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CODE OF PRACTICE

INSHORE DIVING

Mr T Szana

Chief Inspector: OHS

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Contents

1 Introduction

1.1 Purpose

The inshore commercial diving industry, while providing services to inland / inshore industry, can be the subject of various regulations and standards imposed by the Government, Clients who require the diving work being carried out, Insurers of the Diving Contractor and other outside bodies.

This Code of Practice is intended to provide information and guidance on acceptable industry practice for inland and inshore commercial diving work.

1.2 Target community

The Inshore Code of Practice is intended to assist the following, amongst others:

- Personnel involved in inshore 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
- Various installations and managers using divers.
- Personnel involved in quality assurance and occupational health and safety.

1.3 Status of this Code

This Code is issued in terms of Regulation 24(b) of the Diving Regulations, 2009 and is based on the principles of providing a workplace that is acceptably safe and without undue risks to health.

If there is conflict between this Code and the Diving Regulations, the Diving Regulations take precedence.

Failure to observe the Code shall render a person liable in any proceedings. When courts interpret and apply the Diving Regulations with respect to the type of diving procedures covered by this code, they should consider this code to be an accepted standard of good practice.

Employers, employees and their organizations shall use this Code to develop, implement and refine their diving practices to address the health and safety issues in their own workplaces. This code shall specifically be consulted when preparing operations manuals.

This Code is intentionally general, because every person and situation is unique and departures from the guidelines in this code may be justified in appropriate circumstances.

This Code is not a substitute for company operation manuals and procedures, although it provides some guidance in aspects that should be covered in those manuals.

1.3.1 The Occupational Health and Safety Act, Diving Regulations and other Regulations

The Occupational Health and Safety Act is the overarching legislative text, determining the duties of employers, employees, health and safety representatives, health and safety committees, etc. The Diving Regulations are provided in order to provide details on how the Act should be applied in the diving industry. Greater detail is provided for specific sectors of the diving industry in the Codes of Practice provided under the Diving Regulations.

This Code is the default code of practice for commercial diving in South Africa. It should be referred to in the absence of any code more specifically applying to the circumstances of any commercial diving operation within the scope of the Diving Regulations. When another diving code of practice is more specifically relevant to a diving contract, that code should generally be followed providing the advice given is applicable to the operation. When a more specific code does not provide sufficient guidance in particular circumstances, and this code does, this code may be used.

Other regulations published under the Act may be applicable from time to time. These must also be consulted whenever appropriate, including Codes of Practice that may be published in terms of those regulations.

Other Acts may also be relevant to a specific diving project and the diving contractor should ensure that all the relevant texts are consulted.

The Occupational Health and Safety Act (Act No 85 of 1993) and its regulations take precedence over this code and the advice of this Code should be followed only where it does not conflict with said legislation.

Any contractor carrying out inshore / inland diving operations shall establish whether there are any other National Regulations that may apply to the diving project. For instance, if construction work is undertaken, due regard should be given to aspects covered in the Construction Regulations; Diving in contaminated waters may require consultation with the Regulations for Hazardous Chemical Substances or the Regulations for Hazardous Biological Agents; If any loud noise is present in the workplace, the Noise Induced Hearing Loss Regulations should be consulted, etc. These are all aspects that are not covered in the Diving Regulations nor in detail in this code.

1.4 Deviation from the code

Whenever deviation from this code is contemplated, such deviation must be clearly described and limited in the operations manual or authorised by the contractor for specific operations. An additional HIRA that specifically covers the deviations must be performed and recorded, containing the following aspects:

- Diving and working practice planned
- How the practice deviates from this code
- Specific reason(s) for the deviation
- Which specific hazards are introduced because of the deviation
- How these specific hazards are addressed to control and mitigate the risk

1.5 Work covered by the code

This Code is intended to provide advice and guidance in respect of inland / inshore diving operations carried out in South Africa, and specifically covers diving operations conducted in support of inland, inshore, civil or harbour works.

1.5.1 Exclusions

This code does not cover diving practices using Class V and Class VI divers, nor does it cover diving using mixed gas at depths greater than 50m, closed bell or saturation diving techniques, offshore diving practices or underwater mining operations.

1.5.2 Alternatives

a. Scientific diving operations using divers other than Class V and Class VI is covered by the Code of Practice for Scientific Diving, but may be conducted according to this code at the option of the Client or Contractor.

b. Diving practices using Class V divers for the purposes of scientific diving to a maximum depth of 20 meters is covered by the Code of Practice for Scientific Diving.

c. Diving practices using Class VI divers, for the purposes of diving in benign conditions, is covered by the Code of Practice for Diving in Benign Conditions.

d. Diving using mixed gas below 50 metres, closed bell, saturation diving techniques and offshore diving practices, including diving work in the oil and gas industry is covered in the Code of Practice for Offshore Diving (IMCA?).

e. Commercial and scientific diver training is conducted according to the Code of Practice for Commercial Diver Training

f. Underwater mining operations are covered in the Underwater Mining Regulations under the Mine Health and Safety Act, 1996 and the guideline for the compilation of a mandatory code of practice for inshore underwater mining.

1.6 Implementation

This code shall be implemented by publishing on the Department of Labour website

1.7 Updating

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.

The latest version of this document will be available for download on the website of the Department of Labour. The version with the most recent date will automatically supersede previous versions. The version current at the time of a diving operation will apply as far as is reasonably practicable.

Detailed motivation for amendments to the code and reports of errors should be provided to the Chief Inspector as editable electronic documents for the attention of the Diving Advisory Board

2 Definitions:

A number of specialized terms are used in this document. These terms are referenced or defined below to ensure that readers understand what is meant by them in this document:

the Act means, unless the context indicates otherwise, the Occupational Health and Safety Act, 1993.

the Regulations means, unless the context indicates otherwise, the Diving Regulations, 2009.

the Code, or **this Code** means, unless the context indicates otherwise, the Code of Practice for Inshore Diving, i.e. this document.

Any word used in this Code of Practice that is defined in the Act or the Regulations shall have the meaning assigned to it in the Act or the Regulations. The definitions provided in the Act are used whenever conflict exists between these two texts.

These definitions do not necessarily apply in other codes of practice. Section refers to this Code, Regulation refers to the Diving Regulations 2009

Acceptable risk: - A level of risk as indicated by a properly performed HIRA, which is acceptable in terms of the requirements and conditions set out in the Occupational Health and Safety Act and its Regulations, and is as low as is reasonably practicable. When deciding whether a risk is acceptable or not, consideration should be given to precedent, severity of possible consequences and legal liability.

Alpha flag – International Code Flag Alpha

Bailout set or **bailout system** (Emergency Gas Supply) – See section 5.2.1.3

Bottom time – The elapsed time from when the diver starts descent from the surface to the time when the diver starts final ascent from the working dive, unless otherwise defined by the decompression schedule in use.

Buddy line – See section 5.4.3

Client – See section 3.1, and Regulation 3

Decompression stop – An interruption of the ascent towards the surface for purposes of allowing dissolved gases to be eliminated from the diver without producing symptoms of decompression sickness.

Diving Contractor – Regulation 4

Diving mode – System of diving equipment type and associated standard operating procedures. See section 4.1.4

Diving Operation – Regulation 1

Diving Project – Regulation 1

Diving Project Plan – Regulation 5

Hazard – See section 4.1.3.6.1

HIRA (Hazard Identification and Risk Assessment). – See section 4.1.2.1

Life line – See section 5.4.1

MOD (Maximum Operating Depth) – The depth at which the oxygen partial pressure of a breathing gas reaches the maximum accepted value. The maximum acceptable oxygen partial pressure will depend on the mode of diving and should be specified in the Operations Manual.

Operations Manual – Regulation 21

Reasonably practicable – has the range of meaning defined in the Occupational Health and Safety Act

Shot line – See section 5.4.2

Stand-by diver – See sections 4.2.2, 5.2.1.2, 5.3, 8.1.1.5, 8.2, 8.4, 4.1.4.2, 10.7.4

SSDE (Surface-Supplied Diving Equipment) - See section 0

Toolbox talk – An informal group discussion that focuses on a particular safety issue, also intended to facilitate health and safety discussions on the work site.

Umbilical – See section 5.2.1.2

3 Organisation

There is in particular a need for clients and contractors to recognize and accept their responsibility for providing sufficient appropriately qualified and competent personnel to conduct operations safely at all times. This includes periods of routine preventative maintenance and repairs.

3.1 The Client

The client is the person or company who has entered into a contract with a diving contractor for a diving project. The Client will usually be the operator or owner of a proposed or existing worksite where diving work is going to take place or a contractor acting on behalf of the operator or owner. If the client appoints an on-site representative then such a person should have the necessary experience and knowledge to be competent for this task. The following are examples of persons who may be representatives of the client:

- The installation or site manager who is responsible for the area inside which diving work is to take place.
- The master of a vessel 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.

3.1.1 Duties of the client

In terms of Regulation 3, a client (or his designated representative) shall be responsible for the following:

a. to prepare a documented health and safety specification for the diving work, and provide any diving contractor who is making a bid or appointed to perform diving work for the client with the same;

b. to promptly provide the diving contractor and his or her agent with any information which might materially affect the health and safety of any person at work carrying out diving work;

c. to appoint each diving contractor in writing for the project or part thereof on a dive site;

d. to take reasonable steps to ensure that approved health and safety policies are implemented and maintained on the dive site: Provided that the steps taken shall include

periodic audits at intervals mutually agreed upon between the client and diving contractor, but at least once per month; A record of these audits must be available for inspection

e. to stop any diving contractor from executing diving work which is not in accordance with the principal contractor's health and safety specifications for the site or which poses a threat to the health and safety of any persons;

f. to ensure that where changes are brought about, sufficient health and safety information and appropriate resources are made available to the diving contractor to execute the work safely;

g. to ensure that every diving contractor is registered and in good standing with the compensation fund or with a licensed compensation insurer prior to work commencing on the dive site; and

h. to ensure that potential diving contractors submitting tenders, have made provision for the cost of health and safety measures during the diving project.

3.1.2 Contractual requirements

The contract shall ensure that the following responsibilities are accepted by the Client:

- Agreeing to provide facilities and extend all reasonable support to the Diving Contractor or supervisor in the event of an emergency. The diving contractor must ensure that details of the matters agreed are recorded as 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, vent valve mechanisms that may activate without warning, propellers and sea chests of vessels, or equipment liable to start operating automatically. 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 tugboat activity, vessel unloading, overhead scaffolding work, etc.
- Ensure that a formal control system, for example - a permit-to-work & lock out system, exists between the diving team, the installation manager and/or the vessel's 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. chemicals in a plant's tank, sewage or waste in a dam, etc. They will also need to provide relevant material safety data sheets 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, valves opening, etc.

The Client will need to ensure, as far as it is reasonably practicable, that any diving contractor contracted for the diving work has the appropriate plant and equipment and diving equipment, the minimum dive team as specified in the Regulations and operating procedures to meet any relevant regulations before work begins.

3.1.3 Client and Diving Contractor relationships

Responsibilities and liabilities of the client and the contractor must be clearly defined.

A client may appoint an agent in writing to act as his or her representative and where such an appointment is made, the responsibilities as are imposed by the regulations and the Code of Practice upon a client, shall as far as reasonably practicable apply to the person so appointed.

No client shall appoint any person as his agent, unless the client is reasonably satisfied that the person he or she intends to appoint has the necessary competencies and resources to perform the duties imposed on a client by the regulations and the Code of Practice.

3.2 The Diving Contractor

On any diving project there must be one contractor in overall control for the diving operations (Regulation 4). This will normally be the company who employs the divers. If there is more than one company employing divers on a single diving project, then there must be a written agreement as to which of these companies is in overall control.

This company is the Diving Contractor in terms of the Regulations. The name of the diving contractor shall be clearly displayed at the worksite if persons not directly involved in the diving operation may be present, and all personnel, clients and others involved in the diving operation shall be aware who the diving contractor is.

The Diving Contractor is required to define the project management structure in writing. This shall include arrangements for handover of supervisory responsibilities at appropriate stages in the operation.

3.2.1 Responsibilities

The Diving Contractor's responsibilities include provisions to ensure that:

- risk assessments have been carried out and signed by the required personnel.
- a diving operations manual is compiled in consultation with employees.
- the place from which operations are to be carried out is suitable and safe.
- there are sufficient personnel of the required competences in the diving team (see minimum manning levels in the Diving Regulations)
- the personnel are qualified and competent.
- suitable plant and equipment is supplied
- the plant and equipment is correctly certified and properly maintained.

- a suitable diving project plan is prepared which includes relevant emergency and contingency plans adequate for the scope of reasonably foreseeable incidents. This should be signed and dated by the person/s 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, including consultation with the contracted Level 2 Designated Medical Practitioner.
- there is a clear, documented, reporting and responsibility structure supervisors are appointed in writing and extent of their control documented.
- all relevant regulations are complied with.
- any person or company not directly involved in the diving project is informed of the diving project and their roles therein, whenever their work or practices may impact on the health and safety aspects of the diving project
- the provincial office of the Department of Labour is notified whenever any diving project is taking place.
- all the relevant aspects covered in the Regulations and this Code are complied with

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

3.2.2 Employer - employee relationships

Any person who works for, or renders services to, the diving contractor, is presumed, until the contrary is proved, to be the employee of the diving contractor, regardless of the form of the contract (including when "freelance" services are provided), if any one or more of the following factors is present:

- The manner in which the person works is subject to the control or direction of the diving contractor
- The person's hours of work are subject to the control or direction of the diving contractor
- In the case of the person working for a diving company, the person is part of the company
- If the person has worked for the diving contractor for an average of at least 40 hours per month over the last three months
- The person is economically dependent on the diving contractor for whom that person works or renders services
- The person is provided with tools of trade or work equipment by the diving contractor. (Excluding specialised tools and equipment specific to the task, which would not normally be owned by a sub-contractor.)
- The person only works for or renders services to one diving contractor

Whenever this employer-employee relationship exists between the diving contractor and divers, diving supervisors or other persons, the diving contractor must fulfil the duties of the employer as specified in the Act and the Regulations; and the divers, diving supervisors or other persons must fulfil the duties of employees as specified in the Act and the Regulations.

3.2.3 Diving Contractor and contracted Level 2 Diving Medical Practitioner relationship

The contracted designated medical practitioner shall be closely involved in the diving operation and provide appropriate medical support as needed.

The Diving Contractor contracts the medical assistance and advisory services of a level 2 DMP. The Diving Contractor however stays in overall control of the diving operation and the DMP may not take over the diving operation (e.g. during an emergency) or prescribe to the Diving Contractor which course of action to follow. The DMP is thus contracted in an advisory capacity only, unless other levels of responsibility and involvement in the diving operation are specified in the operations manual.

The Diving Contractor must carefully consider the advice provided by the Level 2 DMP and in particular consider how it impacts the health and safety of the diving operation as a whole before the advice is accepted or rejected. Conflicts of opinion should not take unnecessary time to resolve and therefore as much relevant procedural instruction as reasonably possible should be contained in the operations manual in an easily accessible format.

Whenever the Diving Contractor rejects the advice of the Level 2 DMP, the DMP may request that such refusal be provided in writing and this shall not be unreasonably refused by the Diving Contractor. The Level 2 DMP may not refuse to provide further medical advice and assistance for that specific diving operation. Further advice may be sought from other level 2 DMPs or other consultants with appropriate knowledge and/ or experience.

These provisions shall apply to all diving operations under the control of the diving contractor. However, whenever a diver is evacuated from the workplace for medical reasons and reaches a medical facility, the Diving Contractor shall not have control over the case any longer.

3.2.4 Co-operation between the Client or Diving Contractor's contracted Level 2 DMP and other DMPs

A close collaborative relationship is needed between the contracted Level 2 Designated Medical Practitioner performing the responsibilities listed in the Regulations and this Code and other Designated Medical Practitioners. A diver may have had his annual medical examination with one specific Designated Medical Practitioner and then goes diving with a number of different Diving Contractors in the course of the year, which means that a number of different level 2 Designated Medical Practitioners (each contracted with a different diving contractor) will also be involved. There is no need to perform a full medical examination on each occasion, as the medical examination performed by the initial Designated Medical Practitioner may still be valid. However, there may be a need to perform specific examinations (in collaboration with occupational health personnel) as a result of specific hazards being present in the workplace (e.g. diving in a contaminated environment), which is specific to a diving operation.

The Designated Medical Practitioner performing the initial diving medical examination must provide copies of the annual medical examination to the level 2 Designated Medical Practitioner responsible for the diver during a specific diving project. The written consent of the diver is still required in each case. If copies of the diving medical examination are provided to the diver, an additional original

signature of the Designated Medical Practitioner and the original stamp of the Designated Medical Practitioner are required on each page as evidence of authenticity.

3.3 Manuals and procedures

3.3.1 Operations Manual

All contractors carrying out diving operations are required by Regulation 21 to prepare standard diving Operations Manuals and procedures covering their operations and reasonably foreseeable contingencies and emergencies. If the specific task they are undertaking is not standard then they should prepare specific written procedures for that work in the Diving Project Plan.

The Operations Manual should cover all relevant aspects in this Code, as well as any additional aspects identified in the company's standard Hazard Identification and Risk Assessments (HIRA)

The Operations Manual shall be prepared in consultation with the employees and contain all relevant elements addressed in the Regulations and in this Code. The manual shall be made available to each diving team at the diving location before the commencement of each diving operation, and shall be accessible to members of the diving teams as appropriate so that they may become adequately familiar with those sections which apply to them.

3.4 The Diving Supervisor (see 8.1.1.1 for Competence: Diving supervisors)

Diving supervisors are responsible for the operations that they have been appointed to supervise and they shall only hand over control to another supervisor appointed in writing by the diving contractor. Such a handover must be entered and signed in the relevant operations logbook.

A supervisor can only supervise as much of a diving operation as they can personally control both during routine operations and if an emergency should occur. A supervisor cannot supervise two different dive sites at once.

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. and will normally also be the person to terminate the dive. Other relevant parties, such as a ship's master or site manager, can however instruct the supervisor to terminate the dive for safety or operational reasons.

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, the supervisor will need to consider a number of points, including:

- The supervisor should satisfy themself that they are competent to carry out the work, and that they understand their own areas and levels of responsibility and who is responsible for any other relevant aspects. Such responsibilities must be specified 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 for the company.

- The supervisor will need to satisfy themself that the personnel that they are to supervise are competent to carry out the work required of them. They should also check that these personnel are in possession of a valid medical certificate of fitness, and, as far as they are reasonably able, physically, psychologically, and medically fit for the operation.
- The supervisor will need to check that the equipment they propose to use for any particular operation is fit for purpose, 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 himself or herself or another competent person prior to its use. Such checks should be documented, for example, on a pre-prepared checklist which should be signed and recorded in or appended to the operations log for the project.
- When the operation uses, or plans to use, complex or potentially hazardous equipment, the supervisor 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 should be documented. If the situation changes, however, further risk assessment must be considered. Supervisors will meet their responsibilities by ensuring the documentation exists and following any guidance contained in the documentation, for example, in manufacturer's operating and maintenance instructions.
- The supervisor will need to ensure that the operation they are being asked to supervise complies with the requirements of this Code or that variations are authorized, either in the Operations Manual, or for the specific operation.
- The supervisor must 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 wet bell diving operations, supervisors will need to be able to see the divers inside the wet bell. This will normally be achieved on the surface by means of direct viewing through the view ports but when the wet bell is under water this will be by means of a CCTV camera.
- The supervisor will need to have direct communications with any diver, standby diver, or bellman in the water at all times, even if another person also needs to talk to, or listen to, the diver.
- The supervisor shall comply with all the requirements imposed on him or her in accordance with Regulation 9 of the Regulations.

3.5 The Divers (see 8.1.1.2 for Competence: Diver)

Divers have the following duties and responsibilities:

- A diver will take reasonable care of his own health and safety and not endanger the health or safety of any other person by any act or omission.

- Comply with the requirements imposed on him or her by the operations manual, (in as far as this does not endanger the health and safety of any person)
- Co-operate with the diving supervisor and the diving contractor in the fulfilment of their duties
- Carry out any lawful order given to him or her by the diving supervisor or diving contractor
- As soon as he or she becomes aware of any situation which is unsafe or unhealthy, bring this to the attention of the diving supervisor, who will record this in the operations log and incorporate this in the HIRA update
- If he is involved in any incident at work that may affect his health or has caused an injury to himself, report this to the supervisor, who will note it in the operations log and ensure that the designated medical practitioner is consulted.
- Comply with the duties listed in the Regulations.

3.6 Level 2 Designated Medical Practitioners

One or more Level 2 DMPs will be contracted to the diving contractor for the duration of any diving project, and must be available for remote consultation at all times during any diving operation.

The level 2 DMP should ensure the health aspects of the diving project are appropriately addressed. This may include the following aspects:

- Performing fitness-to-dive examinations on the divers
- Reviewing, scrutinizing and updating medical examinations performed by level 1 DMP and/ or medical practitioners not contracted by the company
- Providing specific inputs in the operations manual regarding relevant health aspects that should be addressed, including emergency medical protocols and procedures
- Providing specific inputs regarding contents of the first aid kit and assistance in sourcing the contents thereof
- Providing inputs in the HIRA from the medical point of view
- Arrange for the workplace visit of an occupational medicine specialist or occupational medicine practitioner (as appropriate) when required to assess specific workplace hazards
- Arranging (in consultation with occupational medicine specialists or practitioners) for the measurement of workplace hazards by an Approved Inspection Authority.
- Consultation with an occupational medicine specialist, occupational medicine practitioner or occupational health practitioner (as appropriate) when required in terms of specific health hazards in the workplace, or when an occupational injury has occurred or when an occupational disease is diagnosed
- Consultation with travel medicine practitioners whenever specific issues occur, e.g. diving in malaria areas, the need for specific vaccinations, etc.
- Providing assistance and advice in the case of workplace accidents, injuries and illnesses
- Providing inputs in diving apparatus selection and working tool selection when appropriate
- Providing telephonic and/ or on-site advice and assistance in each case of decompression illness and organise any special investigation, follow-up and rehabilitation that may be required, including the performance of fitness assessments after recovery.
- Recording of the appropriate medical information in the diver's logbook, including treatment provided, for each case of decompression sickness.

- Providing practical advice regarding the application of divers with restricted fitness for diving, which may include adding additional restrictions or, in consultation with the examining DMP, remove such restrictions temporarily or permanently.
- Providing project-specific medical support
- Provision of any other medical advice, services and equipment as required from time to time.
- Reviewing of workplace health and safety indicators and development of appropriate action plans to address health issues in such a way that continuous improvement is evident.
- Provision of a yearly medical report to the diving contractor/ employer
- Complying with the provisions listed in the Diving Regulations

To effectively perform these duties, the level 2 designated medical practitioner must be available for consultation with the diving contractor and the diving team should be able to telephonically contact the level 2 Designated Medical Practitioner without difficulty during any scheduled diving operation.

4 Operations

4.1 Work planning

Before any diving is carried out there must be a relevant dive plan available. The dive plan will consist of, at minimum, the diving contractor's standard Operations Manual and any appropriate site-and task specific risk assessments and procedures.

The dive plan must specify the diving equipment and techniques to be used as well as the requirements of the particular operation. It must specify contingency procedures for any reasonably foreseeable emergency.

Many factors need to be considered when preparing a dive plan for a diving project. The risk assessment must identify site-specific hazards and their risks. Based on this information, the plan will state how these hazards and risks will be controlled.

Whenever a diving project is planned, the information required in terms of the Diving Regulations must be forwarded to the provincial office of the Department of Labour in the prescribed manner.

4.1.1 The Diving Project Plan

The diving project plan defines the scope of diving work to be performed for a diving project and contains records of the conclusions, findings and decisions of the planning activities relevant to the project. It is both guidance for the dive team and evidence of due diligence by the Diving Contractor.

4.1.2 The Dive Plan

Dive plans contain the proposed profile and tasks of each dive and these are updated when required. The dive plan may refer to more detailed information in the diving project plan when appropriate.

4.1.2.1 Quantity of gas

The quantities of gases likely to be needed for diving operations, including for treatments and emergencies, must be calculated when planning a diving project. Allowances should be made for

leakage, wastage, contingencies, etc. Diving must be stopped if the quantity of gas needed for safety purposes falls below the minimum specified in the operations manual and the dive plan.

A reserve supply of medical oxygen with a free volume of $40m^3$ is required at the chamber for the purposes of treatment in the chamber. A minimum supply of reserve air for the chamber is also required on site.

4.1.3 HIRA (Hazard Identification and Risk Assessment)

The dive planning for a diving operation is unique to that specific operation, and therefore only general guidelines can be given. The safe planning and implementation of the dive operation will be based on the Hazard Identification and Risk Assessment (HIRA) for that operation, in conjunction with the Diving Regulations, the contractor's Operations Manual and the task requirements.

4.1.3.1 Requirement

HIRA is required in terms of Regulation 22(1)

No diving operation is to take place without HIRA being carried out before the diving operation commences, and all relevant hazards identified and the associated risks assessed. The risk assessment will determine what diving mode is to be used and if diving is to take place at all.

The HIRA forms part of the project plan and the dive plans and is updated as required.

4.1.3.2 Communication

The results of the HIRA must be communicated to all dive team members and other stakeholders before the dive commences during a dive briefing or toolbox talks.

4.1.3.3 Consultation

The diving contractor shall carry out a HIRA and risk management process in consultation with the whole dive team and include inputs from third party specialists (e.g. Approved Inspection Authorities) when required by legislation or when otherwise considered appropriate

4.1.3.4 Updates

A comprehensive HIRA should be performed for each diving project, but provision should be made for an update prior to each dive. This process must allow for changes in the dive plan, based on the findings.

When performing the HIRA update, the diving supervisor shall consult with the other members of the dive team and include inputs from other persons whose activities may influence the health and safety of the divers.

4.1.3.5 Records

A copy of the relevant updated site and task specific HIRA documents must be kept as part of the diving operations records

All of the findings of the HIRA shall be formally recorded, including the names of the persons involved in the process. All of the aspects listed below should be included where appropriate

Records of health hazards should be kept in accordance with the Regulations pertaining to those hazards, e.g. Regulations for Hazardous Chemical Substances, Regulations for Hazardous Biological Agents, etc.

4.1.3.6 HIRA Process

The HIRA process shall:

- identify and record significant hazards associated with the operation;
- ensure that an assessment is made to determine and record the risks associated with such identified hazards
- control such risks by implementing measures to either eliminate or reduce risks to an acceptable level.
- implement contingency and emergency plans and medical surveillance for risks that remain.

4.1.3.6.1 Hazard Identification process

Health and safety hazards exist at all workplaces. A hazard is any agent, activity, situation or substance that can cause harm. Hazards can be divided into three groups, health hazards, safety hazards and hazards to the environment.

Existing and potential hazards shall be identified during the preparation of the Diving Project Plan and reviewed prior to the commencement of each diving operation. Any additional hazards which arise during the operation should immediately be brought to the attention of the supervisor and the operational plan adapted as necessary to ensure the health and safety of the workers, or the operation should be aborted.

4.1.3.6.1.1 Health hazards

An occupational health hazard is any agent that can cause illness to an individual. A health hazard may produce serious and immediate (acute) affects, or may cause long-term (chronic) problems.

Someone with an occupational illness may not recognise the symptoms immediately. For example, noise-induced hearing loss is often difficult for the affected individual to detect until it is well advanced.

Health hazards include: chemical hazards, biological hazards, physical hazards, psychosocial hazards and work design (ergonomic) hazards.

a. Chemical hazards: Chemical hazards include, but are not limited to:

- Breathing gases and the possibility of breathing contaminants
- Toxicity from gases breathed, e.g. nitrogen narcosis, oxygen toxicity, etc.
- Diving in chemically contaminated waters (e.g. harbours)
- Exposures to any dusts, fumes, vapours, metals, chemical irritants, pesticides and other chemical agents

b. Biological hazards: Biological hazards include, but are not limited to:

- Risk of marine life injuries
- Diving in biologically contaminated waters

- Cross-contamination using diving gear
- Travel diseases, like malaria or travellers' diarrhoea
- Exposures to viruses, bacteria in the workplace
- Any agent that can cause an infection in the diver

c. Physical hazards: Physical hazards include, but are not limited to:

- Radiation hazards
- Noise
- Temperature extremes
- Pressure (causing barotrauma, decompression sickness, etc.)
- Electrical shocks

d. Psychosocial hazards: Psychosocial hazards include, but are not limited to:

- Working shifts (shift work)
- Diving in hazardous environments
- Involvement in stressful situations (e.g. body recovery, mass casualties, etc.)

e. Ergonomic hazards: Ergonomic hazards include, but are not limited to:

- lifting and bending with heavy equipment in and out of the water
- Abnormal postures
- Working with vibrating tools

4.1.3.6.1.2 Safety hazards

A safety hazard is any agent which may cause injury, or damage to property. An injury caused by a safety hazard is usually obvious. For example, a worker may be badly cut. Safety hazards cause harm when workplace controls are not adequate.

Some examples of safety hazards include, but are not limited to:

a. Environmental conditions: include, but are not limited to:

- physical conditions at the operation's site and the sea state,
- visibility
- cleanliness of the premises and plant

b. Task related aspects: Include, but are not limited to:

- the use of explosives,
- use of tools and equipment.

c. Associated activity factors: Includes, but are not limited to:

- accessing the site (including emergency response),
- other equipment at the site
- other structures at the site.
- Working alone

- Slipping/tripping hazards
- Fire hazards
- Moving parts of machinery, tools and equipment
- Work at height
- Pressure systems and differential pressure situations
- Vehicles
- Lifting operations
- Diving under, near ships, vessels, small craft, and boats - propellers, rudders, sea suction intake chests, etc.
- Live boating injuries
- Entrapment or entanglement
- Implementation of permit-to-work systems
- Lockout-procedures

d. Emergency response factors: includes, but are not limited to:

- location and availability of appropriate emergency systems and emergency response procedures.
- Unconscious diver recovery procedures
- Severely injured diver recovery procedures
- Availability of first aid kit and support

4.1.3.6.1.3 Environmental hazards

An environmental hazard (hazard to the environment) is a release to the environment that may cause harm or deleterious effects. An environmental release may not be obvious.

For example, a worker who drains a glycol system and releases the liquid to a storm sewer may not be aware of the effect on the environment. Environmental hazards usually cause harm when controls and work procedures are not followed.

4.1.3.6.2 Risk Assessment

Risk Assessment evaluates the frequency, probability and the consequences of a hazard, into a semi-quantitative measure of risk.

The aims of a risk assessment are to:

- Identify and evaluate risks to enable contingency planning and minimise potential risk to health, environment and equipment.
- Provide a baseline mechanism for communicating to operational personnel the risks and means of minimising them, of a particular task or project.
- Ensure staff compliance to the company health, safety and environmental requirements, as well as compliance with relevant statutory regulations, guidelines and contractual obligations.

4.1.3.6.2.1 Risk Assessment process

The risk assessment shall be conducted in the following way:

a. Assess who may be exposed

Exposure may take place during the dive or the person may be exposed while on the surface. The HIRA must include the health and safety of surface personnel also

b. Assess how the persons will be exposed

The exposure route may be important, for instance chemical exposures may be via the lungs or be absorbed through the skin. Skin exposure may cause local effects (e.g. chemical burns) or may cause systemic effects due to absorption of the chemical

Mechanical injury (safety risks) may happen due to improper equipment being used or if a person is not familiar with the operation of the equipment or not experienced in its use

c. Assess the exposure "dose"

The levels of the hazards are important factors to consider. (For example: The specific noise level can predict the level of hearing loss expected.) The dose is estimated as a combination of severity and time of exposure.

In order to measure the levels of chemical substances, some physical hazards, etc., the services of an Approved Inspection Authority ("Occupational / Industrial Hygienist") is required in terms of some of the Regulations.

Some exposures, e.g. noise levels, cannot be measured under water.

d. Assess the exposure frequency

The more often the person is exposed to the hazard, the higher the risk of injury or disease

e. Assess the influences of exposures on each other

Some exposures may have an influence on each other, for instance mixed chemical exposures. Exposure to any one of the elements may not be considered a health risk, but the combined effect of exposure may be considerable. Exposure to chemicals and noise may have a bigger effect in combination to any one of these in isolation. The assessment should thus take the "big picture" into consideration.

f. Assess the consequences of exposure

Some exposures cause acute effects, while others may cause long-term effects, like causing cancer, hearing loss, etc.

Consultation with the Designated Medical Practitioner and the Occupational Medicine Practitioner (or Occupational Medicine Specialist) is required.

g. Note all your findings

All of the findings should be clearly noted in the HIRA. This will provide a record of systematic approaches taken to address risks, and evidence of due diligence.

4.1.3.6.3 Risk control

Control of risk is achieved by selecting from the hierarchy of control measures one or more measures which individually or in combination achieve the required risk reduction. Only those hazards identified during the hazard identification process that pose a real (unacceptable) risk (as determined in the risk assessment process) need to be addressed. If the risk assessment determined that a hazard is associated with acceptable risk, this should be indicated in the HIRA and it need not be addressed further.

Where the level of risk cannot be controlled to an acceptable level, no diving work shall take place while the hazard is present.

Appropriate control measures shall be applied to the risks, using the hierarchy of controls in the following order:

a. **Elimination**

In some cases risk may be eliminated by removing the hazard or operating when it is not present.

b. **Substitution**

Where the risk can be controlled by performing the task using alternative methods, consideration shall be given to using these alternative methods.

a. **Design**

Plant and procedures can be selected or designed to reduce risk.

b. **Isolation**

Persons should be isolated from the identified hazards where practicable. Diving equipment can provide adequate protection from a number of hazards, e.g. hypothermia, marine stings, etc.

c. **Administrative control measures**

Every operational plan should seek to minimize the degree and duration of the worker's exposure to risk. Rotation of workers is a good example to minimize exposure

Almost every aspect of planning falls into this administrative category.

Administrative controls include, but are not limited to:

- training, supervision, experience and selection of employees, including staffing levels;
- provision of an appropriate operations manual;
- organization and planning before, during and after the operation;
- selection of appropriate plant; and
- selection of the appropriate form and level of communication.

d. **Personal protective equipment**

Appropriately designed and sized personal protective equipment shall be provided, used and maintained. The limitations of all equipment used shall be identified as part of the risk assessment process. Information from manufacturers and from records of prior experience should be used to identify limitations.

4.1.3.6.4 Risk mitigation

Risk is mitigated by planning or taking measures to reduce the effect of an incident associated with that risk on personnel, equipment and the environment.

These may include:

- Emergency and contingency plans
- Provision of first aid and rescue equipment
- Retaining a DMP and/or recompression chamber on standby
- Spare tools and equipment

4.1.3.6.5 Recording of occupational exposures and medical surveillance

If the HIRA process is followed and risk mitigation strategies are put in place, there will still be a level of risk that is accepted as part of the operation. In case any employee is exposed to such a risk that remains, appropriate measures shall be put in place to specifically screen such an employee for consequences of the exposure (including the levels of exposure, e.g. using Biological Exposure Indices) and the possibility of an occupational disease.

Screening for occupational diseases shall be conducted in consultation with an occupational medicine specialist, occupational medicine practitioner or an occupational health practitioner (as appropriate).

An accurate record should be available in the diver's medical file. This is a requirement in addition to the normal "fitness to dive" evaluation of divers.

4.1.4 Diving mode

Diving mode is selected for the operation based on the requirements of the specific task and the logistics of the operation, based on the indications of the HIRA.

Three modes of diving are possible under this Code:

4.1.4.1 Surface supplied diving

This is the default mode and is applicable to the full scope of diving activities covered by this Code.

4.1.4.2 Scuba diving

This may be used for activities which are not proscribed for scuba, provided that the HIRA indicates an acceptable level of risk, and provided that the procedures are authorised in the company Operations Manual for the applicable circumstances.

Scuba equipment is specified in section 5.2.2

Scuba has inherent limitations and difficulties such as limited breathing gas supply, lost diver, etc. and scuba should therefore not be used if surface supplied equipment is available and its use is reasonably practicable.

Whenever scuba diving is performed, life lines (tended by competent divers' tenders), buddy lines surface markers and emergency gas supplies (bailout sets) must be used as reasonably practicable, and provided they do not increase overall risk. The divers should be tethered to the surface marker with an 8mm diameter synthetic line (or equivalent) and this must be constantly visually monitored from a location that allows immediate assistance to be rendered in case of an emergency.

If the diving contractor, the diver and the diving supervisor all considers the use of one or more of these hazardous, then alternative measures shall be put in place to ensure that:

- Voice communications between the divers and the diving supervisor is used; and
- A buddy system is employed whereby two divers remain at all times in constant visual or physical contact and that both end the dive immediately if contact is lost; and
- The diver can be easily located by his fellow divers; and
- The diver can be located without any difficulty by the standby diver; and
- The diver can be rescued without any delay or difficulty in case of an emergency
- A life-line is used for the standby diver.

4.1.4.2.1 Proscribed activities for Scuba diving

Scuba may not be used at construction or industrial diving operations that involve the following: welding, burning/cutting, high-pressure jetting, hoisting, dredging, using power tools, or working in an environment contaminated by hazardous materials or microorganisms.

Scuba may not be used for penetration of overhead environments where the exit cannot be clearly seen by the diver under all reasonably foreseeable circumstances.

4.1.4.3 Airline diving

This may be used for activities which are not proscribed for airline, provided that the HIRA indicates an acceptable level of risk, and provided that the procedures are authorised in the company Operations Manual for the applicable circumstances.

Airline equipment is specified in section 5.2.3

Use of airline equipment may be considered when:

- The risk of diver entrapment is low,
- The risk of snagging the airline is low (in most applications the risk of snagging the airline is minimised by use of a buoyant airline which is sufficiently strong to serve as the lifeline,
- Full surface supply equipment is not appropriate for economic or logistical reasons,
- no proscribed work required,
- Airline mode is required or recommended by a government department for the specific industry.

A bailout system must be carried by the diver when there is any significant risk of the diver being unable to make an immediate, direct and acceptably safe ascent to the surface and to immediately achieve positive buoyancy in the case of a failure of primary air supply. Any ditching of equipment required for such a free ascent may not involve more than one quick release buckle, operable by either hand in a single movement, and all equipment required to fall clear must do so in any

reasonably foreseeable circumstance. A bailout system must be used if obligatory decompression is a plausible contingency.

The standby diver may be equipped with any mode of diving equipment permitted by this Code and acceptable in terms of the HIRA. The standby diver should use a lifeline if on Scuba unless the HIRA shows this to be impracticable or it increases the risk.

A line attendant must be used in all operations where airline diving is used. The line attended must be competent and have the relevant knowledge of line signals to be used during the operation.

4.1.4.3.1 Proscribed activities for Airline diving

Airline diving may not be used at construction or industrial diving operations that involve the following: welding, burning/cutting, high-pressure jetting, hoisting, dredging, using power tools, or working in an environment contaminated by chemicals, hazardous materials or microorganisms. Nor may it be used in circumstances where a differential pressure environment exists (e.g. dams, dry-dock locks, in the presence of valves, etc.). Diving depths exceeding 15m, or where the no-decompression-stop limits are likely to be exceeded.

4.1.4.3.2 Permitted activities for Airline diving

Airline diving may be stipulated by a government department for some applications.

4.2 Emergency and contingency plans

Before a dive commences, all members of the diving team must be systematically and thoroughly informed and trained with regard to the procedures to be followed in case of an emergency.

This is usually done in the form of induction training and the "toolbox talk".

4.2.1 Diving emergencies

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.

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

- Dealing with an injured or unconscious diver: both in the water and on the surface
- Provision of recompression therapy in the case of decompression illness
- Communication with emergency services, local medical facilities and hospitals
- Providing first aid
- Faulty or broken equipment
- Managing contaminated divers (biological/ chemical/ radiological/ etc.)
- Emergency evacuation of the worksite

Specific checklists should be provided whenever appropriate to facilitate management in an emergency

4.2.2 Standby diver

Before the dive commences, the standby diver must be adequately dressed, checked and ready to go with mask or helmet off and have adequate diving equipment with an independent breathing gas appropriate for the depths and circumstances in which the standby diver would have to operate should a rescue become necessary.

4.2.3 Recovery of unconscious diver

All dive sites shall have a means of recovering an unconscious or injured diver from the water safely and effectively in a timely manner.

4.2.4 Medical assistance

4.2.4.1 Level 2 designated Medical Practitioners

The diving contractor shall ensure that arrangements are made with one or more level 2 Designated Medical Practitioners, either with the Designated Medical Practitioners directly or with a medical facility employing Designated Medical Practitioners whenever diving projects are planned.

The operations manual should clearly indicate the responsibilities of the designated medical practitioner and the extent of involvement in diving operations. The following guidelines should be considered:

- Irrespective of the type of diving performed, each diving team should have reasonable access to the advice of a designated medical practitioner
- Whenever a significant injury occurs during a diving project, the diving supervisor is required to follow the company protocol. The Designated Medical Practitioner must be contacted in all cases and the injury should be recorded as an occupational injury on duty.
- Whenever decompression sickness occurs (or symptoms in a diver are suggestive of decompression sickness), the diving contractor is required to consult the designated medical practitioner in all cases (even if routine treatment is needed) and the incident must be recorded as an occupational disease.
- In certain cases, depending on the HIRA, the on-site attendance of the designated medical practitioner may be required for the entire duration of the diving operation.

4.2.4.2 Emergency medical services

Certain circumstances may require the diving contractor to make use of emergency services, e.g. to assist in managing injuries or to assist with decontamination procedures after diving in hazardous materials.

The contact number for the local emergency services (or the national emergency number) should be readily available to the diving team.

The specific procedures for contacting emergency services should be clearly outlined in the operations manual and checklists should be provided to facilitate appropriate management in an emergency.

4.2.5 Termination of dive

At the onset of any sign of malfunction of equipment or sign or symptom of distress, the diver shall, when possible, notify the dive supervisor, the dive tender, and any diving buddy by an appropriate signal and terminate the dive.

4.3 Working periods

Working periods should not be extended or prolonged to an extent that health and safety is compromised. 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.

When breaks are taken in the course of a diving operation, the diving contractor will need to ensure that the health and safety is not compromised in any way and that qualified and experienced personnel are available to act as reliefs during these 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.

4.4 Documentation

If an inspector makes an inspection of a worksite and the required documentation is not available on site, the operation may be stopped until evidence is provided that the documentation is in order and the equipment is suitable and in test. It is strongly recommended that the required documentation is kept on site where reasonably practicable.

5 Diving Equipment

5.1 Equipment location and integrity

The diving contractor must ensure that the dive team is provided with all the necessary equipment and procedures to undertake the diving work without undue compromise to health and safety. The choice of equipment location will be determined by the type of diving work, 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 relevant equipment are available.

In some applications the diving system may be required to operate in a hazardous area (for example: 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 requirements for that area.

5.2 Diving equipment

Diving contractors working under the scope of this code must use surface supplied diving equipment whenever reasonably practicable, and only use scuba or airline equipment when conventional surface supplied equipment is not practicable, or there is a significant logistical advantage and the HIRA indicates that there is no significant additional risk.

No diver may undertake a dive to a depth greater than that for which the equipment he or she is using is suitable. Suitability of equipment for purpose should be confirmed by the manufacturer. This

is usually specified in the user manual for the equipment. All equipment used for a dive must be suitable for the planned depth.

5.2.1 Surface-supplied diving equipment (SSDE)

Surface-supplied diving equipment includes as a minimum:

- a full-face mask or helmet
- a diver's umbilical
- a bail-out system, connected to the primary breathing apparatus by a valve operable by the diver,
- a full body diver safety harness,
- an voice communication system between the diver and the control point,
- a surface breathing gas control panel,
- a suitable pressurised breathing mixture supply

5.2.1.1 Diving masks and Helmets

A full-face mask or diving helmet is an essential component of surface supplied diving equipment.

Helmets and full face masks may be supplied with breathing gas by a demand or free-flow system.

5.2.1.2 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.

The standby diver's umbilical must be at least 2m longer than the working diver's umbilical

The length of the umbilical should take into account the distance to hazards.

A diver's umbilical must comply with the following minimum requirements:

- Contain a breathing gas hose of non-toxic composition (suitable for breathing gas) and a minimum internal diameter of 9mm and a working pressure of 350 kPa (35 bar)
- Contain a pneumofathometer hose of non-toxic composition and a minimum internal diameter of 6mm
- Contain a hardwire communications cable for voice communications
- Have a strength of at least 5 kN

The diver's umbilical must be connected to the diver's safety harness by means of a screw-gate caribiner to prevent the umbilical pulling on the diver's helmet or full-face mask.

5.2.1.3 Bailout systems

A bailout system is an independent supply of a breathing mixture that is carried and activated by the diver.

An adequate bailout system must be worn by all divers and the breathing mixture in the bailout system must be appropriate for the dive.

The bailout system capacity must be sufficient to allow the diver to reach a place of safety in emergency situations (e.g. for the time needed by the standby diver to reach the submerged diver and for both to return to the surface; or to return to the stage or wet bell, if this is being used in the diving operation).

5.2.1.4 Safety harness

A diver's safety harness must be:

- capable of supporting the weight of the fully dressed diver in air
- attached to the diver in such a way that it cannot be accidentally unfastened.
- adjustable to comfortably fit the diver.
- provided with an attachment point for lifting the diver in a posture which will minimise potential injury to an unconscious diver during lifting.
- provided with an attachment point for connecting the umbilical in such a way that loads will not be transmitted to the mask or helmet.

Other features such as support for the bailout system, ballast weights, tool pockets and clips, and adjustable buoyancy are optional.

5.2.1.5 Voice communications system

See section 4.2.9

5.2.1.6 Surface control panel

The surface gas control panel has the following functions:

- provide an adequate flow of primary breathing gas to each diver through the primary umbilical hose at the appropriate pressure,
- provide an alternative supply of primary breathing gas to each diver through the pneumofathometer hose when required,
- Indicate the breathing gas supply pressure,
- indicate the depth of each diver by measuring the pressure in the pneumofathometer hose, to a resolution of 0.5msw,
- provide an adequate flow of backup breathing gas to each diver through the primary and pneumofathometer hoses,
- Switch between primary and backup breathing gas supplies without noticeably interrupting supply to the divers
- Prevent breathing gas loss from each diver on the panel if any hose to another diver is cut
- All valves and gauges must be labelled to indicate function and, where appropriate, which diver they serve.
- If gases other than air are to be supplied to the diver, an oxygen analyser must be supplied from to the supply manifold.

5.2.2 Self-contained diving equipment (SCUBA)

Scuba is a non-preferred option for diving under this code, however there may be occasions when the use of scuba may be justified by logistical constraints, and a HIRA that indicates acceptable risk under the specified circumstances.

Two classes of scuba exist: Open circuit, where all the breathing gas is lost to the environment on exhalation, and Rebreather systems, where all or part of the exhaled gas is retained in the breathing circuit, carbon dioxide is removed, and oxygen added before the gas is made available for breathing again.

Open circuit systems have the disadvantage of limited gas endurance, but are more robust and have fewer critical failure modes than rebreather systems.

Rebreather systems can provide considerably longer gas endurance for an equivalent gas supply, and minimise the amount of gas released as bubbles, but have an inherently greater risk of failure while in use, even when correctly maintained and checked before use. It is possible, but unlikely that a rebreather would be acceptable for any diving operation under this code, and any contractor considering their use should ensure a particularly rigorous risk assessment for the equipment, and is strongly advised to ensure that this is done by an expert.

Open circuit scuba may be used with either a full-face mask or a half mask and demand valve. A full-face mask allows voice communications equipment to be used and is the preferred option under this code. Most full face masks allow a bailout system to be connected to the mask in such a way that the diver can change from primary to bailout gas without removing the mask. The switchover system must allow the diver to easily check which supply is in use at any time, and to monitor the remaining gas pressure in both supplies. A large range of configurations are possible, and the contractor is responsible for ensuring that the system chosen is fit for purpose.

Scuba equipment under this code includes at minimum the following

- Primary breathing air supply from high pressure cylinder/s carried by the diver on a harness, including regulator with demand valve and accurate and legible pressure monitoring gauge.
- Buoyancy compensator device capable of providing the diver with neutral and positive buoyancy without the need to jettison weights or other diving equipment The BCD is not required or expected to support heavy tools or equipment.
- Full-face mask, or if not appropriate, half mask.
- Bailout system as specified in section 5.2.1.3 comprising independent gas supply carried by the diver and demand regulator, with means of changeover and pressure monitoring gauge.
- A diver's safety harness as specified in section 5.2.1.4
- Lifeline as specified in section 5.4.1
- Cutting tool suitable for clearing entanglement by rope or line.
- A means of monitoring depth.

A personal dive computer or recording bottom timer is strongly recommended for all dives in open water.

5.2.3 Airline diving equipment

Airline (also known as Hookah) is a non-preferred option for diving under this code, however there may be occasions when the use of airline may be justified by logistical constraints, and a HIRA that indicates acceptable risk under the specified circumstances.

Airline is customarily used for shallow water aquaculture and harvesting operations, and has a satisfactory safety record in these applications.

Airline may be used by Class IV divers with a suitable training endorsement.

Airline equipment under this code includes at minimum the following:

- Airline supply hose with minimum inside diameter of 9mm suitable for breathing gas, complete with demand regulator system, attached to the safety harness by a screw-gate caribiner, in such a way that loads are not transmitted to the mask or DV from the airline or lifeline.
- Airline supply hose is usually buoyant when filled with air at working pressure. Neutrally buoyant or negatively buoyant airline may be considered in special circumstances.
- Lifeline as specified in section 5.4.1 strapped to the airline if the airline is not suitable for this purpose alone.
- Primary air supply from low pressure breathing air compressor or regulated flow from high pressure cylinders.
- A loss of pressure in the airline must not allow air to flow back into the line from the mask or demand valve, or from the bailout system.
- A loss of pressure in the airline must not compromise the breathing gas supply to any other diver
- Full-face mask, or if not appropriate, half mask.
- Bailout system as specified in section 5.2.1.3 comprising independent gas supply carried by the diver and demand regulator, with means of changeover and pressure monitoring.
- A diver's safety harness as specified in section 5.2.1.4

5.3 Divers' breathing gas supply

The diving apparatus must be arranged in such a manner that every diver, including the standby diver receives a breathing gas of the correct composition, volume, temperature and flow for all reasonably foreseeable situations, including emergencies.

All divers must receive an uninterrupted supply of breathing gas. In particular, the supply must be arranged so that no other diver (including the standby diver) is deprived of breathing gas if another diver's umbilical is cut or ruptured.

If breathing gases are not analysed immediately prior to use, an in-line oxygen analyser with an audible Hi-Lo alarm must 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

5.3.1 Compressors

Compressors used to supply air to divers in the course of a diving operation shall be capable of maintaining a supply of air to meet the air requirements of the diver/s.

All receiver tanks and pressure vessels used in connection with compressors shall meet the required regulations and standards.

Compressors shall be operated by a competent person who, if circumstances permit, may also act as a diver's tender. The compressor operator shall ensure that all equipment necessary to supply an adequate quantity of air to the diver is in good working order. Particular attention shall be given to valves, stop valves, drain cocks, gauges, and all parts liable to be damaged.

5.3.2 Prevention of contamination of breathing air supply

The diving contractor shall ensure that adequate procedures are in place to ensure that compressed air supplied to divers comply with the minimum requirements set out elsewhere in this document. This will include procedures, checklists, maintenance and tests with regards to compressor air intakes, the compressor itself, the filtration systems and any other part of the equipment. Some of these aspects are covered in other Regulations under the Act.

5.3.3 Storage cylinders

Gases stored in cylinders at high pressure are potentially hazardous. The dive plan must specify adequate protection for the gas storage areas. All gases used during diving projects will be handled with appropriate care.

Gas storage cylinders must be suitable in design, fit for purpose and safe for use. Each cylinder must be in date in terms of SANS 10019.

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. Cylinders used under water in direct contact with the water should be tested according to the requirements for Scuba cylinders, as they are subject to the same environmental conditions.

Detailed requirements are contained in other Regulations under the Act.

5.3.3.1 Contents of gas cylinders

Gas cylinders containing breathing gases coming from suppliers will be colour coded in accordance with industry guidance and will be accompanied by an analysis certificate. 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 should be repeated immediately before use of the gas.

5.3.3.2 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 ensure that all gas storage units comply with a recognized and agreed standard of colour coding and marking of gas storage cylinders and banks. Where appropriate, pipework should also be colour coded.

Unless special circumstances apply, gas cylinders for inshore and inland operations will be marked and colour coded in accordance with SANS 10019

5.3.4 Breathing gas composition

Constituent gases for breathing mixtures should be within 0.5% by volume of the nominal composition.

5.3.4.1 Breathing gas toxicity

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.

The recommended maximum partial pressure range for oxygen used under water is 1.4 bar to 1.6 bar for the working part of the dive. The partial pressure for oxygen used must never be lower than 0.2 bar

Partial pressure of oxygen during decompression should comply with the requirements of the decompression schedule in use, taking into account the breathing apparatus and security of the diver's gas supply and airway in case of loss of consciousness.

Breathing mixtures other than oxygen and nitrogen (or air) should be used when diving takes place deeper than 50 m of water. Diving at these depths is covered in the Code of Practice for Offshore Diving.

5.3.4.2 Breathing air purity standards

Breathing air for diving under this Code will comply with the SANS 10019

5.3.4.3 Air purity testing

To ensure that breathing air complies with these minimum standards, the diving contractor will ensure that the air is tested in the following manner:

- The compressor should have a monthly functionality test for delivery and pressure.
- An air purity test must be performed at a maximum interval of 6-months.
- An air purity test may be performed more frequently if deemed necessary.
- Testing for contaminants other than those listed in the SANS10019 shall be conducted if their presence is suspected.

Quantitative testing for particulate matter (including oil) shall be conducted if its presence is evident in a qualitative test.

A record of these tests should be kept with the compressor log for inspection

5.3.4.4 Purity of gases for breathing mixes

These criteria apply equally to the gases in storage and after mixing, before delivery to the diver.

Gases should be tested for specific contaminants when there is reason to suspect that they may be present above the limits. A HIRA survey should be used to determine the likelihood of these or any other potentially toxic contaminants being present in the breathing gas.

Potential contaminants should be limited to:

Contaminant	Limit
Carbon dioxide	1000 ppm_v
Carbon monoxide	5 ppm_v
Water	Storage:

	40 to 200bar 50 mg/m^3 (62ppm$_v$) >200bar 35 mg/m^3 (44ppm$_v$) Low pressure: RH ideally 50% to 60%
Oil	0.1 mg/m^3
Solid particles	0.5 mg/m^3 for particles >5 μm
Odour	None
Volatile hydrocarbons excluding methane	5 ppm$_v$
Methane	25 ppm$_v$
Hydrogen sulphide	1 ppm$_v$
Sulphur dioxide	1 ppm$_v$
Oxides of nitrogen	2 ppm$_v$

(Ref: ECHM Book of Experts Reports, Section 5.1, Table 6: Proposed contaminant units for compressed air).

5.3.5 Oxygen banks and Oxygen installations

Pressurised oxygen can cause a serious fire or an explosion, but can be used safely if stored and handled correctly. Any gas mixture containing more than 25% oxygen by volume should be handled like pure oxygen.

Any components used in plant which is intended to be exposed to high partial pressures of oxygen will need to be cleaned of hydrocarbons to avoid explosions. Formal cleaning procedures for such equipment must be specified by the diving contractor, together with documentary evidence that such procedures have been followed.

5.3.5.1 Oxygen hoses

The use of hoses for oxygen in lieu of piping shall be kept to a minimum. Hoses and associated fittings shall be constructed of material that is compatible with oxygen at the operating pressure and temperature.

5.3.5.2 Flow velocity

High flow velocities of oxygen through hoses shall be such that the differential pressure along a hose does not exceed 700 kPa (7 bar)

5.3.5.3 Valves

Quick-opening valves such as ball valves should not be used in oxygen systems where the pressure exceeds 700 kPa (7 bar)

5.3.5.4 Oxygen storage area

An area where oxygen is stored shall be

- adequately ventilated;
- properly identified with warning signs;
- kept clean and located as far as practical from combustible materials.

5.3.6 Chambers

All chambers used under this code shall be of a twin-lock configuration and have sufficient space available to treat all the ill or injured divers in an emergency, with at least one ill diver lying in the horizontal position.

5.3.6.1 Availability of recompression chambers

A recompression chamber is required at the dive site whenever any one of the following conditions is present:

- diving takes place at a depth exceeding fifty metres; or
- decompression stops are required as part of the dive; or
- a functional facility for recompression of a diver is not available within two hours; or
- the diving project is an offshore operation

Whenever an on-site recompression chamber is not required in terms of the previous paragraph, arrangements must be made to ensure that all divers could receive recompression therapy within two hours from the time when the need for recompression is identified.

The diving contractor must identify the location of the nearest diving or hyperbaric chamber appropriate for the depth at which the diving operations are to be carried out and make sure it is within two hours travelling time by available transport from the dive site to the diving chamber. The diving contractor will confirm that the decompression facility is in a safe and operational state.

5.3.6.2 Operation of chambers

Diving chambers may only be operated by persons with the appropriate qualification and competence.

Chamber operators must be available while diving operations are in progress and they must remain on duty at the chamber while the chamber is in use.

Chambers must only be operated using appropriate published or proprietary diving or treatment tables. The tables to be used must be contained in the operations manual and be available at the chamber.

Whenever deviation from treatment tables is contemplated, it should be accompanied by appropriate instructions provided by the level 2 Designated Medical Practitioner and approved by the diving contractor. If such instructions are given telephonically it should be co-signed by at least two individuals.

5.3.7 Electrical power

5.3.7.1 Primary electrical power source

The diving contractor shall ensure that the primary source of electrical power for the diving system complies with the relevant regulations.

5.3.7.2 Alternative power sources

The diving contractor shall ensure that there is a secondary source of power for the diving system in the event of failure of the primary source. The second power source shall be capable of meeting the requirements of the diving system. This may include the following when applicable:

- being rapidly brought online;
- operating the handling system;

- heating the diving plant and equipment, including providing heat for a diver(s) in water;
- sustaining life-support systems for compression chambers and any diver in the water;
- illuminating the work site of divers and the interior of compression chambers, dive stations, etc.; and
- operating communication and monitoring systems.

5.3.7.3 Electricity used underwater

Divers, and others in the dive team, may be required to work with equipment carrying electric currents, which present the risk of electric shock and burning. The diving contractor shall ensure that the equipment and procedures do not endanger the health and safety of any person.

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

5.4 Safety equipment

5.4.1 Lifelines

A lifeline system shall

- have a breaking strength of no less than 5 kN
- incorporate a strength member that is no less than 8 mm in diameter;
- be of sufficient length for the intended diving activities;
- be free of knots and splices;
- be secured to the diver's safety harness by means of a screw-gate carabiner;
- be secured at the surface to a safe point of anchorage; and
- be tended at all times while attached to the diver by a competent diver's tender.

The above are recommended minimum requirements. The HIRA should determine if a higher strength lifeline system is needed in order to ensure the security of the diver (e.g., potential pressure differentials, strong underwater currents, underwater encumbrances, etc.), or if a larger diameter is desirable to improve handling by the surface team.

In order for the lifeline system to have a rated breaking strength of 5kN, it is necessary that all loaded components (lifeline, connecting components, and harness) be rated to at least this breaking strength.

5.4.2 Shot-lines

A shot line is a weighted line with a surface float used to guide the diver between the surface and the bottom and as a tangible reference for speed of ascent and descent. As such the weight must be sufficient to prevent the divers on the line from lifting it off the bottom and the float must have sufficient buoyancy to prevent the weight of the divers dragging it below the surface if their buoyancy control is compromised. The line must be thick enough to offer a comfortable grip to allow a diver to remain in place for decompression stops, and for the surface team to comfortably deploy and recover the shot-line. A diameter of 15 to 25mm is recommended unless there is a good reason to deviate.

Additional weight or an anchor may be desirable to prevent drift.

A shot line must be used when the diver is not lowered to the underwater working place by means of a diving bell or similar device, unless the use of a shot line is impractical.

Whenever a shot line is not used, a boat must be kept ready for rescue purposes if the possibility exists that the diver may surface away from the control point in the course of a dive. Special consideration must be given when more than one diver may surface away from the control point.

5.4.3 Buddy lines

A buddy line is used for securely connecting two divers to each other during a dive.

Buddy lines must conform to the following standards:

- Not exceed a length of five meters; and
- Have a breaking strength of at least 5 kN
- Must not encumber the diver's hands
- Must be possible to disconnect under tension, either by a reliable release mechanism or by cutting with the diver's knife. The diver should be able to reach the line to cut or release it with either hand.

5.4.4 Depth measuring devices

All divers must use depth measuring devices, provided that surface-supplied divers' diving depth must be measured by pneumofathometer from the surface.

5.4.5 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.

5.4.5.1 Language during operations

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.

5.4.5.2 Communications between supervisor and divers

The diving contractor must provide an effective means of direct, two-way communication between the divers and the diving supervisor of a diving operation. Where voice communications are required, the following shall be provided:

- a diver voice communication system adequate to enable the diver's breathing to be clearly heard at all times;
- a suitable means of voice-unscrambling when breathing mixtures containing helium or other gases that significantly distort sound transmission are being used; and
- a system for recording voice communications.

In addition to the primary communication system between the diver and the diving supervisor, an emergency signal system shall also be in effect.

All voice communications should be recorded, and the recording kept for a period of at least 48 hours. If an incident occurs during the dive, the communication record must be retained for any subsequent investigation. All such voice recordings must be made available to an inspector for inspection purposes.

5.4.5.3 Communications between supervisor and persons other than the divers

The diving contractor must ensure that an effective means of communication is in place between the diving supervisor and any other person that may assist in the diving operation, e.g. winch operators, crane operators, ROV supervisors, etc.

To ensure effective communication, the diving team should have access to the communications system and services of any installation or vessel on which operations are based. This includes all available media, e.g. word of mouth, reports, telephone, telex, fax, radio, etc.

5.4.5.4 Communications with Designated Medical Practitioners

Communication with the level 2 Designated Medical Practitioner may be needed in the course of a diving operation, especially in the case of an accident or other medical emergency. The diving contractor must lay down clear protocols and procedures in the operations manual in consultation with the Designated Medical Practitioner. Care should be taken to ensure that medical information is provided to the dive team when needed.

5.4.6 Diving stages and wet diving bells

A wet diving bell (also called an "open bell") is a compartment at ambient pressure by means of which the divers can be transported to and from the underwater work site, which allows the divers to access the surrounding environment and which is capable of being used as a refuge during diving operations.

A basket or wet bell, used in support of surface-supplied diving, needs to be able to carry at least two divers in an un-cramped position. It must be fitted 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. Additional lifting points should be fitted to permit emergency recovery of the diving basket or wet bell.

Diving with closed diving bells is covered in the Offshore Code of Practice.

5.4.7 Man-riding Launch and Recovery Systems (LARS)

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

A safe launch/ recovery procedure must exist and it should be understood by all members of both the diving team and any other support 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.

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, etc.

The device used to lower the diver(s) into the water shall remain available throughout the dive for the immediate recovery of the diver in the event of an emergency if required.

The person responsible for giving directions to the operator in charge of the hoisting device shall be identified in the dive plan (this is usually given either by the diver, the diver's tender, or the diving supervisor). The signal to stop may be given by anyone.

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 base fixings are in place;
- NDT on relevant welds have been completed;
- After initial installation and thereafter, after each subsequent installation.

5.4.7.1 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.

5.4.7.2 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 a suitable safety factor, be non-rotating, and be as compact as possible to minimise the space requirements of their operating winches.

6 Task related equipment

6.1.1 High-pressure water jetting and LP abrasive cleaning

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.

6.1.2 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.

6.1.3 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.

6.1.4 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.

6.1.5 Equipment – General

6.1.5.1 Equipment register

An equipment register should be maintained at the worksite, with copies of all relevant certificates of examination and test. It should contain any relevant additional information, such as details of the materials used to construct diving bells and surface compression chambers. It should also contain details of any applicable design limitations, for example, maximum weather conditions for use, if applicable.

6.1.5.2 Suitability of equipment

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 reasonably foreseeable circumstances on that project. Suitability can be assessed by means of evaluation by a competent person, clear instructions or statements from the manufacturer or supplier, physical testing, or previous use in similar circumstances.

New, or innovative, equipment must be considered for safety and fitness for purpose, but should not be discounted only because it has not been used before. Single-point failure consequences, both for the equipment components and for operating procedures, must be considered in the HIRA

6.1.5.3 Certification of equipment

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,

must be followed. Suitable certificates (or copies) will need to be provided at the worksite for inspection.

6.1.5.4 Maintenance and testing 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.

6.1.5.4.1 Periodic examination, testing and certification

Detailed guidance exists (Specific regulations, SANS codes, IMCA codes, manufacturer's guidelines, etc.) 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.

6.1.5.4.2 Planned maintenance system

The diving contractor must establish a system of planned maintenance for plant and equipment.

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 should identify the frequency with which each task is to be undertaken and who should do the maintenance work. The responsible technician will then need to provide and file a record of the maintenance work.

6.1.5.4.3 Maintenance of cylinders used underwater

Divers' emergency gas supply cylinders (bail-out bottles) and cylinders used underwater 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. Cylinders used underwater should be tested in accordance with the requirements for Scuba cylinders as detailed in SANS 10019, and should be internally inspected for the presence of water if there is sufficient reason to suspect such contamination.

6.1.5.4.4 Lifting equipment design, periodic test and examination requirements

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.

6.1.5.4.5 Maintenance of 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.

6.1.5.4.6 Maintenance of lift bags

Manufacturers' maintenance instructions and testing requirements will need to be followed.

6.1.5.4.7 Maintenance and testing of chambers

Details regarding the maintenance and testing of chambers is contained in other Regulations under the Act.

6.1.5.4.8 Testing immediately before use

All diving equipment used must be checked and tested by the dive team before use so as to determine whether it is in good working order.

6.1.5.4.9 Additional diver's equipment requirements

In addition to the required working equipment of the divers, the following accessories and equipment must also be provided:

- diver's location indicator devices, e.g., rescue beacons or strobes, where SCUBA diving operations are to be carried out during the hours of darkness; and
- a dive knife.
- a diving harness, complete with lifting ring, worn by each diver.

Immediately before each dive, the diver shall check that all his required equipment is present; such equipment is properly fastened in place; and all his apparatus is functioning properly. Before descent, the same check shall be conducted in the water.

6.1.5.4.10 Surface control point equipment

When diving is in progress, a surface control point shall be equipped, as a minimum, with the following equipment:

- if SCUBA is being used, then one complete spare set of underwater breathing apparatus with fully charged cylinders for emergency purposes;
- one weighted shotline, of sufficient length to reach the bottom at the maximum depth of the work area;
- a first-aid kit appropriate for the size of the work crew and work location;
- one set of decompression tables, appropriate for the depth range and breathing gas in use;
- therapeutic oxygen and administration equipment;
- an adequate two-way communication system connecting the dive site with medical assistance;
- adequate means to facilitate the entry and exit of divers to and from the water;
- adequate means to facilitate the immediate removal from the water of an unconscious diver;
- such other equipment as may be needed to ensure safe operations

7 Control of diving operations

The diving contractor shall maintain strict control over all diving operations and ensure that all the aspects listed in this Code of Practice are in place and complied with.

7.1 Decompression schedules

Diving operations shall be carried out in strict accordance with appropriate published or proprietary decompression tables and procedures acceptable to normal commercial diving industry practice.

All the decompression schedules used during a dive must be available at the dive site. These must be appropriate for the gas mixture being used.

Before diving commences, the maximum bottom time of the dive, the specific decompression schedule and the diving technique to be used during the diving operation must be made known to and be understood by the dive team.

7.2 Discipline

Good discipline must continuously be maintained during the diving operation to ensure that the diving project is carried out safely. The diving project must be carried out strictly in accordance with the manner planned by the diving supervisor and the bottom time and decompression schedules chosen before the dive must be strictly adhered to.

7.3 Warning signals and worksite identification

Appropriate warning signals must be given and the appropriate warning signs must be prominently displayed while the diving operation is in progress.

The warning devices shall be displayed as follows:

- buoys, shapes, flags, lights, lamps, or flares need to define the limits to be kept clear of by any equipment not connected to the diving operation; and
- in navigable waters: flags, shapes and lights shall be used in accordance with the requirements of the International Maritime Organisation and the South African Maritime Safety Authority.

These flags, shapes or signals employed for work site identification shall be removed after completion of the diving operation.

8 Personnel

8.1 Training and competence - General

Only four classes of diver are permitted to work under the scope of this code, namely Class IV, Class III, Class II and Class I. The minimum level of training of personnel committed to work under the scope of this code includes

- Successful completion of a Department of Labour approved training course, or
- Previous training that is approved by the Depart of Labour

Any person taking part in a diving operation must have the necessary competence and training prior to engaging in diving work and be fully conversant with the machinery, tools and equipment used during the diving project.

No diver is allowed to dive to a depth greater than that for which he or she is qualified.

8.1.1 Competence

To work safely, efficiently and as a member of a team, personnel need to have a basic level of competence for 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 necessary competence to perform the

specific task required during the particular diving operation. This will normally mean establishing that the person has had sufficient training coupled with experience. The various members of the diving team will require different levels and types of competence

Competence in diving skills is implied by the diver certification level held.

Competence in work skills may to some extent be implied by diver certification, but there are many specialised work skills which are not implied by diver certification. These must either be provided by additional training and certification, or on the job.

The diver is responsible for informing the supervisor of his or her actual experience, supporting this with evidence of logbook and certification.

8.1.1.1 Diving supervisors (see also 3.4 for organisational responsibilities of the supervisor)

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 shall ensure that the diving supervisor is competent to fulfil the duties and responsibilities of the supervisor as contemplated in Section 3

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 and any person being considered for appointment as a supervisor will need to be in possession of the relevant certificate.

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 assess 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 in to 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.

8.1.1.2 Diver (see also 3.5 for organizational responsibilities of the divers)

Before commencing diving, the diving supervisor shall ensure that the diver is competent to perform the task required. This could be done by scrutinizing the contents of the diver's logbook, or previous experience of working with the diver. If competency cannot be assured, the diver should be accompanied by another diver that is competent and who can act as the lead diver for that dive.

Only holders of South African Class IV, III, II and I qualifications and mutually recognised equivalents are allowed to work under this code. All divers at work should hold a diving qualification suitable for the work they intend to undertake. They will need to have the original certificate in their possession at the site of the diving project - copies should not be accepted.

Persons entering a chamber, under pressure, must possess a suitable qualification to do so; except for medical personnel entering a chamber during an emergency.

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.

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.

It should be recognised that inexperienced divers are required 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.

The Standby diver must be competent to perform a rescue in the reasonably foreseeable emergencies contemplated by the dive plan and associated HIRA, contingency and emergency plans for the diving operation.

8.1.1.3 Tender

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. Including a detailed knowledge of the emergency and contingency plans.
- They will need to be familiar with 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.

8.1.1.4 Chamber operators

Chambers must only be operated by persons who are qualified and competent to do so.

Persons who are qualified as class II or class I divers are qualified to operate chambers. Other persons must hold a chamber operator's certificate as specified in the Regulations.

8.1.1.5 Chamber attendants

Whenever persons enter a diving chamber there will be at least one person, who may be the only diver in the chamber, who must know how to operate valves on the inside, as well as be intimately familiar with the emergency procedures.

If only one person is inside the chamber, there will be another standby diver available to enter the chamber in case of an emergency.

8.1.1.6 Surface crew/riggers

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

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

- They will need to understand and be familiar with good rigging practice. 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 underwater which it took two men to carry on the surface.

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

Often the surface 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 surface crew prior to each job, such that competence is assured.

With a larger surface 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.

8.2 Training and competence – Rescue and first aid

The diving contractor must ensure that adequate medical support, with competencies appropriate to the diving environment, is available at all times to deal with an emergency situation. Medical support should be available to the diver from the time of injury until the diver receives appropriate medical care. The hazard identification and risk assessment should guide the diving contractor in this respect.

Generally speaking, the following should be in place:

Any diver that is not able to help himself in an emergency should be rescued. This is usually done by a fellow diver or the standby diver. This means that all divers should be in possession of an in-date first aid qualification and be competent in standard diving rescue techniques. The standby diver must be in immediate readiness to dive and shall remain on duty at the control point on the surface of the water during the diving operation. When diving with a wet bell or similar equipment, the standby diver (bellman) must descend in the bell and must remain in the bell so as to be able to immediately render assistance to the diver working from the bell.

Diving supervisors should have an in-date first aid qualification and be able to take over and manage the diving emergency appropriately and have competency in doing a basic cardio-respiratory and field-neurological examination and consult with a Designated Medical Practitioner.

The diving supervisor should be in contact with the Designated Medical Practitioner in the case of a diving accident to ensure that optimal treatment of any condition is given to the injured diver.

8.3 Training and competence – Safety and technical

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.

Safety Training may include the following:

- training that is required in terms of any other regulation or legislative document
- courses on first aid or survival or fire-fighting specific to the premises of the client (e.g. induction courses)
- task-specific safety training outlining any special hazards associated with the tasks being worked performed (as identified in the HIRA)
- Refresher training at regular intervals.

8.4 Number of personnel and team size

The diving contractor will need to specify the size of team based on the details of the project and as specified in the diving regulations. For safe operation, this may need to include additional surface support personnel and other management or technical support personnel.

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.

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.

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 (SCUBA, surface supplied, etc.)
- Deployment method.
- Location.
- Water depth
- 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 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 every two divers if the maximum depth of diving does not exceed 30 meters. Whenever diving exceeds 30 meters, at least one tender is required for each diver 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 however, needs to be immediately on hand. A standby diver should not act as a diving tender without another tender, who is not the supervisor, being available to take over these duties.

There will need to be one standby diver for every two divers in the water. The standby diver will remain on the surface.

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
- Dangerous fumes, etc.

On large projects, dedicated personnel may be required to provide overall management and control. These personnel are often called senior supervisors or diving superintendents

8.5 Readiness and availability of personnel

All personnel required for the diving operation must be ready and available before the dive commences. This includes personnel who may be on call and available telephonically (e.g. Designated Medical Practitioners)

8.6 In-date personnel

Only personnel that are in-date may take part in diving operations. If a person is not in date, the diving contractor must ensure that the person receives appropriate training and supervision.

8.6.1 In-date divers

Divers are considered to be in-date when they have a valid diving medical certificate as required in the Regulations, which certifies that the diver is fit to dive and the diver has participated in an in-water diving operation of not less than 30 minutes' duration in the previous six months

9 Medical

9.1 Designated Medical Practitioners

Not all medical practitioners and medical specialists are able to render general and emergency medical care to injured divers. Medical practitioners should thus receive additional training and have adequate experience to render medical support to diving operations.

Some medical practitioners have had additional training that enables them to examine divers regarding their fitness to dive. All of these medical practitioners are designated in terms of the Regulations as level 1 Designated Medical Practitioners. These designated medical practitioners are however not competent in providing medical support to diving operations.

Some Designated Medical Practitioners, because of additional training and experience, are able to render medical support to diving operations. All of these medical practitioners are designated in terms of the Regulations as level 2 designated medical practitioners. These medical practitioners are able to perform diving medical examinations on divers AND advise on the emergency treatment of divers, as well as on recompression therapy for diving accidents.

- Level 2 (air) designated medical practitioners can render operational support to all diving operations involving class VI, V, IV, III divers. They can also provide support for diving operations using class II (air) divers. They may not provide operational diving medical support for class II (mixed gas) and class I divers.

- Level 2 (mixed gas) designated medical practitioners can, in addition to the above, also provide operational medical support for diving operations involving class II (mixed gas) and class I divers.

The designation of all medical practitioners lapse after a period of four years, unless the designated medical practitioner attends refresher training prior to expiry of the designation.

All diving operations should secure the medical support of a designated medical practitioner that is competent to do so.

9.2 Occupational Health Personnel

Not all health practitioners are able to render occupational health care. Additional training and registration is required to perform these functions. Certain regulations under the Act require that specific work-related medical functions be performed by practitioners who have undergone such training and who are appropriately registered. The legal definition of these practitioners is contained in the Occupational Health and Safety Act.

9.2.1 Occupational Health Practitioners

Practitioners registered as nurses, doctors or specialists can undergo training in occupational health that enables them to register as "occupational health practitioners". This is thus a general term that includes all these practitioners. All such practitioners are registered – either as occupational health nursing practitioners or as occupational medicine practitioners or as occupational medicine specialists. Certain medical functions may be performed by occupational health practitioners (these are then usually performed by nursing practitioners). Certain functions are however legally required to be performed by occupational medicine practitioners (doctors).

9.2.2 Occupational Medicine Practitioners

Occupational Medicine Practitioners are General Medical Practitioners (GPs) and Medical Specialists who have undergone additional training in occupational health and are registered as occupational medicine practitioners.

9.2.3 Occupational Medicine Specialists

These are occupational medicine practitioners who have undergone specialist training in occupational medicine. They are registered as occupational medicine specialists and have advanced knowledge on occupational medicine matters.

9.2.4 Occupational Health Advice and Support

Not all occupational health practitioners are able to provide occupational health support for diving projects. Occupational Health Practitioners that do not have appropriate knowledge and experience in providing such support in the hyperbaric environment should consult with a level 2 designated medical practitioner or a colleague experienced in hyperbaric work. The following considerations are worth mentioning:

- The Occupational Exposure Limits (as contained in the Regulations for Hazardous Chemical Substances) need significant adjustment and cannot be applied "as is".

- The increase in environmental pressure acts as an additional risk factor, which necessitates it being considered as part of "mixed exposures". The effect is in some cases additive and in others synergistic.
- Significant physiological changes in the cardiovascular, respiratory and other systems of the body significantly changes a number of toxicological principles, which should be taken into account. The absorption, distribution, metabolism and elimination of almost all substances are changed.
- Some exposures are extremely difficult (if not impossible) to model (e.g. noise exposure: sound conduction is different in different fluids that divers are diving in; increase in pressure has an effect on sound conduction; the middle ear space may be filled with compressed gas or with gas other than air; the external ear canal may be filled with fluid – thus splinting the tympanic membrane, etc.)
- Specific diving injuries and diseases are listed as occupational diseases. A thorough knowledge of these is needed.

The diving contractor should only use occupational health practitioners that are competent to provide such services in the diving environment. The ideal is a designated medical practitioner who is also registered as an occupational medicine practitioner or occupational medicine specialist.

9.3 Medical certification

9.3.1 Fitness to dive certification

A diver shall not be permitted to dive unless a he has a valid diving medical certificate signed by a Designated Medical Practitioner, and the certificate includes all the aspects listed in the Regulations. This examination should be performed every 12 months, or more frequently as determined by the examining Designated Medical Practitioner.

If the medical 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.

9.3.2 Additional fitness to dive requirements

Additional risks (as determined by the HIRA) may necessitate additional medical examinations. The level 2 Designated Medical Practitioner should scrutinize all medical examinations of the company divers to ensure all the relevant examinations were performed. If such Designated Medical Practitioner did not perform the examinations himself, this may require consultation with the other Designated Medical Practitioner who has performed the initial fitness evaluation. These additional tests will then be performed when needed. Such additional requirements (if any) and the specific fitness requirements should be listed in a specific medical section in the operations manual.

9.3.3 Occupational Health requirements

Exposure to specific occupational health risks may require even further examinations in terms of other regulations. Many of these examinations must be performed by an occupational health practitioner or an occupational medicine practitioner and a Designated Medical Practitioner who does not have this qualification is not legally allowed to perform the examinations himself. An additional certificate (issued by the occupational health practitioner or occupational medicine practitioner) should then be provided.

9.3.4 Medical certificates from international diving doctors

Some divers may have completed a diving medical examination internationally before diving in South Africa. The level 2 Designated Medical Practitioner must scrutinize all these medical examinations and perform any additional examinations that are required in terms of local conditions, regulations and specific workplace risks.

Not all of these investigations need to be repeated, provided that the level 2 Designated Medical Practitioner has ascertained that:

- the examinations pertains to that specific diver (verified by a signature of the examiner AND the diver on all examinations)
- the examinations were performed by an appropriate medical practitioner
- the examinations comply with appropriate quality and validity requirements
- Any X-ray examinations must be accompanied by the original X-ray plates OR a report issued by a specialist radiologist.
- The physical examination shall always be repeated.

The level 2 DMP may then issue a valid medical certificate based on these examinations and those additional examinations that may be needed. Clear procedures in the operations manual will provide transparency.

9.3.5 Extensions of fitness

The fitness of a diver for diving work is certified for a maximum of 12 months. This period may however be shortened for specific reasons (e.g. 3-monthly follow-up of blood pressure) at the discretion of the examining Designated Medical Practitioner. The Designated Medical Practitioner that has provided this restriction in the duration of fitness may extend this fitness if based on good medical principles and the initial concerns were adequately addressed. This may, for instance, happen after discussions between the level 2 Designated Medical Practitioner and the Designated Medical Practitioner initially performing the examination and issuing the restriction.

No medical certificate may be extended beyond the maximum period of 12 months. Divers that are planning to work in the period close to expiry of their medical certification, should ensure that they submit for a medical examination prior to leaving on such diving project, or alternatively ensure that they can obtain a diving medical examination prior to the expiry thereof.

9.3.6 Appeal against fitness decisions

All persons found unfit for diving, or fit with a restriction, may appeal such a decision if he or she feels there is a reason providing sufficient grounds for such an appeal. The appeal procedures are clearly explained in the Regulations.

Before appealing against the decision, it is advisable to discuss the decision with the Designated Medical Practitioner – especially the level 2 Designated Medical Practitioner. The reason for the unfitness or restricted fitness should be explained in plain language to the person concerned, including the explanation of results of investigations that the decision is based on. This requires designated medical practitioners to ensure that appropriate investigations are performed before a decision is made.

The appeal procedure should NOT be used to cover the costs of non-routine or expensive specialist investigations and examinations. When these are indicated, it should be performed BEFORE the diver is certified unfit or fit with restrictions. Discussion with other medical colleagues may be indicated. All Designated Medical Practitioners are advised to confirm all cases of unfitness with a colleague prior to declaring a person unfit.

An appeal should be accompanied by the medical certificate issued in terms of the examination, as well as the grounds for the appeal

9.4 Medical records

9.4.1 Records of fitness to dive examinations

The results of fitness-to-dive examinations shall be recorded in the medical file of the diver and be kept at the examining Designated Medical Practitioner in accordance with accepted medical practice prescriptions and principles. A certificate to certify the diver's fitness to dive may be provided to the diver and/ or the company, but it is essential that the particulars are entered in the logbook of the diver and stamped. Care should be taken not to divulge medical confidential information.

The level 2 Designated Medical Practitioner should request copies of these examinations (if not performed by him). This will ensure that he can provide appropriate medical support for the diving team and is intimately familiar with the medical conditions of the team. The information should be used to trend health effects related to specific risks present in the workplace. Examples of these include trending of lung function tests, hearing thresholds and blood results (e.g. Biological Exposure Indices). Many of these will need to be performed in consultation with an occupational medicine practitioner. Any abnormalities found should prompt a workplace visit and investigation, with an update of the HIRA and implementation of specific risk mitigation strategies.

9.4.2 Diving fitness registry

All designated medical practitioners performing medical examinations should forward the following information regarding examination to the Southern African Undersea and Hyperbaric Medical Association (SAUHMA):

- the date of the examination
- The period of validity of the examination
- Name of the person to whom it relates
- Passport or identity number of the person
- Whether the person is considered fit or not
- Any restrictions that may apply
- The name, address, telephone number and designation number of the designated medical practitioner who performed the medical examination

This applies to examinations for all persons covered by the diving regulations, namely divers, diving supervisors, system's technicians, instructors, etc.

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9.4.3 Records of occupational health examinations

Records of occupational health assessments shall be recorded in the medical file of the person and be kept at the office of the occupational medicine practitioner. This would include records of biological monitoring and/ or records of medical surveillance.

Some of these records must be kept for extended periods, e.g. 40 years (see other regulations). A certificate to verify the diver's fitness for work (in addition to diving fitness) must be provided to the company.

9.4.4 Records of occupational diseases

Any occupational diseases should be reported in accordance with the Compensation for Occupational Injuries and Diseases Act. The diagnosis of an occupational disease also requires a workplace investigation, update of the HIRA and implementation of specific risk mitigation strategies.

9.5 Fitness on the day of diving

Although a diver may be certified as fit to dive for a period of up to twelve months, there are a number of conditions that may render a person temporarily unfit for work on a given day or for a specific period.

9.5.1 Responsibilities of the diver

No diver shall dive if he feels that he is unfit to dive for any reason.

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 the diving contractor's designated medical practitioner, 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 an assessment can be made of their fitness to return to diving.

9.5.2 Responsibilities of the supervisor

A diver shall not dive when, at the discretion of the diving supervisor or diver, the diver is judged incapable of functioning safely and effectively under water. The supervisor may require the diver to consult with the level 2 DMP if there is any uncertainty regarding the person's fitness to dive.

The supervisor shall specifically enquire about the fitness of each person to dive and this shall be recorded in the diving log.

Due regard shall be given to the restrictions noted on the diver's fitness on the medical certificate.

9.5.3 Fitness after illness or injury

If, on account of an illness or injury (whether diving-related or not), a person has been medically unfit to take part in a diving project for a period of fourteen days or more, the person shall not be

allowed to dive again or participate in the diving project in any way unless he or she furnishes the diving contractor with a medical certificate indicating the nature of his or her illness or injury and in which a medical practitioner certifies that he or she has recovered from such illness or injury.

Whenever the diving contractor feels that the illness or injury of the person is of such a nature as to make an examination by a designated medical practitioner desirable, such person shall not participate in diving work until a designated medical practitioner has certified that the person is again fit for diving work.

9.5.4 Fitness after decompression illness

Divers who have suffered decompression illness, including cases where the diving supervisor or the diver himself suspects that the diver has suffered decompression illness, shall not be allowed to dive again without consultation with the Level 2 Designated Medical Practitioner. If the Designated Medical Practitioner confirms a diagnosis of decompression illness, this will be reported as an occupational disease and noted in the diver's logbook. The diver may only be allowed to dive again after being passed as fit to dive by the Level 2 Designated Medical Practitioner. The following minimum times before re-assessment by the Designated Medical Practitioner are recommended:

9.5.4.1 Simple decompression illness

Divers suffering decompression illness that manifest as: limb pain only (with no motor system involvement); cutaneous (skin rash with itching, but excluding marbling of the skin); lymphatic or non-specific (persistent headache, excessive fatigue, loss of appetite, nausea, etc.):

- If the diver fully responds to a single recompression treatment, the diver may be permitted to return to diving in 24 hours. (Telephonic consultation with the designated medical practitioner may be adequate in some cases).
- If the diver does not fully respond, or if a relapse in symptoms occur, or if further recompression therapy is required, the diver may be assessed in 7 days' time.

9.5.4.2 Sensory neurological decompression illness

Neurological decompression illness involving sensation in the limbs only (excluding any spinal involvement) and with definite exclusion of motor involvement:

The diver may be assessed after 7 days following maximum recovery.

9.5.4.3 Cardiorespiratory decompression illness

Decompression illness manifesting with cardio-respiratory symptoms (commonly known as the "chokes") or with pulmonary barotrauma

The diver may be assessed after 28 days following maximum recovery

9.5.4.4 Serious neurological decompression illness

Decompression illness manifesting with serious neurological signs (motor involvement, inner ear involvement, etc)

The diver may be assessed after 28 days following maximum recovery. Specialist consultation is advised.

9.5.5 Victimization

No person reporting himself as unfit for work shall be forced to work and such a person shall not be victimized in any way. A consultation with the level 2 DMP may be required and this may in certain instances occur telephonically.

No person may victimise a diving supervisor who considers a diver unfit for diving due to indisposition, physical illness or mental infirmity and such a diver shall not be allowed to participate in the diving project without being cleared by the level 2 DMP.

9.6 Fitness screening

9.6.1 Screening before diving

Each diver shall be medically screened, at the discretion of the diving supervisor, to ensure that the diver is physically fit on a day-to-day basis. This examination may be performed by the supervisor himself, who may refer the person for further medical evaluation if needed. Such a screening examination may include the person's ability to equalize, his balance and coordination and other screening tests as prescribed by the level 2 Designated Medical Practitioner in the operations manual.

In certain high-risk areas screening for drugs of abuse should be included. This may be done at random intervals without the divers, diving supervisors or any other person involved in the diving project knowing. Such screening should however always be conducted within the guidelines and limits set in a company policy on drugs of abuse (including alcohol). Such a policy should include clear guidelines and standard procedures, including measures related to disciplinary action (when appropriate) or rehabilitation programmes and disability management (when appropriate). Labour legislation should be consulted in this regard.

9.6.2 Screening after diving

The supervisor should screen all divers after a dive and specifically enquire about any abnormal sensations or any other symptoms that may suggest decompression sickness or other injury or disease sustained during the dive. The presence or absence thereof should be clearly noted in the diving log. Any abnormalities should be reported to the level 2 Designated Medical Practitioner without delay.

9.7 Medical alert tag

A medical alert tag or bracelet, to indicate the possibility of decompression sickness or other diving illness, is recommended to be worn by each diver for at least 24 h after completing each dive. The tag should include the following statement: "This individual is a commercial diver and may need recompression therapy in a decompression chamber." The number for the level 2 designated medical practitioner, or alternatively, the Divers Alert Network should be displayed.

9.8 Medical equipment on site

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 and a list of the contents of the medical kit shall be compiled in conjunction with the diving contractor's level 2 DMP. The DMP will then know what equipment and supplies are available when giving advice to a

worksite. The diving contractor, in conjunction with their DMP, will need to prepare contingency plans for emergency situations.

The first aid equipment should be adequately marked to enable any person to identify the first aid kit.

A specific person should be made responsible for the first aid kit (usually the supervisor). The issue of supplies from the kit should be accompanied by an injury report and proper control of the contents needs to be maintained, including due cognizance of expiry dates thereof.

Before any dive commences, the diving contractor must ensure that the emergency equipment is ready for immediate use.

Sufficient stored quantities of medical oxygen must be available at every dive site to ensure that an emergency may be dealt with effectively. Not having enough oxygen available to manage all injured divers is not acceptable.

9.9 Other medical and physiological considerations

9.9.1 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.

9.9.2 Seismic Operations and Sonar Transmissions

There are inherent problems for divers who are close to seismic operations or sonar transmissions. 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.

9.9.3 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.

9.9.4 Flying after diving

The dive plan will need to state that flying is avoided for a specified time following a dive because of the decrease in pressure on the diver's body caused by increased altitude and the resultant increased risk for decompression sickness.

If transportation is required (e.g. for medical evacuation), the altitude and in-flight conditions shall be recommended by the level 2 Designated Medical Practitioner. The cabin pressure of the aircraft shall not be less than the equivalent of an altitude of 300m (approximately 1000ft) above the dive site.

9.9.5 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.

10 Special operational conditions

10.1 Night diving

Where a diving operation is carried out at night, a lamp or other device must be attached to the diver to indicate his or her position when he or she is on the surface.

The surface area and the bell from which the diving is taking place and the underwater working area must be illuminated well. If such illumination is undesirable, it may be switched off during the diving operation, but be immediately available in the case of an emergency.

10.2 Water intakes, discharges and differential pressure environments

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 adequately protected by a suitable physical barrier. Such measures will need to be part of a work control system, such as a permit-to-work system, and could include mechanical isolation.

Underwater approaches to operating intakes, exhausts, and water-control structures shall be declared hazardous locations for diving operations. Operating intakes and exhausts include those units which do not currently function, but which are capable of being operated at any time.

Divers diving in these environments shall only use surface-supplied equipment with voice communications and be tended from a position outside the hazardous area at all times.

When practicable the free length of the umbilical should be restricted to prevent the diver from entering the hazard zone

When a diver is required to approach any underwater intake pipe, tunnel, or duct, he/she shall be provided with means to identify the intake in such a manner as to distinguish it from any other similar intake in the location.

The diver shall not approach any intake until the flow through it is stopped or controlled. Provisions shall be made so that the flow cannot be re-established until the diver leaves the water or until the diving supervisor has declared the diver clear of the location.

When the flow cannot be stopped, the safety of a diver approaching the intake shall be assessed by the determination of flow patterns using direct measurement, calculation, or other means acceptable to the diving supervisor.

10.3 Restricted surface visibility

Restricted surface visibility caused by, for example fog or driving rain may affect the safety of the operation. The dive plan should identify when operations will need to be suspended because of restricted visibility.

10.4 Underwater currents

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

10.5 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 considerations 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.

If there is an ROV operation taking place in the vicinity, 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 pilot (this is normally routed through the diving supervisor).

10.6 Underwater obstructions

Diving operations can be complicated by the number of lines deployed during operations: 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 operation, resulting in all involved parties having a clear understanding of responsibilities and expectations.

10.7 Risks from the environment

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. The operations manual must contain clear limits for hazards from the environment.

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.

10.7.1 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:

- 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.
- Temperature - Extreme temperatures (both high and low) may affect the reliability of equipment and impose particular hazards on personnel.
- 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.
- Shallow water - Divers are very sensitive to water movement and great care has to be taken in shallow water where surge of the water can have a major effect on the ability of a diver to remain in a particular position.

10.7.2 Currents

Currents can cause considerable problems in diving operations 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.

10.7.3 Sea state

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

Working from a boat or vessel in rough seas requires careful consideration.

Rough seas also require a heightened awareness of the possibility of accidents.

Rough seas increase the risk to the divers, and may make rescue operations impossible or unacceptably dangerous

10.7.4 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 the diving operation difficult.
- Rain and fog will cause a reduction in surface visibility, possibly creating a hazard at the surface.
- Bad weather can affect surface workings, particularly with adverse combinations of wind, rain, 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 affect 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.

10.7.5 Hazardous marine life

In some parts of the country 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 in consultation with the level 2 Designated Medical Practitioner to deal with its effects.

10.7.6 Other considerations

A diving supervisor should only allow a diving operation to begin after he has carefully considered all relevant 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.

10.8 Support locations and control points

Divers are required to operate from different locations with varying levels of support. Due consideration must be given to the effect each location will have on the safety and efficiency of an operation.

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, and communications between different locations considered.

10.9 Transportation through the air-water interface

Diving activities shall not be carried out from a diving station located more than 3m above the water unless the divers are transported through the air–water interface by a suitable stage, ladder, or wet bell.

Whichever method is chosen, provision must be made for the recovery and transport of an unconscious diver.

10.10 Hazardous mechanisms

Before a diver approaches a worksite that may be made hazardous due to operation of mechanisms, specific care must be taken to ensure that such mechanisms are secured against inadvertent movement before the diver enters the water and kept secured by means of proper lockout procedures.

10.11 Use of explosives

Where explosives are handled in diving operations, the diving contractor shall refer to the recommendations and regulations of the appropriate authority for their transportation, storage, and use.

10.12 Liveboating

Liveboating means diving from a vessel that is moving under power (propellers are engaged while divers are in the water)

Liveboating presents severe hazards to the diver and must be avoided as far as is practicable.

Liveboating from a surface vessel shall not be conducted at night or in rough seas or from vessels with insufficient manoeuverability. Controls that will prevent the diving umbilical or tether from becoming entangled in the propellers shall be employed.

The tender for a liveboating operation shall be competent to perform this type of tending. The tender shall be in direct voice contact with the diving supervisor.

When liveboating is necessary and the divers use Scuba, the use of a lifeline may be more hazardous than alternative arrangements.

10.13 Deep diving

Deep diving applies to diving operations for depths greater than 50 metres and includes bell, saturation, bounce (non-saturation), and submersible lockout diving as well as sea bottom habitat dives. This information is covered in the offshore code.

Where surface mixed gas and saturation diving techniques are used, the diving contractor and the diving supervisor shall refer to the Offshore Code of Practice.

10.14 Diving in contaminated waters

When diving in contaminated waters (biological, chemical, nuclear, etc.), the diving contractor will ensure that all the relevant Regulations are complied with, as well as any specific local authority regulations that may be applicable.

10.15 Diving in confined spaces

A "**confined space**" means an enclosed, restricted, or limited space in which, because of its construction, location or contents, or any work activity carried on therein, a hazardous substance may accumulate or an oxygen-deficient atmosphere may occur, and includes any chamber, tunnel, pipe, pit, sewer, container, valve, pump, sump, or similar construction, equipment, machinery or

object in which a dangerous liquid or dangerous concentration of gas, vapour, dust or fumes may be present;

It is the duty of the diving contractor to identify all confined spaces present at a diving project and ensure that the requirements of confined space entry stipulated in the General Safety Regulations are complied with.

The diving contractor must also take cognizance of risks associated with differential pressure situations as well as the risks associated with possible entrapment and manage these risks appropriately. (See also section10.2)

11 Records

11.1 General

All records required in terms of the Regulations must be kept and be available for inspection.

Records are kept for two basic reasons:

- As evidence that due diligence has been applied in planning and controlling operations
- As evidence that equipment and personnel are fit for purpose and ready for deployment.

Records should be available where and when they may be needed for these purposes. As a labour inspector or other authority may require some of this information to determine whether an operation is legitimate and safe, information which is necessary to show this should be available on site, so that otherwise unnecessary delays may be avoided. Documentation which the supervisor may need during the diving operation should also be available.

11.2 Planned maintenance records

Records of the planned maintenance system and the maintenance procedures undertaken must be available for inspection.