiner of divers who certifies their fitness to dive needs to have an understanding of the working environment of the diver, which is normally gained by undertaking an appropriate training course. Such a doctor however may be unable to give the necessary advice in relation to treatment of decompression sickness or other diving related injury.

Some doctors, as a result of training and / or experience have the necessary knowledge to advise on suitable treatment of diving related injury. They are usually described as Diving Medical Specialists.

6.3 First-Aid Training and Competencies

Diving physiology and medicine forms an integral part of all diver training courses.

This qualification expires after a period of time. For diving within the scope of this Code, divers will need to refresh their qualification at appropriate intervals . Divers with diving first-aid certificates may choose to complete a general first-aid course rather than a diving-specific course.

In addition, one member of the dive team who is not diving (other than the supervisor) will need to be trained to a higher standard of first aid known as “diver medic”. In practice, this means that at least two team members, who do not dive together, are trained as diver medics. This level of training will also require refresher training at regular intervals (normally every three years). [Ref 24]

For saturation diving, the diver medic may be a team member on the surface, but must be qualified to go under pressure in an emergency

A number of qualifications are available to satisfy these requirement:

6.4 Medical Checks

All divers at work must have a valid certificate of medical fitness to dive issued by a suitable doctor. The certificate of medical fitness to dive must be renewed prior to expiring if a diver wishes to continue diving at work. If the examination is carried out during the last 30 days of the validity of the preceding medical then the start date of the new certificate will be the expiry date of the old certificate.

The certificate of medical fitness to dive is a statement of the diver's fitness to perform work under water, and is valid for as long as the doctor certifies, up to a maximum of 12 months.

The medical examination looks at the diver's overall fitness for purpose. It includes the main systems of the body – cardio-vascular system, respiratory system, central nervous system – and ears, nose and throat, capacity for exercise, vision and dentition.

6.4.1 Responsibility of the Diver

Divers who consider themselves unfit for any reason, e.g. fatigue, minor injury, recent medical treatment, etc., will need to inform their supervisor. Even a minor illness, such as the common cold or a dental problem, can have serious effects on a diver under pressure, and should be reported to the supervisor before the start of a dive. Supervisors should seek guidance from their company or its medical adviser if there is doubt about a diver's fitness.

Divers who have suffered an incident of decompression illness will need to record details of the treatment they received in their log books. They will need to show this to the supervisor responsible for the first dive after the treatment in order that a check can be made of their fitness to return to diving. [Ref 25]

6.4.2 Responsibility of the Supervisor

Before saturation exposure, the supervisor will need to ensure that the divers have had a medical examination within the previous 24 hours. This will confirm, as far as reasonably practicable, their fitness to enter saturation. The medical examination will be carried out by a nurse or a diver medic. The content of the examination and the format of the written record will be decided by the diving contractor, and will be specified in the contractor's diving manuals.

Before any dive not involving saturation, the supervisor will need to ask the divers to confirm that they are fit to dive, and will record this in the diving records.

6.5 Liaison with a Suitable Doctor

The dive plan and risk assessment will need to consider the situation where a diver is injured but a doctor is not available at the worksite. In such a circumstance, arrangements will be needed to allow personnel at the site to communicate over radio or telephone links with a diving medical specialist. It is the responsibility of the diving contractor to make such arrangements, before any diving operation commences, with a suitably qualified and experienced doctor such that medical advice and treatment is available at any time to the diving personnel offshore.

Such an arrangement is normally the subject of a "standby" agreement with a doctor experienced in diving medicine and means that an emergency contact is available at all times for medical advice. This arrangement should be documented with the necessary details readily available offshore.

Part of the planning will need to be the pre-agreement of a suitable method of transferring medical information from worksite to doctor, for example, the Diving Medical Advisory Committee's aide memoire. [Ref 26]

All risk assessments and dive plans will need to account for the fact that a seriously ill or injured diver in saturation cannot be treated as if he was at atmospheric pressure. [Ref 22]

If the required treatment cannot be administered by the personnel at the worksite, then trained medical staff and specialised equipment will need to be transported to the casualty. Treatment will be given to the injured diver inside the saturation chamber. The diver will not be decompressed or transferred to any other location until in a stable condition.

6.6 Medical and Physiological Considerations

6.6.1 Diver Monitoring

For safety reasons, the dive plan will need to specify that supervisors need to be able to monitor divers' breathing patterns and receive verbal reports from the divers of their condition. There is no requirement to monitor the temperature, heart rate or other physiological parameters of the diver because this information will not assist the supervisors' assessment of safety. [Ref 27]

6.6.2 Seismic Operations and Sonar Transmissions

There are inherent problems for divers who are close to seismic operations or sonar transmissions. [Ref 28,29] If there is any possibility of sonar activity or seismic activity in the vicinity of a diving project, the dive plan will need to include parameters for the safety of the diver.

6.6.3 Decompression Illness after Diving

Divers are at risk of decompression illness (DCI) after diving. It is difficult to treat decompression illness if recompression facilities are not immediately available. The dive plan will therefore need to specify that divers remain close to suitable recompression facilities for a set time following a dive. [Ref 30]

6.6.4 Flying after Diving	The dive plan will need to state that flying is to be avoided for a specified time [Ref 31] following a dive because of the decrease in pressure on the diver's body caused by increased altitude.
6.6.5 Thermal Stress	The dive plan will need to specify ways in which divers can be maintained in thermal balance because excessive heat or cold can affect their health, safety and efficiency. For example, divers may be provided with suitable passive or active heating, such as thermal undergarments and a well-fitting "dry" diving suit, or a hot-water suit. Conversely in very warm waters nothing more than cotton overalls may be required.
	The dive plan will need to state that divers who breathe oxygen and helium mixtures will require active heating because of the high thermal conductivity of this breathing mixture, and that their inspired breathing gas will need active heating for dives deeper than 150 m.
6.6.6 Duration of Saturation Exposure	When planning a dive, consideration will need to be given to the previous saturation exposures of each diver and the time they have spent at atmospheric pressure since completing their last saturation dive.
	Because of the effects of long periods under pressure on the diver's health, safety and efficiency the dive plan should state that divers are not to be in saturation for more than a specified number of days (normally 28) including decompression, and that they will need to be at atmospheric pressure for a specified period before starting another saturation.
	It is recognised that operational circumstances may require these artificial limits, particularly the time at atmospheric pressure, to be varied and this should be done in conjunction with the Company Medical Adviser. [Ref 32]
6.6.7 Divers out of Closed Bells	Divers operating out of a closed bell over extended periods can suffer from dehydration. A diver spending over two hours out of a closed bell should be offered the opportunity to return to the bell and remove their breathing apparatus for a drink or other refreshments. While lack of food will not normally be a problem, a light snack when back at the bell can be helpful.

7 WORK PLANNING

Before any diving is carried out there should be a dive plan in existence. The dive plan will consist of a diving contractor's standard operating rules and any site-specific risk assessments and procedures.

The plan will need to cover the general principles of the diving techniques as well as the needs of the particular operation. It will also need to provide contingency procedures for any foreseeable emergency

Many factors need to be considered when preparing a dive plan for a diving project. The risk assessment will need to identify site-specific hazards and their risks. Based on this information, the plan will then need to state how these hazards and risks can be controlled. An exhaustive list of hazards and risks is not possible but some are highlighted below. More detailed information will be found in the Bibliography later in this document.

All supervisors will need to have copies of the dive plan.

7.1 General

7.1.1 SCUBA

Self-contained underwater breathing apparatus (SCUBA) has inherent limitations and difficulties, such as limited breathing gas supplies. It should not be used if surface supplied equipment can be used and thus there are unlikely to be any circumstances where the use of SCUBA will provide a suitable technique for diving under the scope of this Code. [Ref 33]

7.1.2 Use of compressed air or oxy-nitrogen mixtures

Divers breathing a mixture of oxygen and nitrogen under pressure, whether compressed natural air or an artificial mixture, are at risk of both oxygen toxicity and nitrogen narcosis as the depth increases. The dive plan will therefore need to specify the maximum depth for the mixture being used. Breathing mixtures other than oxygen and nitrogen (or air) will need to be used when diving takes place deeper than 50 m of water.

7.1.3 Exposure hits for air and oxy-nitrogen diving

Diving carries an inherent risk of decompression illness (DCI) . In surface supplied diving the incidence of DCI drops if the length of time a diver spends at any particular depth is limited. Many diving contractors use an artificial limit on time at any depth, typically the US Navy "0" repetitive group, to reduce the chances of DCI. Dive plans should be based on these maximum time limits.

It should be remembered that any subsequent dive within 12 hours of surfacing (repetitive diving) may not be allowed by some decompression tables and will be restricted in others.

7.1.4 Surface supplied mixed gas diving

The diving contractor may wish to carry out work using surface supplied techniques but where the use of compressed air or oxy-nitrogen mixtures would not be appropriate. The normal solution is to use a mixture of helium and oxygen as the breathing gas. For such diving a properly equipped wet bell should be used and the maximum depth should be limited to 75 m of water. For depths between 50 and 75 m of water the bottom time should be limited to a maximum of 30 minutes.

The dive plan for such work will need to consider all the relevant safety implications of using this technique instead of the use of a closed bell. In particular both divers and supervisors will need to be experienced in this type of diving.

7.1.5 Water intakes and discharges

Divers are vulnerable to suction or turbulence caused by water intakes and discharges. The diving contractor will need to establish with the client whether there are any underwater obstructions or hazards in the vicinity of the proposed diving project. If there are any intakes or discharges, suitable measures will need to be taken to ensure that these cannot operate while divers are in the water unless the divers are protected with a suitable physical guard. Such measures will need to be part of a work control system, such as a permit-to-work system, and could include mechanical isolation. [Ref 1]

7.1.6 Restricted surface visibility

Restricted surface visibility caused by, for example, driving ram may affect the safety of the operation. The dive plan will need to identify when operations will need to be suspended because of restricted visibility. [Ref 34]

7.1.7 Underwater currents

The dive plan will need to consider the presence of currents and the limitations they impose on the diver's operational ability [Ref 35] While other parameters also need to be taken into account, tide meters provide accurate information on the current at different depths and can be used to assess the diving conditions.

7.1.8 Diving near ROV operations

There are a number of safety considerations that need to be taken into account when divers are working with, or in the vicinity of, ROVs, and guidance is available. These include entanglement of umbilicals, physical contact, electrical hazards, etc. The dive plan will need to include solutions for these hazards. For example, umbilicals could be restricted in length, and electrical trip mechanisms or guards could be employed. [Ref 16,36,37]

7.1.9 Safe use of electricity

Divers often come into contact with equipment operated by, or carrying electricity. Care will need to be taken, therefore, to ensure that the divers and other members of the dive team, are protected from any hazards resulting from the use of electricity and particularly from any shock hazard. [Ref 16]

Battery-operated equipment used inside compression chambers can also be a hazard and the dive plan will need to include safe parameters for using such equipment. [Ref 38]

7.1.10 High-pressure water jetting	Even an apparently minor accident with this equipment has the potential to cause a serious internal injury to the diver. A dive plan that includes the use of such units will therefore also need to include safe operating procedures that will need to be followed. Such procedures can be found in industry guidance.[Ref 39,40]
7.1.11 Lift bags	The use of lift bags under water can be hazardous. The dive plan will need to include ways to prevent the uncontrolled ascent of a load. Good practice established by the industry will need to be followed.[Ref 19]
7.1.12 Abrasive cutting discs	The dive plan will need to address the risk of abrasive cutting discs breaking during use under water. In particular, the adhesive used in these discs tends to degrade in water. The plan will need to ensure that only dry discs not previously exposed to water are used, and that only enough discs for each dive are taken under water at any one time.
7.1.13 Oxy-arc cutting and burning operations	There are inherent hazards in the use of oxy-arc cutting and burning techniques under water, including explosions from trapped gases, trapping of divers by items after cutting, etc. Guidance on this subject exists. The dive plan will need to include precise instructions regarding the operating procedures. Procedures which eliminate blowback, etc. will need to be employed.[Ref 16,41]
7.1.14 Diving from DP vessels	Diving from dynamically positioned vessels can be hazardous to divers because of the presence of rotating propellers and thrusters. Practical steps have been established to reduce the risks arising from this hazard, and these will need to be included in the dive plan.[Ref 42] The use of an ROV or some other way of carrying out the task will need to be considered if the possibility of an umbilical or diver coming into contact with a thruster or propeller cannot be discounted. The dive plan will need to ensure that any diving support vessel operating on dynamic positioning meets industry technical and operational standards.[Ref 43,44,45]
7.1.15 Quantity of Gas	The likely quantities of gases needed for diving operations, including therapeutic treatments and emergencies, will need to be calculated when planning a diving project. Allowances will also need to be made for leakage, wastage, contingencies, etc.[Ref 46] Diving will need to be stopped if the minimum quantity of gas acceptable for safety purposes falls below the agreed minimum specified in the dive plan.

7.1.16 Levels of Oxygen in Helium

For safety reasons, pure helium should not be sent offshore except as a calibration gas or for a specific operational requirement. A small percentage of oxygen will need to be present in helium to be used within the scope of this Code. The industry norm is 2% .[Ref 47,48]

When an oxygen-helium mixture is used as the reserve supply in a diver's bail-out bottle, it should contain a percentage of oxygen that allows it to be breathable over the largest possible depth range. Guidance on a suitable percentage exists. [Ref 49]

7.1.17 Contents of Gas Mixes

Gas cylinders containing breathing gases coming from suppliers will be colour coded in accordance with industry guidance [Ref 6] and will be accompanied by an analysis certificate. The dive plan will need to make it clear that neither of these should be accepted as correct until a competent member of the dive team has analysed at least the oxygen content. This analysis will need to be repeated immediately before use of the gas

7.1.18 Length of Diver's Umbilicals

The required length of the diver's umbilical in relation to the worksite will need to be included in the dive plan, particularly where an emergency situation might require rapid location and recovery of the diver. [Ref 50]

When a diving bell is being used from a dynamically positioned vessel, the dive plan will additionally need to consider the fouling and snagging hazards in relation to umbilical length. [Ref 42]

7.1.19 Duration of Bell Runs and Lockouts

The dive plan will need to limit bell runs to less than 8 hours from "lock-off' to "lock-on" because of decreased safety and efficiency The dive plan will also need to ensure that each diver spends no more than 6 hours out of the bell.

The dive plan will need to state that divers in saturation need to be given at least 12 continuous hours of rest in each 24-hour period.

7.1.20 Transfer Under Pressure

The transfer of divers or equipment into or out of the saturation chamber, or between chambers under pressure, introduces a particular hazard. The dive plan will need to state that internal doors, i.e. those between the transfer chamber and the trunking to the diving bell and those separating living chambers within the chamber complex, are to be kept closed and sealed at all times except when divers are actually passing through them. Industry safety notices have been issued on this subject

7.1.2 1 Underwater Obstructions

Diving operations can be complicated by the number of lines deployed during operations: DP tautwire, equipment guide lines, clump weights and wires and diver's and bell umbilicals, swim lines etc. This situation is however often simplified by the level of detailed planning involved in the

7.2 ENVIRONMENTAL CONSIDERATIONS

operation, resulting in all involved parties having a clear understanding of responsibilities and expectations.

The safe and efficient deployment and operation of divers is dependent upon suitable environmental conditions. For any given situation the combination of these conditions can be dramatically different and it is the responsibility of the diving supervisor to assess all available information before deciding to conduct, to continue or to finish diving operations. Each Diving Contractor normally defines clear environmental limits. Diving supervisors should also ensure that they understand the implications of any other limitations which apply to vessels and deployment systems.

At no time should a diving supervisor allow contractual pressure to compromise the safety of personnel during ongoing or planned diving operations.

The following sub-sections are designed to highlight environmental aspects that affect diving operations. There is not, however, any substitute for practical experience.

7.2.1 Water Depth and Characteristics

Water characteristics may have a significant effect and the following factors should be taken into account when assessing the use of a diver on a given task:

(i) Visibility – Poor visibility can alter the effectiveness of the operation. Diving operations near or on the bottom can stir up fine grained sediment which may reduce visibility, particularly in low or zero current situations.

(ii) Temperature – Extreme temperatures (both high and low) may affect the reliability of equipment and impose particular hazards on personnel.

(iii) Pollutants – The presence of man-made and natural petroleum products around oil fields can cloud optical lenses and may damage plastic materials. Equally gas can affect visibility, block sound transmission and cause sudden loss of buoyancy. Special precautions should be taken to protect the divers if pollutants are present as well as protecting personnel who may handle the divers or their equipment during launch / recovery and during maintenance.

(iv) Divers are very sensitive to water movement and great care has to be taken in shallow water where surge of the water or the proximity of vessel thrusters can have a major effect on the ability of a diver to remain in a particular position. [Ref 35]

7.2.2 Currents

Currents can cause considerable problems in diving operations [Ref 35] but unfortunately it is often the case that very little quantitative data on particular current profiles is available.

Simulations and analysis can provide good indications of the effect of currents but often currents are not constant even close to the seabed. Currents vary with location and surface currents can be quickly affected by wind direction.

The use of a tide / current meter may provide information on the current strength and direction at any particular depth.

7.2.3 Sea State

The sea state can affect every stage of a diving operation.

Working from a support vessel in rough seas requires careful consideration of safety before and during launch and recovery.

Rough seas also require a heightened awareness of the possibility of accidents during recovery, both to the surface crew and to the divers. It is important, particularly in adverse sea states, that all personnel involved with launch and recovery wear all necessary personal protective equipment and fully understand their own role as well as the role of others involved in the operation, such as the captain of the support vessel. Good communication is a vital factor in reducing the possibility of accidents.

In certain situations, purpose-built deployment systems, e.g. motion compensation systems, can either reduce or better accommodate the effect of wave action thereby enabling diving operations to be conducted in higher than normal sea state conditions while maintaining normal safety standards.

7.2.4 Weather

The cost and efficiency of operations can be adversely altered by the effects of weather.

While divers under water may not be directly affected by the various effects of weather, these can have an effect on diving operations in a number of different ways:

- Wind speed and direction can make station-keeping difficult for the support vessel.
- Rain and fog will cause a reduction in surface visibility, possibly creating a hazard for the support vessel. [Ref 34]
- Bad weather can make working on deck extremely hazardous for the diving crew, particularly with adverse combinations of wind, rain, snow etc.;

- Hot weather can cause overheating. In particular umbilicals stored on deck are more susceptible to overheating by warm air or direct sunlight.

- Extreme heat, including direct sunlight, (or cold) can cause the temperature inside deck chambers to rise (or fall) to dangerous levels. In such conditions the internal temperature should be monitored and kept at a comfortable level.

- Extreme heat (including direct sunlight) or cold can adversely effect the diver acting as standby who will be static but dressed in most of his diving equipment. Arrangements should be made to keep the standby diver sheltered, at a comfortable temperature and well hydrated.

- Electric storms or lightning may be a hazard to exposed personnel or equipment.

Operations should, therefore, be carefully monitored with regard to the safety of both personnel and equipment.

7.2.5 Hazardous Marine Life

In some parts of the world divers may come in contact with marine life which will pose a hazard. Prior to commencing diving operations it should therefore be established if there is any known local hazard of this type.

If hazardous marine life is suspected then suitable emergency and contingency plans should be drawn up to deal with its effects.

7.2.6 Other Considerations

A diving supervisor should only allow a diving operation to begin after he has carefully considered all possible environmental criteria, their interaction with each other, and other factors including the deployment equipment, the system's readiness, crew readiness and the nature and urgency of the tasks. This will normally form part of the Risk Assessment carried out for that operation.

7.3 **Communications**

Effective communications are essential to ensure that all personnel directly involved in operations are made fully aware of the work being undertaken and that during operations all parties are kept aware of the status of any unusual situation.

Communications between the diving team and any other relevant personnel (such as marine crew) are important to the safe and efficient operation.

If there is an ROV operation taking place in the vicinity [Ref 36], established communications should always exist between:

- The diving supervisor and the ROV supervisor. (When an ROV is used in a diving operation the diving supervisor has ultimate responsibility for the safety of the whole operation).

- The diver and the ROV operator. *(Note* this is normally routed through the diving supervisor) If the ROV is used to watch the diver then back-up hand signals should be rehearsed.

Effective communications are vital to the safety and success of any operation. To ensure this the diving supervisor needs to be given access to the communications service of the vessel or installation on which operations are based, as and when required.

Communication systems encompass all available media and equipment: word of mouth, reports, telephone, telex, fax, radio etc.

7.4 Support Locations

Divers are required to operate from different locations with varying levels of support to the diving system and crew. Due consideration should be given, therefore, to the effect each location will have on the safety and efficiency of an operation. Such items as suitable deck strength, extra supports needed, external supplies available and the ease of launch and recovery will need to be considered.

Prior to mobilisation it is recommended that a suitable person (this may be the diving supervisor) should inspect the site and decide on the optimum location for the system. The level of services should also be assessed.

While it is not necessary for the various components of the diving system to be placed in a single location, care should be taken when considering hose or cable runs which exceed standard system lengths. Hose and cable runs should be protected from physical damage and should not cause a hazard to personnel. Due account should be taken of voltage and/or pressure drops due to length.

There are six basic types of support location:-

7.4.1 Small Work boat, Supply Boat or Standby Vessel

These are vessels of convenience from which diving may be carried out. They offer relatively low day rates compared to other support vessels but may also present operational limitations such as:

- lack of manoeuvrability;

- low grade navigation systems;

- no, or very low capability, offshore mooring or position keeping system;

- minimal deck space;
- no, or very low capacity, crane facilities
- low electrical power reserves;
- unsuitable propeller guards;
- limited personnel accommodation;
- poor weather susceptibility for overside operations;
- lack of marine crew familiarity with diving operations.

While such vessels can be used successfully in many situations, they need to be carefully assessed prior to the project and a clear decision made that the limitations of the vessel are nevertheless acceptable in relation to the proposed work scope and envisaged environmental considerations.

7.4.2 Small Air Range Diving Support Vessels and Larger Supply Boats

These vessels can be convenient for diving operations and while they will normally not have all the limitations listed in 7.4.1 above, they will still have some of these limitations.

Again such vessels can be used in a number of situations, but they still need to be carefully assessed prior to the project to ensure that the limitations of the vessel are nevertheless acceptable in relation to the proposed work scope and envisaged environmental considerations.

Often, the vessel's crew will be familiar with diving operations which can be very advantageous in difficult operating conditions or in an emergency

The range of vessels falling in to this category is substantial but some of the smaller or earlier generation vessels may still have some limitations may which will require careful consideration.

7.4.3 Monohull Diving Support Vessels (DSVS)

Such vessels make good diving support ships but are they are relatively expensive in comparison to other vessels due to the range of capabilities they can provide. ROVs may operate from DSVs in a complementary role to a diving operation in which case the requirements relating to the diver's safety take precedence at all times. [Ref 36]

7.4.4 Fixed Platforms

While the fixed nature of an installation results in the absence of a number of the limitations imposed by floating structures, there are a number of specific problems associated with operating from a fixed platform such as:

- The need to comply with specific, often onerous, zoning requirements in relation to hydrocarbon safety.
- Space limitations leading to difficulty in installation of surface support equipment.
- Additional safety requirements imposed on personnel such as training in H_2S emergencies.
- The possibility of a power shut-down due to a preferential trip operation
- Problems can arise if tidal effects on the diver make relocation difficult
- Deployment and recovery may be complicated by the height between the platform and sea level
- Additional hazards resulting from operations undertaken inside the jacket area.
- Intakes and Outfalls.

In addition all platforms operate a 'permit-to-work' system which governs the operation of diving systems and may result in operational delays.

7.4.5 Temporarily Fixed Platforms

Included in this category are various large structures which may in themselves be mobile but are intended to remain in one location during work. They may be maintained in that location by moorings, DP systems or other means. Examples would be drilling rigs, crane barges, accommodation barges etc.

These may present to diving operations similar hazards to those of a fixed Platform and while zoning and hydrocarbon safety requirements will normally apply to drilling rigs, other types of platform may have no such limitations.

These platforms may however have other hazards to diving operations such as anchor wires and submerged pontoons.

7.4.6 Specialist Locations

These can include multi-support vessels (MSVs) , laybarges, trenching barges or specialised marine vessels.

Every specialist location will present different problems which will need to be carefully considered at the planning stage. On many specialised vessels one of the main limitations on diving operations is that the primary task, for example pipelaying, cannot be interrupted without serious consequences.

It is important that all diving operations being conducted from a specialist location are planned to conform to a set of procedures agreed specifically for that location with the client.

7.4.7 Dynamic Positioning

Many of the above types of support location can be held in a fixed position by the use of dynamic positioning. This type of system can comprise anything from a supply boat captain using a joystick to manually maintain the vessel in one approximate location through to very sophisticated systems whereby several computers use external reference measurements to keep the vessel in an almost static position.

Dynamic positioning has its own inherent limitations and hazards in relation to diving operations:

- No system keeps the vessel static. All allow the vessel to move in a predetermined "footprint", which can be quite large.
- Although many such systems are very reliable, all have the possibility of failure which can leave a vessel effectively out of control close to a number of other vessels or fixed objects.
- DP uses the thrusters and propellers at all times which means that the diver and his umbilical can be at risk from these items or the wash that they generate.

For the above reasons it is important that a thorough assessment is carried out prior to the offshore operation to establish what the capabilities and limitations are of the DP system on the proposed vessel. This can then be compared with the required scope of work and a decision made about suitability and any restrictions which may need to be put on the operation.

DP vessels may be classified in accordance with an International classification system which will assist in any such consideration.

Only vessels complying fully with all aspects (such as number of reference systems, levels of redundancy, crew competence etc.) of the international standard for diving using DP should be used. [Ref 43,44,45]

7.5 Launch and Recovery

Because of the variety of diving systems, support locations and deployment systems, it is not possible to define every launch / recovery procedure in this document.

It is the responsibility of the diving supervisor to ensure that a safe launch/recovery procedure exists that is understood by all members of both the diving and the support installation crews. The procedure should progress in smooth, logical steps and be designed so that all personnel involved in the operation are fully aware of the situation at all times.

The diving contractor would be expected to have prepared appropriate calculations to a recognised standard which may or may not have been checked by a certifying authority. These calculations may specify limits for launch and recovery based on weather / sea state / vessel motions or other parameters.

8 EMERGENCY and CONTINGENCY PLANS

The diving contractor's operations manual should contain a section laying out the actions required of each member of the diving team in the event of a foreseeable emergency occurring during operations.

8.1 Diving Emergencies

The following list, which is not exhaustive, identifies the type of possible emergencies to be considered.

- Dealing with an injured or unconscious diver
- Fire in a chamber or around the dive system
- Loss of pressure in chambers or bell
- Faulty or broken equipment
- Approach of severe weather

8.2 Lost Bell Contingency Plan

A contingency plan will need to exist for the relocation and recovery of a lost closed bell. This should identify the actions of the diving contractor and other personnel, and the provision of specific equipment, such as locators. Ref 11

8.3 Hyperbaric Evacuation

In an emergency, divers in saturation cannot be evacuated by the same methods as other crew members. Special arrangements and procedures will, therefore, need to be made to evacuate them safely while keeping them under pressure, for example, in a chamber capable of being removed from the worksite to a safe location while maintaining the divers at. the correct pressure and with life support for a minimum of 24 hours.

The exact design of such equipment and its method of deployment will depend on the facilities available, the number of divers to be evacuated, the location of the worksite, etc. These factors will need to be considered during the risk assessment. The use of purpose built hyperbaric lifeboats is one option which can be considered.

9 DOCUMENTATION

9.1 Equipment Certification and Maintenance

Guidance exists on the frequency and extent of inspection and testing required of all items of equipment used in a diving project, together with the levels of competence required of those carrying out the work. [Ref 18] All of the equipment used in a diving operation will need to comply with at least these standards. Suitable certificates (or copies) will need to be provided at the worksite for checking.

Diving equipment is used under extreme conditions, including frequent immersion in salt water. It therefore requires regular inspection, maintenance and testing to ensure it is fit for use, e.g. that it is not damaged or suffering from deterioration. Regular maintenance is an important factor in ensuring the safe operation of a diving system.

Diving contractors should give due consideration to recommendations given in manufacturers' maintenance manuals.

Many complex action sequences are required during a diving project and there is a risk that steps may be omitted or actioned out of sequence. A suitable way to ensure the thoroughness of such sequences on each occasion is the use of pre-prepared checklists that require the relevant personnel to tick a box to demonstrate correct completion.

Diving contractors will need to prepare and authorize the use of such checklists as part of the planning for projects. A typical system check is described below in outline format.

9.1.1 Pre- and Post-dive Checks

Prior to diving commencing and after diving has been completed, a series of simple tests and examinations should be carried out to confirm that equipment is in good condition. These checks should include :

- A brief visual and 'touch inspection prior to any power being turned on.
- The system should be examined for cracks and dents, loose parts, unsecured wires or hoses, oil spots, discolouration, dirty camera lens etc.
- Each function should be briefly operated to ensure proper response.
- Loose bolts or couplings should be tightened or, if necessary, replaced.
- All mechanical parts should be kept clean and lubricated.
- Areas of potential corrosion should be examined and any necessary preventative or corrective measures undertaken.

- Major mechanical components should be regularly checked for alignment and abrasion.

- The handling system should be checked for structural damage.

- Electrical lines and connections should be examined and any hydraulic system inspected for leaks, abrasions and oil leaks. Fluid levels should be regularly checked.

- A function test should be performed on all brakes and latches.

9.2 Planned/Periodic Maintenance

The Diving contractor will need to establish a system of planned maintenance for plant and equipment. Such a system may be based on passage of time, amount of use, manufacturers recommendations or previous operational experience, but ideally will be based on a combination of all of these.

The planned maintenance system will need to identify the frequency with which each task is to be undertaken and who should do the work. The individual involved will then need to complete a record of the work, either on paper or computer.

9.2.1 Spare Parts

Diving operations are often undertaken in remote offshore areas. Diving contractors should therefore ensure that an adequate serviceable supply of spare items is available, particularly for those items which are essential to continued operation and safety.

9.3 Equipment Register

An equipment register will need to be maintained at the worksite, with copies of all relevant certificates of examination and test. It will need to contain any relevant additional information such as details of any applicable design limitations, for example, maximum weather conditions for use.

9.4 Operating Procedures

The operating procedures will consist of a diving contractor's standard operating rules and any site-specific risk assessments and procedures. The procedures will require to cover the general principles of the diving techniques as well as the needs of the particular operation. They will also need to provide contingency procedures for any foreseeable emergency.

The management of a project should be clearly specified together with a defined chain of command.

Many factors need to be considered when preparing the procedures for a specific project. A risk assessment will need to identify site-specific hazards and their risks. Based on this information, the procedures will then need to state how these hazards and risks can be controlled. An exhaustive list of hazards and risks is not possible but some are highlighted in the previous sections.

Documentation should include:

- A clearly defined scope of work and a list of resources, personnel and any tooling necessary to execute the programme;
- A mobilisation plan;
- A Q.A. summary;
- A logistics plan

In certain circumstances (such as a contractual or legislative requirement) specific documentation and procedures covering the intended scope of work should be prepared and submitted to the client for approval.

9.5 Manuals and Documentation

A major factor in a safe and efficient diving operation is the supply of a comprehensive set of manuals, check lists and log books appropriate to the operation. It is the responsibility of every contractor to ensure that each diving system is supplied with the necessary documentation including at least the following:-

- contractor's operations manual;
- safety management system;
- system equipment technical manuals;
- daily diary/report book;
- planned maintenance system
- repair and maintenance record
- systems spares inventory;
- pre/post dive check list.

9.5.1 Reference Documentation

Diving contractors should be familiar with all relevant legislation for the areas in which they are operating and the various advisory publications relevant to diving operations. Some examples of the latter are listed in the bibliography at the end of this document.

9.6 Diving Operations Log

Diving Contractors should ensure that a written record is kept on a daily basis of all the activities carried out and of any other relevant factors.

There is no specific format that this document should take however the following matters should be a minimum level of information to be recorded:

1. Name and address of the diving contractor.
2. Date to which entry relates (an entry must be completed daily by each supervisor for each diving operation).
3. Location of the diving operation, including the name of any vessel or installation from which diving is taking place.
4. Name of the supervisor making the entry and date on which the entry was made.
5. Names of all those taking part in the diving operation as divers or other members of the dive team.
6. Any codes of practice which apply to the diving operation.
7. Purpose of the diving operation.
8. Breathing apparatus and breathing mixture used by each diver in the diving operation.
9. Decompression schedule containing details of the pressures (or depths) and the duration of time spent by divers at those pressures (or depths) during decompression.
10. Emergency support arrangements.
11. Maximum depth which each diver reached.
12. Time at which each diver leaves atmospheric pressure and returns to atmospheric pressure plus his bottom time.
13. Any emergency or incident of special note which occurred during the diving operation, including details of any decompression illness and the treatment given.
14. Any defect recorded in the functioning of any plant used in the diving operation.
15. Particulars of any relevant environmental factors during the operation.
16. Any other factors likely to affect the safety or health of any persons engaged in the operation.

9-7 Divers Personal Log Books

Divers need to keep a detailed daily record of any dives they have carried out. There are a number of hard bound log books available for this purpose (IMCA publish one) however any suitable log book can be used. The following is the minimum information which needs to be entered in the diver's log book.

1. The name and address of the diving contractor.
2. The date to which the entry relates (an entry must be completed daily for each dive carried out by the diver).

3. The name or other designation and the location of the installation, worksite, craft or other place from which the diving operation was carried out.
4. The name of the supervisor who was in control of a diving operation in which the diver took part.
5. The maximum depth reached on each occasion.
6. The time the diver left the surface, the bottom time, and the time the diver reached the surface on each occasion.
7. Where the dive includes time spent in a compression chamber, details of any time spent outside the chamber at a different pressure.
8. The type of breathing apparatus and mixture used by the diver.
9. Any work done by the diver on each occasion, and the equipment (including any tools) used in that work.
10. Any decompression schedules followed by the diver on each occasion.
11. Any decompression illness, discomfort or injury suffered by the diver.
12. Any other factor relevant to the diver's safety or health.
13. Any emergency or incident of special note which occurred during the dive.

The entry must be dated and signed by the diver and countersigned by the supervisor.

9.8 Use of Checklists

Many complex action sequences are required during a diving project, for example, checking a diving bell before deployment. There is a risk that steps may be omitted or actioned out of sequence. A suitable way to ensure the thoroughness of such sequences on each occasion is the use of pre-prepared checklists that require the relevant personnel to tick a box to demonstrate correct completion. Diving contractors will need to prepare and authorize the use of such checklists as part of the planning for diving projects.

10. BIBLIOGRAPHY/ REFERENCES

The following is a list of documents which give more detailed information on subjects covered in the Code. In some cases these documents may be based on the Regulations of a particular country. If operating outside that country then their content should be considered as sound advice rather than a fixed requirement.

REF.	SOURCE	DESCRIPTION
1	AODC 055	Protection of Water Intake Points for Diver Safety
2	AODC 031	Communications with Divers
3	AODC 010 (Rev 1)	Gas Cylinders used in conjunction with diving operations in areas governed by UK Regulations
4	AODC 037	Periodic Examination of bail-out bottles
5	AODC 064	Ingress of Water into Underwater Cylinders charged by means of a Manifold System
6	AODC 016 (Rev 1)	Marking and colour coding of gas cylinders, quads and banks for diving applications
7	AODC 028	Diver's Gas Supply
8	AODC 039	Emergency air bottles in diving baskets
9	AODC 029	Oxygen Cleaning
10	AODC 009	Emergency Isolation of gas circuits in the event of a ruptured bell umbilical
11	AODC 019 (Rev 1)	Guidance Note on emergency diving bell recovery
12	AODC 012	Bell emergency location equipment trials
13	AODC 026	Diver emergency heating
14	AODC 061	Bell Ballast Release Systems and Buoyant Ascent in Offshore Diving Operations
15	AODC 017	Guidance Note on the marking of hyperbaric rescue systems designed to float in water
16	AODC 035	Code of Practice for the Safe Use of Electricity Under Water
17	AODC 054	Prevention of Explosions during Battery Charging in relation to Diving Systems

18	AODC 056	Code of Practice in the Initial and Periodic Examination, Testing and Certification of Diving Plant and Equipment – in accordance with UK Regulations. NB. Certification Societies also publish standards for this. The main ones are : DnV, Lloyds, ABS, Bureau Veritas, Germanischer Lloyd, USCG.
19	AODC 063	Underwater Air Lift Bags
20	IMCAD013	IMCA Offshore diving supervisor and life support technician schemes
21	DMAC 15 (Rev 1)	Medical equipment to be held at the site of an offshore diving operation
22	DMAC 28	The provision of emergency medical care for divers in saturation
23	DMAC 17	The training and refresher training of doctors involved in the examination and treatment of professional divers
24	DMAC 11	First aid training for divers and diving supervisors
25	DMAC 13 (Rev 1)	Guidance on assessing fitness to return to diving after decompression illness
26	DMAC 01	Aide memoire for recording and transmission of medical data to shore
27	DMAC 02	In water diver monitoring
28	DMAC06	The effect of sonar transmissions on commercial diving activities
29	DMAC 12	Safe diving distance from seismic surveying operations
30	DMAC 22	Proximity to a recompression chamber after surfacin
31	DMAC 07	Recommendations for flying after diving
32	DMAC 21 (Rev 1)	Guidance on the duration of saturation exposures and surface intervals between saturations
33	AODC 065	SCUBA
34	AODC 034	Diving when there is poor surface visibility
35	AODC 047	The effects of underwater currents on divers' performance and safety

36	AODC 032 (Rev **1)**	Remotely operated vehicle intervention during diving operations
37	IMCA R 004	Code of practice for the safe and efficient operation of remotely operated vehicles
38	AODC **062**	Use of battery operated equipment in hyperbaric conditions
39	AODC 049	Code of practice for the use of high pressure water jetting equipment by divers
40	DMAC 03	Accidents with high pressure water jets
41	IMCA D 003	Oxy-arc cutting operations under water
42	IMCA D **010** (Rev **1)**	Diving operations from vessels operating in DP mode
43	103 DPVOA	Guidelines for the design and operation of dynamically positioned vessels
44	108 DPVOA	Power system protection for DP vessels
45	IMCAM 117	The training and experience of key DP personnel
46	AODC 014	Minimum quantities of gas required offshore
47	DMAC 05	Recommendations on minimum level of 0, in helium supplied offshore
48	AODC 038	Guidance note on the use of inert gases
49	DMAC 04	Recommendations on partial pressure of 0, in bail-out bottles
50	AODC 020	Length of diver's umbilicals from diving bells
51	**ADC**	Association of Diving Contractors Inc. Consensus Standards for Commercial Diving Operations – available from ADC, 3910 FM **1960** West, Suite 230, Houston, TX 77068, USA

Further details on **IMCA/AODC** publications are available on the IMCAWebSite:**http://www.imca-int.com**.
Copies of these documents can be obtained from IMCA in London

11. COUNTRY SPECIFIC APPENDICES

Once the main Code has been agreed, IMCA will prepare appendices for countries which have specific Regulations or requirements. It is likely that such Appendices will be prepared in conjunction with the relevant authorities and the IMCA members who work regularly in that country.

As an example, we would foresee an Appendix for Norway which would give details of the extra requirements of Norwegian Regulations for any company intending to carry out diving work offshore Norway. There would be similar appendices for Holland, Denmark and the UK.

For areas without specific regulations but where local IMCA members have agreed specific operating standards, such as in the Middle East, then these agreed standards would form a regional appendix.

IMCA The International Marine Contractors Association
Represents offshore, marine and underwater engineering companies.

PUBLICATIONS

Prices from 1 July 1998

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1. This includes details of all AODC and DPVOA publications which, for the time being at least, will keep their respective reference numbers.

   It also includes details of all DMAC publications.

2. All sales are on the basis of cheque or cash with order, in £ sterling. A PAID invoice will be sent on dispatch of the documents.

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5. Prices include post and packaging for delivery in Europe. For delivery outside Europe an additional charge may be made.

6. IMCA Members receive copies of relevant documents free of charge when they are published. If further copies are required they can be purchased at the prices shown in the "Price to Members" column.

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Document Number	Title	Price to Members	Price to non Members	Remarks
	LOG BOOKS			
	DPVOA Dynamic Positioning Log Book	*El 1 .oo*	£13.50	
	ROV Pilot's Log Book	£11.00	£13.50	
	Professional Diver's Log Book	£11 .oo	£13.50	
	Diving Supervisor's Log Book	£11.00	£13.50	
	Inspection Diver's Log Book	£11.oo	£13.50	
	Life Support Technician's Log Book	£11.00	£13.50	
	Diving Technician's Log Book	£11.00	£13.50	
	Diving Tenders – Record of Training and Assessment	£ 7.50	£ 7.50	
	MISCELLANEOUS			
	Bell Tapping Code Plastic Cards	£ 2.50	£ 5.00	
	Diver Grading Certificates	£12.50 (incl VAT)	N/A	Only available to companies who signed the agreement with the RMT
	Set of Hyperbaric Rescue System Marking Signs	£35.00	£70.00	

Complete Collection of all AODC, IMCA (excluding DPVOA and Marine Division) and DMAC Guidance Notes and Codes of Practice

These are available in three composite volumes which, along with the six larger stand-alone AODC and IMCA documents, in a slipcase, make a complete set of all current Guidance Notes and Codes of Practice in this price list, relating to diving and ROV matters.

Item	Price to Members	Price to non Members	VAT
Volume 1 -AODC 09, 10 Rev 1, 11, 12, 14, 16Rev 1, 17, 18 Rev 1, 19 Rev 1, 20, 26-31, 32 Rev 1, 33, 34, 36 Rev 1, 37, 38, 39, 45, 47, 48, 49, 54, 55, 58-65	£60	£90	ZERO
Volume 2 **-** IMCA D00 1 Rev 1, IMCA D002-005 IMCA D006 Rev 1, IMCA D 007-009, D 010 Rev 1, IMCA DO1 l-013, 15 IMCA ROO l-003	£40	£60	ZERO
Volume 3 -DMAC 1-9, 11, 12, 13 Rev 1, 15 Rev 1, 16, 17, 18, 19 Rev 1, 20 Rev 1, 21 Rev 1, 22, 23, 24, 26, 28	£40	£60	ZERO
AODC 022	£30	£60	ZERO
AODC 035	£20	£35	ZERO
AODC 052 REV 1 **	£125	£250	17.5%
AODC 056	£35	£70	ZERO
IMCA R 004	£10	£20	ZERO
IMCA D 014	£10	£20	ZERO
Slipcase	£25	£25	17.5%
TOTAL	£395	£690	

This price includes post and packing for delivery in Europe.

** However, see three variations in detailed sheet which follows

Document Number	Title	Price to Members	Price to non Members	Remarks
	AODC DOCUMENTS			
AODC 001	Guidance notes/code of practice on certain aspects of the design and operation of diving bells			Replaced by AODC 0 19
AODC 002	Length of umbilicals			Replaced by AODC 020
AODC 003	Crane hooks			Replaced by AODC 0 18
AODC 004	Hyperbaric evacuation using the diving bell			Replaced by AODC 021
AODC 005	Emergency diving bell recovery 'location of diving bell'			Replaced by AODC 019
AODC 006	Guidelines for the selection of bell diving supervisors			Replaced by AODC 025
AODC 007	Code of practice for the use of high pressure water jetting techniques by divers			Replaced by AODC 049
AODC 008	Guidelines for the selection ot'air diving supervisors			Replace+ by AODC 024
AODC 009	Emergency isolation of gas circuits in the event of a ruptured bell umbilical	£2.50	£5.oo	
AODC 010 Rev 1	Gas cylinders used in conjunction with diving operations in areas governed by UK Regulations	£2.50	£5.00	Rev 1 published in March 1994 rep laces AODC 0 10
AODC 011	Tax allowances for diver training	£2.50	£5.00	
AODC 012	Bell emergency location equipment trials	£2.50	£5 .oo	
AODC 013	General diving services contract			Withdrawn
AODC 014	Minimum quantities of gas required offshore	£2.50	£5.00	
AODC 015	Surface orientated (air) diving from DP vessels			Replaced by AODC 050
AODC 016 Rev l	Marking and colour coding of gas cylinders, quads and banks for diving applications	£2.50	£5.00	Rev 1 published in March 1994 replaces AODC 0 16

Document Number	Title	Price to Members	Price to non Members	Remarks
AODC 017	Guidance note on the marking of hyperbaric rescue systems designed to float in water	£2.50	£5.00	
AODC 018 Rev 1	Attachment of loads to lifting hooks during diving operations	£2.50	£5.00	Rev 1 published in December 1995 replaces AODC 018
AODC 019 Rev 1	Emergency procedures – provisions to be included for diving bell recovery	£2.50	£5.00	Rev 1 published in April 1996
AODC 020	Length of divers' umbilicals from diving bells	£2.50	£5.00	
AODC 021	Hyperbaric evacuation using the diving bell			Withdrawn – now forms an appendix to hyperbaric evacuation study AODC 040
AODC 022	Code of practice for the operation of manned submersible craft	£30.00	£60.00	ZERO VAT
AODC 023	Life support technician scheme			Replaced by AODC 046
AODC 024	Selection criteria for air diving supervisors for operations where a compression chamber is required on site			Replaced by AODC 042
AODC 025	Selection criteria for mixed gas or bell diving supervisors			Now forms part of AODC 042
AODC 026	Diver emergency heating	£2.50	£5.00	
AODC 027	Oil lubricated compressors	£2.50	£5.00	
AODC 028	Diver's gas supply	£2.50	£5.00	
AODC 029	Oxygen cleaning	£2.50	£5.00	
AODC 030	Acrylic plastic viewports	£2.50	£5.00	
AODC 031	Communications with divers	£2.50	£5.00	
AODC 032 Rev 1	Remotely operated vehicle intervention during diving operations	£2.50	£5.00	Rev 1 issued in September 1992
AODC 033	Responsibility for underwater inspection	£2.50	£5.00	

Document Number	Title	Price to Members	Price to non Members	Remarks
AODC 034	Diving when there is poor surface visibility	£2.50	£5.00	
AODC 035	Code of practice for the safe use of electricity underwater	£20.00	535.00 £40.00	ZERO VAT
AODC 036 Rev l	The initial and periodic examination, testing and certification of ROV handling systems	£2.50	£5.00	
AODC 037	Periodic examination of bail-out bottles	£2.50	£5.00	
AODC 038	Guidance note on the use of inert gases	£2.50	£5.00	
AODC 039	Emergency air botles in diving baskets	£2.50	£5.00	
AODC 040	Hyperbaric evacuation study			Withdrawn
AODC 041	The initial and periodic testing, examination and certification of diving plant and equipment			Superseded by AODC 056
AODC 042	Offshore diving supervisors scheme			Replaced by AODC 053
AODC 043	Offshore diving supervisors scheme – explanatory booklet			Replaced by AODC 053
AODC 044	Code of safe practice for offshore diving on the Norwegian continental shelf			Withdrawn
AODC 045	Drug abuse	£2.50	£5.00	
AODC 046	Life support technicians scheme			Replaced by AODC 053
AODC 047	The effects of underwater currents on divers' performance and safety	£2.50	£5.00	
AODC 048	Offshore diving team manning levels	£2.50	£5.00	
AODC 049	Code of practice for the use of high pressure water jetting equipment by divers	£2.50	£5.00	
AODC 050	Guidance Note on surface orientated diving from DP vessels			Replaced by IMCA D010

Document Number	Title	Price to Members	Price to non Members	Remarks
AODC 05 1	Guidance Note on the safe and efficient operation of remotely operated vehicles			Replaced by IMCA R 004
AODC 052 Rev 1	Diving Equipment Systems Inspection Guidance Note (D.E.S.I.G.N): available in three formats:			
	i) bound library copy	£125.00	£250	
	ii) loose-leaf version in ring binder which can be photocopied	£125.00	£250	
	iii) as ii) plus two computer disks	£200.00	£325	
AODC 053 Rev 1	AODC offshore diving supervisor and life support technician schemes			Replaces AODC 042,043, 046 and 053. Superseded by IMCA D 013.
AODC 054	Prevention of explosions during battery charging in relation to diving systems	£2.50	£5.00	
AODC 055	Protection of water intake points for diver safety	£2.50	£5 .00	
AODC 056	Code of Practice on the initial and periodic examination, testing and certification of diving plant and equipment – offshore, inshore, inland and UK flag ships in accordance with UK Regulations	£35 .00		ZERO VAT
			£70.00	Volume only ZERO VAT
			£50.00	Updating service plus VAT
AODC 057	Basic induction course for ROV personnel	£2.50	£5 .00	Replaced by IMCA R 002
AODC 058	Diver attachment to structures by means of a 'weak link'	£2.50	£5 .00	
AODC 059	Pressure gauges and other forms of pressure monitoring equipment used in conjunction with diving operations	£2.50	£5 .00	
AODC 060	Safety procedures for working on high voltage equipment	£2.50	£5 .00	
AODC 061	Bell ballast release systems and buoyant ascent in offshore diving operations	£2.50	£5.00	

Document Number	Title	Price to Members	Price to non Members	Remarks
AODC 062	Use of battery operated equipment in hyperbaric conditions	£2.50	£5.00	
AODC 063	Underwater air lift bags	£2.50	£5.00	
AODC 064	Ingress of water into underwater cylinders charged by means of a manifold system	£2.50	£5.00	
AODC 065	SCUBA	£2.50	£5.00	

Document Number	Title	Price to Members	Price to non Members	Remarks
	IMCA ROVDIVISION DOCUMENTS			
IMCA R1/95	Plastic spherical air-filled fishing buoys	£2.50	£5.00	
IMCA R002	Basic level of competence to be met by ROV personnel	£2.50	£5.00	Replaces AODC 057
IMCA R003	Guidance on termination of load bearing umbilicals or lift cables used in ROV handling systems	£2.50	£5 .oo	
IMCA R004	Code of practice for the safe and efficient operation of remotely operated vehicles	£10.00	£20.00	Replaces AODC 05 1 December 1997 ZERO VAT
	IMCA DIVING DIVISION DOCUMENTS			
IMCA D001 Rev 1	Dive technician training	£2.50	£5 .oo	Replaces D 1/95
IMCA D002	Battery packs in pressure housings	£2.50	£5.00	
IMCA D003	Oxy-arc cutting operations underwater	£2.50	£5 .oo	
IMCA D004	The initial and periodic examination, testing and certification of hyperbaric evacuation launch systems	£2.50	£5.00	
IMCA D005	Auditing of IMCA training courses for diving personnel	£2.50	£5 .oo	
IMCA D006 Rev l	Guidance on diving operations in the vicinity of pipelines	£2.50	£5 .oo	Replaces IMCA DO06
IMCA D007	Overboard scaffolding operations and their effect on diving safety	£2.50	£5.00	
IMCA DO08	Testing of through-water communications	£2.50	£5 .oo	
IMCA D009	Protective guarding of gas cylinder transport containers (quads)	£2.50	£5 .oo	
IMCA D010 Rev 1	Diving operations from vessels operating in dynamically positioned mode	£2.50	£5.00	Replaces AODC 050 and IMCA D010 January 1998

Document Number	Title	Price to Members	Price to non Members	Remarks
	IMCA ROVDIVISION DOCUMENTS			
IMCA R1/95	Plastic spherical air-filled fishing buoys	£2.50	£5.00	
IMCA R002	Basic level of competence to be met by ROV personnel	£2.50	£5.00	Replaces AODC 057
IMCA R003	Guidance on termination of load bearing umbilicals or lift cables used in ROV handling systems	£2.50	£5.00	
IMCA R004	Code of practice for the safe and efficient operation of remotely operated vehicles	£10.00	£20.00	Replaces AODC 05 1 December 1997 ZERO VAT
	IMCA DIVING DIVISION DOCUMENTS			
IMCA D001 Rev 1	Dive technician training	£2.50	£5.00	Replaces D 1/95
IMCA D002	Battery packs in pressure housings	£2.50	£5.00	
IMCA D003	Oxy-arc cutting operations underwater	£2.50	£5.00	
IMCA D004	The initial and periodic examination, testing and certification of hyperbaric evacuation launch systems	£2.50	£5.00	
IMCA D005	Auditing of IMCA training courses for diving personnel	£2.50	£5.00	
IMCA D006 Rev l	Guidance on diving operations in the vicinity of pipelines	£2.50	£5.00	Replaces IMCA D006
IMCA D007	Overboard scaffolding operations and their effect on diving safety	£2.50	£5.00	
IMCA DO08	Testing of through-water communications	£2.50	£5.00	
IMCA D009	Protective guarding of gas cylinder transport containers (quads)	£2.50	£5.00	
IMCA D010 Rev l	Diving operations from vessels operating in dynamically positioned mode	E2.50	£5.00	Replaces AODC 050 and IMCA D010 January 1998

Document Number	Title	Price to Members	Price to non Members	Remarks
IMCA DO1 1	Annual audit of diving systems (for the UK continental shelf)	£2.50	£5 .oo	October 1997
IMCA DO 12	Stainless steel in oxygen systems	£2.50	£5.00	January 1998
IMCA DO 13	IMCA offshore diving supervisor and Life support technician schemes	£5.00	£10.00	April 1998. Replaces AODC 053 Rev 1.
IMCA DO 14	IMCA international code of practice for offshore diving	£10.00	£20.00	April 1998 ZERO VAT
IMCA D015	Guidance note on mobile/portable surface supplied systems	£2.50	£5 .oo	

Document Number	Title	Price to Members	Price to non Members	Remarks
	DIVING MEDICAL ADVISORY COMMITTEE (DMAC) DOCUMENTS			
DMAC 01	Aide memoire for recording and transmission of medical data to shore	£2.50	£5.00	
DMAC 02	In water diver monitoring	£2.50	£5.00	
DMAC 03	Accidents with high pressure water jets	£2.50	£5.00	
DMAC 04	Recommendations on partial pressure of O_2 in bail-out bottles	£2.50	£5.00	
DMAC 05	Recommendation on minimum level of O_2 in helium supplied offshore	£2.50	£5.00	
DMAC 06	The effect of sonar transmissions on commercial diving activities	£2.50	£5.00	
DMAC 07	Recommendations for flying after diving	£2.50	£5.00	
DMAC 03	Thermal stress in relation to diving (report of workshop held in March 1981)	£2.50	£5.00	
DMAC 09	Fitness to dive after neurological decompression sickness	£2.50	£5.00	
DMAC 10	Medical standards for ADS pilots, submersible crew and passengers			Not available. Included in AODC 022
DMAC 11	First aid training for divers and diving supervisors	£2.50	£5.00	
DMAC 12	Safe diving distance from seismic surveying operations	£2.50	£5.00	
DMAC 13 Rev 1	Guidance on assessing fitness to return to diving after decompression illness	£2.50	£5.00	Rev 1 issued in October 1994
DMAC 14	Medical equipment to be held at a site of diving operations			Not available. Replaced by DMAC 15
DMAC 15 Rev 1	Medical equipment to be held at the site of an OFFSHORE diving operation	£2.50	£5.00	Rev 1 issued in February 1995

Document Number	Title	Price to Members	Price to non Members	Remarks
DMAC 16	Saturation chamber hygiene	£2.50	£5.00	
DMAC 17	The training and refresher training of doctors involved in the examination and treatment of professional divers	£2.50	£5.00	
DMAC 18	Guidance on Acquired Immune Deficiency Syndrome (AIDS) in diving	£2.50	£5.00	
DMAC 19 Rev	The effects of water vapour on diver physiology	£2.50	£5.00	Revised in November 1990
DMAC 20 Rev 1	Duration of bell lockouts	£2.50	£5.00	Rev 1 issued in November 1997
DMAC 21 Rev 1	Guidance on the duration of saturation exposures and surface intervals between saturations	£2.50	£5.00	Rev 1 issued in October 1992
DMAC 22	Proximity to a recompression chamber after surfacing	£2.50	£5.00	
DMAC 23	The use of heliox in treating decompression illness	£2.50	£5.00	
DMAC 24	Differential diagnosis	£2.50	£5.00	
DMAC 25 Rev 1	Recommendations for the provision of emergency care for the seriously ill or injured diver when in saturation			Rev 1 issued in March 1996 Now not available. Replaced by DMAC 28
DMAC 26	Saturation diving chamber hygiene	£2.50	£5.00	
DMAC 27	An industry standard for the provision of equipment for emergency medical care in saturation diving systems			Not available. Replaced by DMAC 28
DMAC 28	The provision of emergency medical care for divers in saturation	£2.50	£5.00	Supersedes DMAC 25 Rev 1 and DMAC 27

Document Number and Source	Title	Price to IMCA Members	Price to non Members	Issue Date
	DPVOA and IMCA MARINE DIVISION DOCUMENTS	**ZERO VAT**	**ZERO VAT**	
100 DOE	Dynamic positioning systems' incidents. Prepared for the Department of Energy's Diving Inspectorate by Global Maritime	£20.00	£75.oo	November 1989
101 DPVOA	Examples of a DP vessel's annual trials programme	£ 10.00	£50.00	May 1991
102 DPVOA	Update of DP systems' incidents (DPSI 1)	£10.00	£50.00	August 199 1
103 DPVOA	Guidelines for the design and operation of dynamically positioned vessels	£20.00	£50.00	January 1995
104 DPVOA	Update of DP systems' incidents (DPSI 2)	£10.00	£50.00	May 1992
105 DPVOA	Failure modes of the Artemis position reference system	£15.00	£30.00	July 1992
106 DPVOA	A review of DGPS for dynamic positioning	£10.00	£20.00	July 1992
107 DPVOA	Specifications for DP capability plots			Replaced by IMCA M 140
108 DPVOA	Power system protection for DP vessels	£10.00	£50.00	November 1992
109 DPVOA	A review of DP related documentation for DP vessels	£10.00	£25.00	February 1993
110 DPVOA	Update of DP systems' incidents (DPSI 3)	£10.00	£85.00	June 1993
112 UKOOA	UKOOA publications of joint initiatives	£10.00	220.00	September 1993
113 IMO	Guidelines for vessels with dynamic positioning systems (MSC Circular 645)	£5.00	£5 .oo	June 1994
115 DPVOA	Risk analysis of **collision** of dynamically positioned support vessels with offshore installations (revised)	£25.00	£250.00	October 1994
116 DPVOA	Summary of proceedings of the DPVOA Dynamic Positioning Seminar, Stavanger, Norway, November 1993	£ 10.00	£50.00	January 1994
IMCAM 117	The training and experience of key DP personnel **(current)**	£5 .oo	f35.00	January 1996 Replaces 117 DPVOA

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	*DPVOA and **IMCA** MARINE DIVISION DOCUMENTS*	**ZERO VAT**	**ZERO VAT**	
118 DPVOA	Failure modes of Artemis Mk IV position referencing system	£10.00	£25.00	May 1994
119 DPVOA	Engine room fires on DP vessels	£10.00	£25.00	August 1994
120 DPVOA	Update of DP systems' incidents (DPSI 4)	£10.00	£85.00	September 1994
121 DPVOA	DP position loss risks in shallow water	£ 10.00	£25.00	September 1994
122 DPVOA	Differential GPS reliability study	£10.00	£25.00	September 1994
123 DPVOA	Summary of proceedings of the DPVOA Dynamic Positioning Seminar, Amsterdam, November 1994	£20.00	£75.00	December 1994
124 DPVOA	Human factors pilot project	£15.00	£ 100.00	November 1994
IMCA M 125	Safety interface document for a DP vessel working near an offshore platform Disk (checklist only)	£10.00 £10.00+ VAT	£25.00	July 1997
126 DPVOA	Reliability of electrical systems on DP vessels	£10.00	£ 100.00	February 1995
127 DPVOA	Guidelines to the issue of a flag state verification acceptance document	£5.00	£10.00	February 1995
128 DPVOA	QRA for the use of a dual DGPS system for dynamic positioning	£10.00	£75.00	February 1995
IMCA M 129	Failure modes of CPP thrusters	£10.00	£ 100.00	July 1995
IMCA M 130	Update of DP systems' incidents (DPSI 5)	£10.00	£ 100.00	July 1995
IMCAM 131	Review of the use of the fan beam laser system for dynamic positioning	£10.00	£50.00	September 1995
IMCA M 132	Summary of the proceedings of the IMCA Station Keeping Seminar, London, November 1995	£20.00	£85.oo	November 1995
IMCA M 133	HV training (preliminary). Currently not for sale			October 1996
IMCA M 134	A comparison of moored and dynamically positioned diving support vessels.	£15.00	£40.00	August 1997
IMCA M 135	Station keeping incidents reported for 1995	£10.00	£ 100.00	Apri I 1996

Document Number and Source	Title	Price to IMCA Members	Price to non Members	Issue Date
	*DPVOA and **IMCA** MARINE DIVISION DOCUMENTS*	**ZERO VAT**	**ZERO VAT**	
IMCA M 136	Summary of the station keeping seminar and workshop, Houston, USA, November 1996	£25.00	£100.00	November 1996
IMCA M 137	General thruster specification and bid information questionnaire	£10.00	£25.00	May 1997
IMCAM 138	Microbiological contamination of fuel oil IMCA questionnaire exercise results	£10.00	£25.00	July 1997
IMCA M 139	Standard report for DP vessels annual trials Disk	£5 .00 £10.00 + VAT	£20.00	July 1997
IMCA M 140	Specification for DP Capability Plots	£10.00	£25.00	August 1997
IMCAM 141	Guidelines on the use of DGPS as a position reference in DP control systems	£15.00	£40.00	October 1997
IMCA M 142	Position reference reliability study	£10.00	£25 .00	November 1997
IMCA M 143	Proceedings of station keeping seminar and workshop, 30-3 1 October 1997, Aberdeen	£25.00	£100.00	December 1997
IMCA M 144	Station keeping incidents reported for 1996	£15.00	£100.00	December 1997
IMCA M 145	Review of three dual hydro acoustic position reference systems for deepwater drilling	£10.00	£25.00	April 1998
IMCA M 146	The possibilities of GLONASS as a DP position reference	£10.00	£25.00	May 1998
	Dynamic positioning incidents 1989-96. Composite reports: 100 DOE, 102 DPVOA, 104 DPVOA, 110 DPVOA, 120 DPVOA, 130 DPVOA, IMCA M135, IMCA Ml44	£70.00	£450.00	December 1997

rational Association

120 **Members**

22 Countries

esents the interest of specialists vessel
ators, owners and contractors, engaged in
ort of offshore oil and gas operations

Accommodation	**FPSOs**
Construction	**Offshore Survey**
Diving	**Pipe/Cable Laying**
Drilling	**Remote & ROV Operations**

otes sharing of experience/avoidance of
cessary duplication of effort in fields of:

jislation

- **Monitors output of EU, IMO, ILO and national bodies**
- **Circulates relevant legislative information to members**
- **Develops industry positions**
- **Advances industry case**

fety

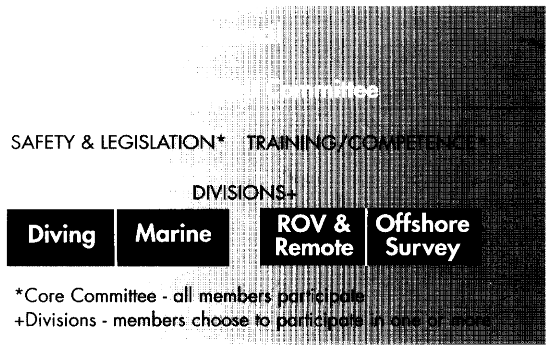
Sets standards to reduce accidents, promote safety awareness and provide uniform industry guidance.

- **60+ current guidance documents**
- **Safety notices**
- **Consolidated accident statistics**

IMCA Council - International Contractor Members

Allseas Group	Peerless Shipping
Brown & Root/Rockwater	Saipem
Coflexip Stena Offshore	Stolt Comex Seaway
European Marine Contractors	SubSea Offshore
Heerema Marine Contractors	

Structure of IMCA



Membership Categories

ICO	Large International contractor
c o	International/national contractor
S	Supplier of equipment/services
C	Non-voting corresponding member

IMCA

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Tony Read - CHIEF EXECUTIVE
Jane Bugler - TECHNICAL DIRECTOR

IMCA

The International Marine Contractors Association (IMCA) is the international trade association representing offshore, marine and underwater engineering companies. It was formed in April 1995 from the amalgamation of AODC (The International Association of Offshore Diving Contractors) founded in 1972 and DPVOA (The Dynamic Positioning Vessel Owners Association) founded in 1990.

IMCA seeks to promote its members' common interests, to resolve industry-wide issues and to provide a single authoritative voice for its members.

Important areas of activity

- Marine/Dynamically Positioned (DP) Vessels
  - Published DP failure incidents since 1980 (59 incidents in 1996)
  - Annual meeting to share experience on key developments
  - DP Operators log book scheme
  - Position reference equipment
  - Reliability of systems
  - Thruster assisted systems

- Diving
  - Comprehensive guidance based on 25+ years of members international offshore experience
  - Guidance available in four volumes regularly updated
  - Diving supervisors scheme
  - Log books for divers, supervisors etc.
  - Links with international diving safety/health technical authorities
  - Industry links to key regulatory bodies - IMO, ILO,EU

- Remotely Operated Vehicles (ROV)
  - ROV Code of practice
  - Guidance documents
  - ROV Personnel qualifications

- Offshore Survey
  - Personnel Contractor issues
  - Competence of safety critical personnel
  - Quarterly workshops on priority topics

- Middle East Section
  - 20+ members
  - Promotes commitment to safety
  - Industry voice to regulators and clients

- Training, Certification and Personnel Competence
  - Competence standards for offshore personnel in safety critical positions
  - Diving Supervisor training
  - DP Operator training

- Communication with Members
  - Newsletter - quarterly
  - Information notes on key topics
  - Guidelines/Reviews
  - Catalogue of publications - updated regularly
  - Internet website