Contents

RULES FOR DIVING SYSTEMS

Chapter 1 GENERAL

1.1 General

1.1.1 Scope

1 The Rules for Diving Systems, etc. (hereinafter referred to as "the Rules") apply to the survey and construction of the diving systems of ships classed with NIPPON KAIJI KYOKAI (hereinafter referred to as "the Society") intended to be registered in accordance with **Chapter 3 of the Regulations for the Classification and Registry of Ships**.

2 The relevant requirements in **the Rules for the Survey and Construction of Steel Ships** apply to the materials, equipment, installation and workmanship of the systems, unless otherwise specified in the Rules.

3 Taking into account that there are some diving platforms, including fixed offshore installations, to which *SOLAS* does not apply but which carry out diving operations, the Society is invited, for the purpose of consideration of the safety of diving operations, to apply the Rules in such circumstances to the extent deemed reasonable and practicable.

4 The Rules applies to ships of not less than 500 gross tonnes that have a diving system installed on or after 1 January 2024.

5 Ships that have a diving system already installed prior to 1 January 2024 are to be certified as a diving unit according to this Rules by the due date of the next Safety Construction Renewal Survey or equivalent.

6 The Rules does not apply to the plant and equipment required for the medical care or treatment of patients, not related to diving, in a Pressure Vessels for Human Occupancy (PVHO).

7 Notwithstanding the Rules, the Coastal State may impose additional or alternative requirements regarding the diving unit and diving operations.

8 Where plant and equipment are installed upon a standby diving unit, the application of the Rules should be considered on a case-by-case basis by the Administration.

1.1.2 Goal

The goal of the Rules is, especially where diving safety issues are not adequately addressed by other instruments of the Society, to:

(1) provide a minimum international standard for the design, construction, installation and survey of diving systems integrated on ships, floating structures and MODUs (hereafter referred to as diving platforms) engaged in diving operations;

(2) facilitate safe diving operations from diving platforms and achieve a level of safety equivalent to that required by *SOLAS* for ships engaged on international voyages; and

(3) enable the international movement and safe operation of diving units.

1.1.3 Performance standards (2023 Diving Code 1.3)

Unless expressly provided otherwise, systems and equipment addressed in this Code should satisfy equivalent performance standards to those referred to in *SOLAS*.

1.1.4 Equivalency

Diving systems which do not comply with the requirements of the Rules may be accepted provided that they are deemed by the Society to be equivalent to those specified in the Rules.

1.1.5 Modification of Requirements

The Society may modify parts of the requirements in the Rules taking the national requirements of the ship's flag state, kinds and the intended service area of the ship into consideration.

1.1.6 Diving Systems with Novel Design Features

For diving systems with novel design features the Society may impose appropriate requirements of the Rules to the extent practically applicable with additional requirements made on design and test procedures other than those specified in the Rules.

1.1.7 Definitions

The definitions of terms which appear in the Rules are specified as following **(1)** to **(44)** unless otherwise specified in other Chapters.

(1) "Administration" means the Government of the State whose flag a ship or floating structure which carries a diving system is entitled to fly or in which the ship or floating structure is registered.

(2) "Breathing gas/breathing mixture" means all gases/mixtures of gases which are used for breathing during diving operations.

(3) "Machinery Spaces of Category *A*" are those spaces and trunks to such spaces as defined in **3.2.21, Part R of the Rules for the Survey and Construction of Steel Ships**.

(4) "Certificate" means Diving Unit Safety Certificate (DUSC).

(5) "Coastal State" means the Government of the State exercising administrative control over the diving operations of the diving unit.

(6) "Cylinder" means a pressure container for the storage and transport of gases under pressure.

(7) "Daughter-craft" means a workboat deployed from and/or operating in conjunction with a diving platform; the workboat is used to deploy divers into and recover them from the water.

(8) "Dive basket (synonymous with diving basket, diving stage or diving cage)" means a diver deployment and recovery device normally designed with an open cage structure.

(9) "Diving depth" means the depth of water or equivalent pressure to which the diver is exposed at any time during a dive or inside a Pressure Vessel for Human Occupancy (PVHO).

(10) "Diving bell (synonymous with closed bell and submersible decompression chamber)" means a submersible Pressure Vessel for Human Occupancy (PVHO), including its fitted equipment, for transfer of diving personnel between the work location and the surface compression chamber.

(11) "Diving operation" means a planned activity where one or more persons are exposed to a pressure greater than 100 mbar above atmospheric pressure and which is supported by a Pressure Vessel for Human Occupancy (PVHO) and/or a Launch and Recovery System (LARS).

(12) "Diving organization" means the legal entity responsible for conducting a diving operation.

(13) "Diving platform" means the ship, floating structure or mobile offshore drilling unit (MODU) from which a diving operation is being conducted.

(14) "Diving system" means the whole plant and equipment necessary for the conduct of diving operations and for the evacuation of divers.

(15) "Diving system internal muster point" means the location within the surface compression chamber complex where the divers gather before entering the Hyperbaric Survival Craft (HBSC) access trunking.

(16) "Diving unit" means the combined diving system and diving platform, installed and integrated to conduct diving operations.

(17) "Essential services" means the services for maintaining the diving system functionality with regard to the safety, health and environment of the divers in a hyperbaric environment and at the worksite.

(18) "Fire Safety Systems Code (*FSS* Code)" means the International Code, as defined in **3.2.22, Part R of the Rules for the Survey and Construction of Steel Ships**.

(19) "Fire Test Procedures Code (*FTP* Code)" means the International Code, as defined in **3.2.23, Part R of the Rules for the Survey and Construction of Steel Ships**.

(20) "Hazardous areas" are the locations, as defined in **1.1.5(1), Part H of the Rules for the Survey and Construction of Steel Ships**.

(21) "Hyperbaric evacuation" means the emergency transport of divers under pressure from a diving unit to a place of safety where planned decompression can be completed.

(22) "Hyperbaric Survival Craft (HBSC)" means a Pressure Vessel for Human Occupancy (PVHO) and associated support plant and equipment whereby divers under pressure can be safely evacuated from a diving unit until recovered to a position where planned decompression can be completed.

(23) "Launch and Recovery System (LARS)" means the plant and equipment necessary for lowering, raising and transporting divers between the diving platform and/or the surface compression chamber into and from the sea or on to a support vessel, as the case may be. These systems are used for the deployment and recovery of dive baskets, wet bells, diving bells, daughter-craft and

HBSC.

(24) "Living compartment" means the part of the surface compression chamber which is intended to be used as the main habitation for the divers during diving operations and which is equipped for such purpose.

(25) "*LSA* Code" means the International Life-Saving Appliance Code, as defined in *SOLAS* Chapter III.

(26) "Mating device" means the equipment necessary for the connection and disconnection of a diving bell or an HBSC to a surface compression chamber.

(27) "MODU Code" means the International Code, as defined in **1.2.36, Part P of the Rules for the Survey and Construction of Steel Ships**.

(28) "Place of safety" means a location where rescue operations are considered to terminate. It is also a place where the survivors' safety of life is no longer threatened and their basic human needs (such as food, shelter and medical/decompression needs) can be met. A place of safety may be on land, or it may be on board a rescue unit or facility at sea that can serve as a place of safety until the survivors are disembarked to their next destination. An assisting ship should not be considered as a place of safety solely on the fact that survivors are on board as it may not have appropriate facilities and equipment to sustain the survivors.

(29) "Pressure vessel" means a container capable of withstanding an internal maximum working pressure greater than or equal to 1 *bar*.

(30) "Pressure Vessel for Human Occupancy (PVHO)" means a container that is intended to be occupied by one or more persons that is capable of withstanding an internal or external pressure differential exceeding 0.14 *bar* (2 *psi*).

(31) "Saturation diving" means a method of diving, using PVHO, that allows divers to remain in the pressurized environment long enough for their body tissues to become saturated with the inert components of the gas mixture they are breathing.

(32) "Standby diving unit" means a ship carrying plant and equipment solely to assist in the rescue of divers from another diving unit(s).

(33) "Surface compression chamber" means a PVHO installed on the diving platform with means of controlling the pressure inside the chamber.

(34) "Surface compression chamber complex" means a series of mechanically connected PVHOs including all associated trunkings.

(35) "Surface orientated diving" means a method of diving in which it is not planned for the diver(s) to become saturated

(36) "Temporary diving system" means a diving system installed on a diving platform for a period not exceeding one year.

(37) "Umbilical" means the link between a PVHO, wet bell, or diver and the rest of the diving system and may contain surveillance, communication and power supply cables, breathing gas and hot water hoses. The hoisting and lowering strength member may be part of the umbilical.

(38) "Water depth" means the depth of the water in which the diving platform is operating.

(39) "Wet bell" means a diver deployment and recovery device as a minimum fitted with a gas filled dome, a main supply umbilical from the surface (providing breathing gas and other service to a manifold inside the device), and diver excursion umbilicals terminated at the device.

(40) "Attendant ship" is a ship on board of which diving systems are installed.

(41) "Pressure hull" is a shell structure, including closing means and penetrating pieces, capable of withstanding an external pressure corresponding to the diving depth to admit persons and equipment in the pressure hull.

(42) "Maximum diving depth" is a maximum depth to which the diving bell can submerge safely, being a vertical distance from the lowest surface of shell plating of the pressure hull to the water surface.

(43) "Anniversary Date" is the day corresponding to the expiry date of the Classification Certificate, excluding expiry date of the Classification Certificate.

(44) "Life support system" means the gas supply, breathing gas system, decompression equipment, environmental control system and equipment required to provide a safe environment for the divers in the diving bell and the deck decompression chamber under all ranges of pressure and conditions they may be exposed to during diving operations.

1.1.8 General Requirements

1 As far as reasonable and practicable, a diving system is to be designed to minimize human error and constructed so that the failure of any single component should not lead to a dangerous situation for the divers.

2 All components in a diving system are to be so designed, constructed and arranged as to permit easy cleaning, disinfection, inspection and maintenance.

3 The diving system is to be capable of allowing the safe transfer of a diver under pressure between the diving bell and the deck decompression chamber.

4 The diving system and breathing gas cylinders is not to be sited in machinery spaces if the machinery is not associated with the diving system.

5 The diving system is not to be sited in hazardous areas zone 0.

6 The diving system is to be so arranged as to ensure that centralized control of the safe operation of the system can be maintained under all weather conditions.

7 The diving system is to be installed in accordance with the following requirements:

(1) The diving system is to be securely fastened to the attendant ship.

(2) The adjacent equipment to the diving system is to be similarly secured as above **(1)**.

(3) Consideration is to be given to the relative movement between the components of the system.

(4) The fastening arrangements are to be able to meet any required survival conditions of the attendant ship.

8 The diving system and breathing gas cylinders are to be arranged in spaces or locations which are adequately ventilated and provided with suitable electric lighting.

9 When any part of the diving system is sited on deck, particular consideration is to be given to providing reasonable protection from the sea, icing or any damage which may result from other activities on board the attendant ship.

10 Where a diving unit is normally engaged on international voyages as defined in *SOLAS*, it is to, in addition, also carry *SOLAS* safety certificates, either:

(1) for a passenger ship with a *SOLAS* Exemption Certificate; or

(2) for a cargo ship with a *SOLAS* Exemption Certificate, where necessary, as the Administration deems appropriate.

11 The diving bell is to have sufficient stability at all conditions during normal operation and in case of emergency.

12 Consideration for Corrosion

(1) As for the parts of the diving bell and deck decompression chamber where corrosion may occur, appropriate anticorrosion measures are to be taken according to the materials used and the environmental condition.

(2) In such a case that heat insulation is provided on the diving bell and deck decompression chamber and thereby their construction makes a regular visual inspection on the corrosion of the parts difficult, corrosion allowance is to be considered as occasion demands.

13 Materials

(1) The materials used for the main structural members of the diving bell and deck decompression chamber are to be in compliance with the requirements in **Part K of the Rules for the Survey and Construction of Steel Ships**.

(2) Materials for view ports of the diving system are to comply with a standard deemed appropriate by the Society.

14 Welding Materials and Welding Procedure

The welding materials and welding procedure adopted to the main structural members of the diving bell and the deck decompression chamber are to be in accordance with the requirements in **Part M of the Rules for the Survey and Construction of Steel Ships**.

15 Stress Relieving of Pressure Hull

Stress relieving is to be carried out on the pressure hull, where deemed necessary by the Society in consideration of the construction, materials used, structure of welded joints, welding procedure, etc. of pressure hull.

16 Instruments Provided with Diving Bell

(1) At least two sets of depth gauges to indicate the sea water pressure corresponding to the diving depth of the diving bell are to be provided in the diving bell. Their sensors are to be provided separately.

(2) In case of the hyperbaric diving bell, in addition to the instruments required in **-1**, a pressure gauge to indicate the pressure in the diving bell is to be provided.

(3) Provision is to be made within the bell for an independent means of indicating oxygen and carbon dioxide levels.

17 Instrument Provided in Surface Compression Chamber

A pressure gauge to indicate a pressure in the surface compression chamber is to be provided in a easily visible position outside the chamber. Where, however, a pressure gauge specified in **-18(2)** is provided in a vicinity of the surface compression chamber, this pressure gauge may be considered as a substitute of that required in this article.

18 Instruments Provided on Attendant Ship

(1) A pressure gauge to indicate the sea water pressure corresponding to the diving depth of the diving bell is to be provided in a suitable position on the attendant ship.

(2) For the attendant ship equipped with the hyperbaric diving system, in addition to the instruments required in **(1)**, valves, instruments and other fittings necessary to control and indicate the parameters inside the diving bell and the deck decompression chamber specified in **Table 1.1** are to be provided in a place where operation of the bell and the chamber is controlled (hereinafter referred to as "the control station").

Table 1.1

Parameters	Diving bell	Deck decompression chamber
Pressure or depth	●	●
Temperature		●
Humidity		●
O_2 partial pressure	●	●
CO_2 partial pressure	●	●

19 Installation of Drop Weights

(1) The diving bell is to be provided with drop weights as an emergency surfacing arrangement. The drop weights are to be capable of giving the diving bell positive buoyancy by releasing them in case where the diving bell cannot be lifted by means of the handling system on board the attendant ship.

(2) Releasing of drop weights is to be easily made from the inside of the diving bell at the maximum diving depth.

(3) Drop weights are to be capable of being released without any supply of energy from the attendant ship.

20 Auxiliary Hoisting Device for Emergency Surfacing

(1) The attendant ship is to be provided with a device to wind up the rope, the umbilical cables, etc. in place of the handling system in order to surface the diving bell together with them by releasing the drop weights in case of failure of the handling system. Where, however, the diving bell is designed to be capable of surfacing only by releasing the drop weights, this requirement does not apply.

(2) The auxiliary hoisting device is to be designed and manufactured in accordance with the relevant requirements in **Part 1 of the Rules for Lifting Appliances and Anchor Handling Winches**.

21 Electrical Installation

(1) The electrical installation is to be suitable for marine use and to be capable of operating safely under the environmental condition of its location.

(2) The live part of the electrical machinery and equipment is to be properly protected or arranged so that persons will not be injured in case where they accidentally come into contact with it.

22 System of Power Distribution

The system of power distribution for the electrical machinery and equipment provided inside and outside the diving bell and inside the deck decompression chamber is to be an insulated system.

23 Protective Devices

The electrical installation is to be protected against accidental overcurrents including short-circuit. The protective devices are to be capable of putting other sound circuits in continuous use as far as possible by breaking the fault circuit and eliminating damage to the system and hazard of fire.

24 Earthing

The exposed non-current-carrying metallic part of the electrical machinery and equipment and the metallic covering of cable are to be effectively earthed.

25 Independence of Important Circuits

The electric supply to the handling system, environment control device, lighting arrangement, important communication and alarm devices is to be powered by separate circuits respectively.

26 Cables

(1) The cables are to be of flame-retardant or fire-resisting type. Those installed in the diving bell are not to produce any unhealthy gases, as far as practicable, when burnt.

(2) The umbilical cable between the diving bell and the attendant ship is to have sufficient tensile strength by itself, or suitable measures are to be taken to reduce the tensile load on the cable.

(3) The umbilical cable between the diving bell and the attendant ship and other cables installed outside the diving bell are to be capable of withstanding a water pressure, and the cable connectors are to be watertight and their function is not to be lowered even when they are subjected to a water pressure equal to the pressure corresponding to the maximum diving depth of the diving bell.

(4) Cable penetrations on the diving bell are to maintain the watertightness necessary to ensure the safety of the diving bell against a water pressure equal to the pressure corresponding to the maximum diving depth of the diving bell, even when break of the cable outside the diving bell or breakaway or breakdown of the connector may happen.

(5) The cable penetrations on the hyperbaric diving bell and the deck decompression chamber are to have sufficient airtightness against the approved working pressure of the diving bell or the deck decompression chamber respectively.

27 Electrical Installation in Hyperbaric Diving Bell and Deck Decompression Chamber

(1) Cable installed in the hyperbaric diving bell and the deck decompression chamber are to be metallic sheathed cables such as mineral insulated cables. Where other kinds of cables are unavoidably used, information on the inflammability of these cables in the high pressure air or the high pressure mixed gases, including protective measures in consideration of the inflammability of them is to be submitted in advance to the Society for approval.

(2) Switches for circuit and plug-in-type connectors (excluding locking type) used while pressurized are not to be installed in the hyperbaric diving bell and the deck decompression chamber, except for switches which do not produce sparks during switching operation such as semiconductor switch.

(3) The electrical machinery and equipment installed in the hyperbaric diving bell and the deck decompression chamber are to have sufficient strength and to be capable of operating safely and effectively even when subjected to an external pressure equal to the approved working pressure of the diving bell or the deck decompression chamber.

(4) The inside of the deck decompression chamber is, as a rule, to be illuminated from the outside of the chamber through a suitable window. Where, however, lighting lamps are unavoidably provided in the deck decompression chamber, they are to be in accordance with the requirements in **(5)**.

(5) Where lighting lamps are provided in the hyperbaric diving bell, they are to be in accordance with the requirements in the following **(a)** to **(d)**:

(a) They are to be fixed to the hull;

(b) They are to be sufficiently protected by metallic guards;

(c) The temperature of their enclosure are to be kept as low as practicable;

(d) They are to be arranged so as to be controlled only from the control station on board the attendant ship. Where control switches are unavoidably provided in the diving bell, they are to be those such as semiconductor switches which do not produce any sparks during switching operation.

(6) Electrical installations installed in hazardous areas are to comply with the requirements specified in **13.4, Part P of the Rules for the Survey and Construction of Steel Ships**.

1.1.9 Evacuation System (Hyperbaric Survival Craft (HBSC))

An evacuation system is to be provided having sufficient capacity to evacuate all divers under pressure, in the event of the ship having to be abandoned, and to be in accordance with the provisions of this Rule.

Chapter 2 SURVEYS OF THE DIVING UNIT AND SYSTEMS

2.1 General

2.1.1 Kinds of Surveys

1 Diving systems registered or intended to be registered are to subject to the following surveys:

(1) Surveys for registration of the diving systems (hereinafter referred to as "Registration Surveys")

(2) Surveys for maintaining registration of the diving systems (hereinafter referred to as "Registration Maintenance Surveys"), which are:

(a) Special Surveys

(b) Annual Surveys

(c) Occasional Surveys

(d) Unscheduled Surveys

2 A diving unit represents the integration of a diving system onto or into a diving platform. As the diving system and diving platform may be owned/operated by different parties, a two-part certification process is used with Part I (**Form DUSC Part I**) of the Certificate (hereinafter referred to as "DUSC") for the diving unit and Part II (**Form DUSC Part I**) for the diving system.

2.1.2 Survey Intervals*

1 A Registration Survey is to be carried out at the time when application for registration is made.

2 Registration Maintenance Surveys are to be carried out at the times as prescribed in **(1)** to **(4)** below.

(1) Special Surveys are to be carried out at intervals specified in **1.1.3-1(3), Part B of the Rules for the Survey and Construction of Steel Ships**.

(2) Annual Surveys are to be carried out at intervals specified in **1.1.3-1(1), Part B of the Rules for the Survey and Construction of Steel Ships**.

(3) An Occasional Survey: at a time falling on any of **(a)** to **(c)** mentioned below, independently of Special Surveys and Annual Surveys. To implement the survey, in lieu of the traditional ordinary surveys where a surveyor is in attendance, the Society may approve survey methods which it considers to be appropriate.

(a) When main parts of the systems have been damaged, repaired or renewed.

(b) When the systems are modified or altered.

(c) Whenever considered necessary by the Society.

(4) The classed ships may be subject to Unscheduled Surveys when the confirmation of the status of systems by survey is deemed necessary in cases where the Society considers the systems to be subject to **1.4-3 of the Conditions of Service for Classification of Ships and Registration of Installations**.

2.1.3 Special Surveys and Annual Surveys Carried Out in Advance, etc.

1 Surveys carried out in advance

The requirements for Special Surveys and Annual Surveys carried out in advance are to be in accordance with the provisions specified in **1.1.4, Part B of the Rules for the Survey and Construction of Steel Ships**.

2 Postponement of Special Surveys

The requirements for postponement of Special Surveys are to be in accordance with the provisions specified in **1.1.5-1(1)** or **1.1.5-1(2), Part B of the Rules for the Survey and Construction of Steel Ships**.

2.1.4 Preparation for Surveys and Others

1 All such preparations as required for the survey to be carried out as well as those which may be required by the Surveyor as necessary in accordance with the requirements in the Rules are to be made by the applicant of the survey. The preparations are to include provisions of an easy and safe access, necessary facilities and necessary records for the execution of the survey. Inspection, measuring and test equipment, which Surveyors rely on to make decisions affecting classification are to be individually identified and calibrated to a standard deemed appropriate by the Society. However, the Surveyor may accept simple measuring equipment (*e.g.* rulers, measuring tapes, weld gauges, micrometers) without individual identification or confirmation of calibration, provided they are

of standard commercial design, properly maintained and periodically compared with other similar equipment or test pieces. The Surveyor may also accept equipment fitted on board a ship and used in examination of shipboard equipment (*e.g.* pressure, temperature or rpm gauges and meters) based either on calibration records or comparison of readings with multiple instruments.

2 The applicant for the survey is to arrange a supervisor who is well conversant with the survey items intended for the preparation of the survey to provide the necessary assistance to the Surveyor according to his requests during the survey.

3 The survey may be suspended where necessary preparations have not been made, any appropriate attendant mentioned in the previous **-2** is not present, or the Surveyor considers that the safety for execution of the survey is not ensured.

4 Where repairs are deemed necessary as a result of the survey, the Surveyor will notify his recommendations to the applicant of the survey. Upon this notification, the repair is to be made to the satisfaction of the Surveyor.

5 In cases where it is necessary to replace any fittings, equipment or parts, etc. used onboard, replacements are to comply with the regulations to be applied during ship construction. However, in cases where new requirements are specified or where deemed necessary by the Society, the Society may require that such replacements comply with any new requirements in effect at the time the relevant replacement work is carried out. In addition, replacements are not to use any materials which contain asbestos.

2.1.5 Laid-up Ships

1 Laid-up ships are not subject to Registration Maintenance Surveys. However, Occasional Surveys may be carried out at the request of owners.

2 When laid-up ships are about to be re-entering service, the following surveys and surveys for specific matters which have been postponed due to being laid-up, if any, are to be carried out.

(1) If the due dates for Registration Maintenance Surveys have not transpired while the ship was laid-up, then an equivalent to the Annual Surveys specified in **2.3.2** is to be carried out.

(2) If the due dates for Registration Maintenance Surveys have transpired while the ship was laid-up, then these Registration Maintenance Surveys are, in principle, to be carried out. However in cases where Special Surveys and Annual Surveys are due, only the Special Surveys may be carried out.

2.2 Registration Surveys

2.2.1 Registration Surveys*

1 The tests and inspections specified in **2.2.3** to **2.2.9** are be implemented. To implement tests and surveys (excluding those specified in **2.2.9**), in lieu of traditional ordinary surveys where the Surveyor is in attendance, the Society may approve other survey methods which it considers to be appropriate.

2 Where deemed necessary by the Society, tests and inspections other than those specified in this **2.2** may be required.

3 As for the machinery and equipment holding adequate certificates, the Society may exempt the tests and inspections specified in this **2.2** partly or wholly.

4 Those among the tests specified in this **2.2** which are deemed difficult by the Society to be carried out on real subjects may be substituted by tests on suitable models or samples.

5 Surveyors are to confirm that materials which contain asbestos are not being used.

2.2.2 Submission of Plans and Documents

1 For the diving systems intended to be registered, the plans and documents specified in **(1)** to **(26)** are to be submitted for approval.

(1) General arrangement (including arrangement of machinery and equipment)

(2) Details of installation of the diving unit and system

(3) Construction of the pressure hull of the diving bell

(4) Construction and arrangement of view ports, covers and penetrating pieces of the diving bell

(5) Construction of the surface compression chamber

(6) Particulars of pressure vessels, piping systems, electrical installations, etc. (including communication systems)

(7) Construction of breathing gas cylinders and other pressure vessels

(8) Piping diagrams

(9) Construction and arrangement of the emergency surfacing arrangement

(10) Construction and arrangement of the handling system
(11) Diagrams of the wiring system
(12) Details of penetrating parts through the diving bell and the surface compression chamber by pipes, shafts, cables, etc.
(13) Construction of electrical machinery and equipment and cables installed in the surface compression chamber.
(14) Construction of cables and cable connectors subjected to external pressure
(15) Details of welding procedures on the pressure hull and the surface compression chamber
(16) Construction of hoses used as a part of the piping system
(17) Construction of the evacuation system
(18) Specifications and arrangements of the structural fire protection, fire-extinguishing system and fire detection and alarm system of areas in which the diving system is installed
(19) Material specifications and arrangement of the habitation installation of the surface compression chamber
(20) Drawings specifying hazardous areas and a list of electrical machinery and equipment used in hazardous areas
(21) Specification, arrangement and calculation of capability of the water spray system for breathing gas cylinders
(22) Specification of the emergency locating device
(23) Specification of the through-water communication system
(24) Specification and calculation of capacity of the life support system
(25) Schemes for testing required in **2.2.3** to **2.2.12**
(26) Other plans and documents deemed necessary by the Society

2 For the diving systems intended to be registered, the following drawings and data are to be submitted for reference in addition to the drawings and data specified in **-1** above.

(1) Specifications
(2) Calculation of strength of pressure hull of the diving bell
(3) Calculation of strength of view ports, covers, etc. of the diving bell
(4) Calculation of strength of windows, covers, etc. of the surface compression chamber
(5) Calculation of strength of the launch and recovery system (LARS)
(6) Calculation of stability under water and on surface (in case of emergency)
(7) Instruction for the function of emergency surfacing arrangement
(8) Maintenance standard recommended by the manufacturer
(9) Asbestos-free declarations and supporting documents
(10) Other plans and documents deemed necessary by the Society

3 The plans and documents specified in **-1** and **-2** above are to be submitted the Society in accordance with **(1)** to **(3)** below.

(1) Where the submission of plans and documents by paper, 2 sets for the Society and necessary sets for returning to the applicant are to be submitted.
(2) Where the submission of plans and documents electrically, the plans and documents are to be submitted using the systems prepared by the Society.
(3) Where the submission of plans and documents by means other than **(1)** and **(2)** above, the plans and documents are to be submitted by the means deemed appropriate by the Society.

2.2.3 Survey of Diving Bell

1 The pressure hull is to undergo the tests and inspections specified in the following **(1)** to **(4)**:

(1) As for butt-welded parts of pressure hulls, radiographic examinations are to be carried out on the whole length and it is to be confirmed that no injurious defect exists. Where, however, accepted by the Society, part of radiographic examinations may be substituted by any other suitable nondestructive inspections.
(2) Upon completion of pressure hulls, the roundness of them is to be measured all around the circumference and it is to be confirmed that the measured values at the respective points in the pressure hulls completed do not exceed the allowable value specified at the design stage.
(3) View ports, covers (excluding conical sheet hatches) and penetrating pieces (excluding penetrating pieces for cables) fitted to the opening parts of the pressure hull are to be hydrostatically tested under a pressure corresponding to 1.5 times the maximum diving depth of the pressure hull and it is to be confirmed that no leakage nor injurious deformation exists.

(4) As a rule, after all fittings have been fitted to the pressure hull, pressure hull is to be hydrostatically tested under an external pressure corresponding to 1.1 times the maximum diving depth and it is to be confirmed that it has sufficient watertightness and the stresses or strains measured at appropriate points are of proper value.

2 Upon completion of all works, diving bell is to undergo the tests to determine its centre of gravity and centre of buoyancy and its stability is to be confirmed.

3 The hyperbaric diving bell are to undergo the tests and inspections specified in the following **(1)** to **(3)**, in addition to the tests and inspections prescribed in the **-1** and **-2** above:

(1) Pressure hull is to undergo the tests and inspections in accordance with the requirements in **Chapter 10, Part D of the Rules for the Survey and Construction of Steel Ships**.

(2) View ports of the pressure hull are to be hydrostatically tested under a pressure 1.5 times the approved working pressure of the diving bell and it is to be confirmed that no leakage nor injurious deformation exists.

(3) Upon completion of all works, an airtightness test on the hyperbaric diving bell at the approved working pressure is to be carried out.

2.2.4 Survey of Diving Unit

Every diving unit is to be subject to the surveys specified below **(1)** to **(4)**:

(1) An initial survey before any diving unit is put into service or before the DUSC required under this section of the Rules is issued for the first time, which should include a complete and thorough verification of the diving systems integration and arrangement with the diving platform. The integration of a diving organization's occupational health and safety management system, provision of essential services and diving system limitations listed in Part II of the DUSC are to be verified, as well as the suitability of the lifesaving arrangements and the functionality of the whole diving unit.

(2) Where a diving system has already been certified to the provisions of *IMO* Resolution *MSC*.548(107), the status of that certification is to be confirmed to be acceptable to the Society.

(3) Where the DUSC Part II requires an installation survey by the certifying authority of the diving system, this is to be completed prior to issuing the DUSC Part I.

(4) Where an existing diving system is not certified in accordance with the Code of Safety for Diving Systems, 1995 (*IMO* Resolution A.831(19)), a DUSC Part II may be issued with validity no longer than 1 January 2029 clearly stating which provisions under **5.3.2-2** of the Rules cannot be confirmed as alternative arrangements for the consideration of the Society issuing DUSC Part I.

2.2.5 Survey of Diving System

Every diving system forming part of a diving unit is to be subject to the surveys specified below **(1)** to **(4)**:

(1) An initial survey before being put into service as part of a diving unit or before DUSC Part II required under the Rules is issued for the first time, which is to include verification of the diving system, equipment, fittings, arrangements and material and which is to be such as to ensure their full compliance with the applicable provisions of the Rules.

(2) Where an existing diving system has already been certified in accordance with the Code of Safety for Diving Systems, 1995 (*IMO* Resolution A.831(19)), as amended) then this certification may be accepted as the basis of the DUSC Part II.

(3) Where an existing diving system is not certified in accordance with the Code of Safety for Diving Systems, 1995 (*IMO* Resolution A.831(19)), a DUSC Part II may be issued with validity no longer than 1 January 2029 and clearly stating the circumstances under which the Society considers it acceptable to issue the DUSC Part II. The DUSC Part II is to also state which provisions under **5.3.2-2** of the Rules cannot be confirmed as alternative arrangements for the consideration of the Society issuing Part I of the DUSC.

(4) When a temporary diving system is demobilized, the surveys above may be carried out as far as practicable and endorsed on the Certificate as above. However, upon a remobilization all surveys that were not practicable to carry out while demobilized are to be completed and Part II of the Certificate endorsed accordingly.

2.2.6 Survey of Surface Compression Chamber

1 The shell structure of the surface compression chamber and its covers, fittings etc. are to undergo tests and inspections in accordance with the requirements for pressure vessels, Group I in **Chapter 10, Part D of the Rules for the Survey and Construction of Steel Ships**.

2 The windows provided on the surface compression chamber are to undergo hydrostatic tests at a pressure 1.5 times the approved

working pressure of the surface compression chamber and it is to be confirmed that no leakage nor injurious deformation exists.

3 Upon completion of all works, the surface compression chamber is to undergo an airtightness test at the approved working pressure for all conditions including mating conditions with the diving bell and the evacuation system, and service condition of the service lock.

2.2.7 Survey of Evacuation System and Hyperbaric Survival Craft (HBSC)

The survey of the evacuation system and Hyperbaric Survival Craft (HBSC) are to be in accordance with the requirements for the surface compression chamber specified in **2.2.6**.

2.2.8 Survey of Handling System

The handling system is to undergo tests and inspections in accordance with the following **(1)** to **(3)**:

(1) Winches and the derrick systems are to undergo the tests correspondingly in accordance with **Part 1 of the Rules for Lifting Appliances and Anchor Handling Winches**.

(2) Breaking tests are to be carried out for ropes correspondingly in accordance with the requirements in **Part L of the Rules for the Survey and Construction of Steel Ships**.

(3) Proof tests are to be carried out for fittings such as hooks, shackles, blocks, etc. by a load deemed appropriate by the Society.

2.2.9 Survey of Pressure Vessels, Piping Systems, etc.

The pressure vessels, piping systems, etc. are to undergo tests and inspections in accordance with the following **(1)** to **(4)**:

(1) Pressure vessels are to undergo the tests in accordance with the requirements in **Chapter 10, Part D of the Rules for the Survey and Construction of Steel Ships**.

(2) Piping systems as a rule, are to undergo the tests in accordance with the requirements in **Chapter 12, Part D of the Rules for the Survey and Construction of Steel Ships**. In this case, the important piping systems such as piping systems penetrating the diving bell or the surface compression chamber are to undergo tests as piping systems, Group I.

(3) Auxiliary machinery used in the handling system and the breathing gas supply system for pressurizing and decompressing are to undergo the tests in accordance with the requirements in **Chapter 12, Part D of the Rules for the Survey and Construction of Steel Ships**.

(4) Pressure vessels and piping systems installed outside the diving bell (including electrical machinery and equipment installed outside the diving bell), inside the hyperbaric diving bell or inside the deck decompression chamber which are subjected to the pressure corresponding to the diving depth of the diving bell, the internal pressure of the hyperbaric diving bell or the internal pressure of the surface compression chamber as an external pressure, are to be hydrostatically tested at an external pressure corresponding to 1.5 times the maximum diving depth of the diving bell or an external pressure 1.5 times the approved working pressure of the diving bell or the surface compression chamber respectively. However, omission of tests or modification of test pressure may be made in consideration of their construction and operating procedure.

2.2.10 Survey of Electrical Installation

Tests and inspections on the electrical installation are to be carried out in accordance with the following **(1)** to **(6)**:

(1) Insulation resistance tests are to be carried out.

(2) Electrical machinery and equipment used in the handling system and the breathing gas supply system specified in **4.9.2** are to undergo tests in accordance with the requirements in **Part H of the Rules for the Survey and Construction of Steel Ships**.

(3) Penetrating parts of cables through the diving bell specified in **1.1.8-26(4)** are to be hydrostatically tested by a method approved by the Society.

(4) Cables are to undergo tests in accordance with the requirements in **Part H of the Rules for the Survey and Construction of Steel Ships**. However, as for the cables used inside the hyperbaric diving bell and the surface compression chamber, tests in consideration of the environmental condition, and as for the cables between the diving bell and the attendant ship and others installed outside the diving bell, hydrostatic tests at a pressure corresponding to 1.5 times the maximum diving depth of the diving bell are to be carried out in addition respectively.

(5) Cable connectors used in the water are to be hydrostatically tested at a pressure corresponding to 1.5 times the maximum diving depth of the diving bell.

(6) Electrical machinery and equipment provided inside the hyperbaric diving bell and the surface compression chamber are to undergo tests by a method approved by the Society in order to confirm that can be used safely in their environmental condition.

2.2.11 Survey of Other Equipment

Performance tests are to be carried out on the followings:

(1) The instruments specified in **1.1.8-16** to **-18**.

(2) The emergency surfacing arrangement specified in **1.1.8-19**.

(3) The fixed fire-extinguishing system, the automatic fire detection and alarm system and the water spray system specified in **4.8**.

(4) The life support system of breathing gas supply, etc. specified in **5.8**.

(5) The communication and location systems specified in **5.13**.

2.2.12 Tests at the Maximum Diving Depth

Upon completion of all works and after installed on board the attendant ship, the diving system is to undergo a trial test at the maximum diving depth to confirm the performance of the structures of individual parts and the equipment and their condition of operation.

2.3 Registration Maintenance Surveys

2.3.1 Special Surveys

1 At each Special Survey for the diving systems, the following surveys are to be carried out to the satisfaction of the Surveyor:

(1) Inspection of the actual condition of the pressure hull of the diving bell (including its view ports and covers).

(2) Inspection of the actual condition of the shell structure of the surface compression chamber and its windows, covers and doors.

(3) Inspection of the actual condition of the handling system and the breathing gas supply system for pressurizing and decompressing.

(4) Inspection of the actual condition of the electrical installation, the piping systems, etc.

(5) Inspection resistance test of the electrical installations.

(6) Overhaul inspection of the watertight or airtight packings at the penetrating parts of pipes, shafts, cable connectors, etc. through the diving bell or the surface compression chamber.

(7) Upon removal of view ports, covers and penetrating pieces of the diving bell and the piping systems installed outside the diving bell, hydrostatic tests specified in **2.2.3-1(3)**, **-3(1)** and **(2)** (only for the hyperbaric diving bell) and **2.2.9(2)**. Where, however, it is difficult to carry out these tests, the tests may be substituted by any other tests and inspections subject to the approval by the Society.

(8) Upon removal by a cable penetrating parts through the diving bell, hydrostatic tests by a method approved by the Society. Where, however, it is difficult to carry out hydrostatic tests, the tests may be substituted by any other tests and inspections subject to the approval by the Society.

(9) Pressure tests of piping required by the Surveyor, where deemed necessary.

(10) Measurement of the plate thickness of the pressure hull of the diving bell and the shell structure of the surface compression chamber, where deemed necessary.

(11) Performance tests of the followings:

(a) The instruments specified in **1.1.8-16** to **-18**

(b) The emergency surfacing arrangement specified in **1.1.8-19**.

(c) The lighting arrangement

(d) The automatic fire detection and alarm system specified in **4.8**

(e) The electric power receiving system specified in **4.9.2**

(f) The communication system specified in **5.13**

(12) Diving test to the maximum diving depth or external pressure test equivalent thereto.

(13) Performance tests of the fixed fire-extinguishing system and the water spray system specified in **4.8**.

(14) Any other inspections deemed necessary by the Society.

2 Where inspections to certain items have been carried out in previous Annual Survey or subsequent Surveys correspondingly in accordance with the requirement for the Special Survey, the inspections for these items in detail may be dispensed with at the discretion of the Surveyor.

2.3.2 Annual Surveys

At each Annual Survey for the diving systems, inspections specified in 2.3.1-1(1) to **(5)** and **(11)**, overhaul inspections of watertight and airtight packings at the penetrating parts through the diving bell which are deemed necessary by the Society and diving tests to the depth deemed appropriate by the Society are to be carried out to the satisfaction of the Surveyor. Where, however, deemed appropriate by the Surveyor, examining the records of voluntary maintenance and examination record and the underwater operation record, the overhaul inspections of watertight and airtight packings may be partly exempted. And, with regard to the matters which were inspected correspondingly in accordance with the requirements for the Annual Surveys within 6 *months* prior to the Survey, the inspection for these items may be dispensed with at the discretion of the Survey.

2.3.3 Unscheduled Surveys

At Unscheduled Surveys, investigations, examinations or tests are to be made to the satisfaction of the Surveyor with respect to the matters concerned.

2.4 Certificates

2.4.1 The issuance of certificates

1 After survey or inspection, a Certificate is to be issued either by the Administration or the Society after survey or inspection to a diving unit which complies with the provisions of the Rules. In every case the Administration should assume full responsibility for the Certificate.

2 The Certificate is to be drawn up in the official language of the Administration in the form corresponding to the model given in appendix 2 of *IMO* Resolution *MSC*.548(107). lf the language used is neither English, French nor Spanish, the text is to include a translation into one of these languages.

3 Any alternative arrangements granted under 1.1.4 above are to be clearly noted on the Certificate specified in **-2**.

4 A Certificate specified in **-1** above is to be issued for a period specified by the Society, and is not exceed five years from the date of issue.

5 An extension of the validity of the Certificate specified in **-1** above may be granted for a maximum period of five months at the discretion of the Society, subject to an annual survey being carried out.

Chapter 3 DIVING UNIT PRINCIPLES (REDUNDANCY AND INTEGRATION)

3.1 Goal

3.1.1 General (2023 Diving Code 2.1)

The goal of this chapter is to define the overall redundancy and integration provisions for the diving unit when integrating the diving system into the diving platform.

3.2 Functional criteria

3.2.1 General (2023 Diving Code 2.2)

In order to achieve its goal in 3.1 above, this chapter embodies the following provision.

3.3 Redundancy level and risks external to the diving activity (Diving Code 2.3)

3.3.1 Goal (2023 Diving Code 2.3.1)

The goal of this section is to ensure that the diving unit has sufficient redundancy suitable for its intended operation and for all diving system equipment critical to life support, considering all relevant internal and external risk factors.

3.3.2 Functional criteria (2023 Diving Code 2.3.2 and 2.3.3)

1 In order to achieve the goal set out in section 3.3.1 above, the following requirements are to be satisfied.

(1) the technical level of fault tolerance in the diving unit plant and equipment is to be matched to the safety-critical aspects of the intended operation and define any additional levels of redundancy; and

(2) interactions with other objects and non-diving activities both on board and external to the diving unit are not to reduce the designed redundancy level.

2 In order to comply with the functional criteria of section -1 above, the following requirements are to be applied.

(1) When working on subsea objects where the termination of diving operations may lead to additional risks to the environment or other personnel, the redundancy of the diving unit is to be at a level to cover the risks to both the diver and the environment.

(2) When working on subsea objects where the termination of diving operations may be achieved safely without risk at any time, the systematic review required under section 3.4 is to be considered to achieve an acceptable level.

(3) Where another onboard activity also requires access to systems or services supporting the diving activity, these are to be separated as far as possible. Where these cannot be separated, failures within the other activity's equipment are to be included within a systematic review required under section 3.4.

(4) Where communication, signals or other information are critical to safe diving unit operation, but originate externally to the diving unit or from a non-diving activity, the redundancy of these is to be addressed in the systematic review required under section 3.4.

(5) Any findings from the above are to be clearly identified within the systematic review required under section 3.4.

3.4 Redundancy and essential services (2023 Diving Code 2.4)

3.4.1 Goal (2023 Diving Code 2.4.1）

The goal of this section is to ensure that the diving unit can tolerate failures without creating a hazardous situation.

3.4.2 Functional criteria (2023 Diving Code 2.4.2 and 2.4.3)

1 In order to achieve the goal set out in section 3.4.1 above, the diving unit is to be designed and tested to ensure and verify that it is sufficiently safeguarded against failures creating a hazardous situation in terms of:

(1) failure of components and systems;

(2) loss of any services to the diving unit; and

(3) inadvertent and intentional acts, and to ensure that:

(4) the criticality of components and systems is identified;

(5) the designed level of redundancy is maintained throughout the service life; and

(6) mitigations are suitably documented and accessible to the operator.

2 In order to comply with the functional criteria of section **-1** above, the following are to be complied with:

(1) All services supporting the divers directly, including environmental control, are to be considered as essential services as per *SOLAS* Chapter II-1.

(2) The essential services listed in Part II of the DUSC are to be specially considered in relation to the diving platform supply arrangements and all consumer demands.

(3) No single failure of a component, either static or dynamic, nor a single inadvertent act is to lead to life-threatening situations for any person, or to unacceptable damage to facilities or the environment. However, where a failure mode of a system or component cannot be addressed by redundancy, either following **(a)** or **(b)** below is to be conducted.

(a) independent backup arrangements should be provided (e.g. in the case of umbilical separation); or

(b) the system or component is to be designed and built to recognized national or international standards that have appropriate safety factors for manned application in similar service conditions (e.g. PVHO rupture).

(4) Essential services for divers in the water are to have sufficient redundancy to ensure the divers can return to a safe haven within the diving bell or basket.

(5) Essential services for divers located in a diving bell or basket are to have sufficient redundancy to ensure the diver can return to a safe haven within the diving unit.

(6) Essential services for divers in the diving unit are to have sufficient redundancy to ensure that all planned decompressions can be completed at the planned normal rate. The ability to provide hyperbaric medical care is not to be adversely affected.

(7) Emergency services are not to replace the required redundancies. Emergency services are to allow divers within the diving system or in the water to safely evacuate the diving unit.

(8) Emergency power services are to be available to provide services to the surface compression chamber complex in order to complete the normal planned decompression without main power.

(9) A systematic risk review of the diving unit is to be carried out in order to ensure compliance with the designed redundancy level and the suitability of emergency services.

(10) The systematic risk review is to consider followings:

(a) failure of a normally static component;

(b) failure of an active component or system;

(c) loss of any services to the diving unit; and

(d) inadvertent and intentional acts.

(11) The systematic risk review is to be confirmed by a test programme, performed when the diving system is first installed, that clearly describes the expected behaviour of the diving unit and includes all necessary procedures to allow later testing to confirm the ongoing redundancy.

(12) The diving unit systematic risk review is to take into consideration already prepared reviews for the diving platform and diving system.

(13) The systematic risk review and corresponding test programme are to be fully documented and maintained available on board the diving unit. The test programme is to establish intervals for testing acceptable to the Administration to ensure redundancy levels are maintained.

(14) Mitigations:

(a) Probability assessment as a means of mitigation is not acceptable without the availability of suitable industry data applicable for personnel safety levels. Such data is to also be applicable to marine conditions.

(b) Any mitigations that are based on repairs are to be assessed/tested against time assumptions. Ensuring access to spares in an acceptable timescale is to be included in documentation required in **Chapter 6**.

(c) Any failures that allow compliance with **(3)** and **(4)** above, but leave the diving unit below the designed redundancy level is to be identified to ensure such failures will result in termination of appropriate operations.

(d) Mitigations or potential hidden failures that are controlled by inspection and testing are to be addressed by maintenance

routines.

3.5 Enabling evacuation and protection from external events (2023 Diving Code 2.5)

3.5.1 Goal (2023 Diving Code 2.5.1)

The goal of this section is to provide a basis for reviewing the suitability of the diving unit to enable the diving system to withstand accidental events originating elsewhere in the diving platform and also to allow recovery and safe evacuation of divers.

3.5.2 Functional criteria (2023 Diving Code 2.5.2 and 2.5.3)

1 In order to achieve the goal set out in section **3.5.1** above, the diving unit is to comply with the following requirements.

(1) the diving unit design is to be such that a survivable incident elsewhere on the diving unit does not force the divers to evacuate the diving unit by way of the HBSC; and

(2) the diving unit is to provide protection so as to allow the divers sufficient time to be recovered and evacuated taking into account the type of diving operations.

2 In order to comply with the functional criteria of section **-1** above, the following requirements are to be complied with.

(1) A fire or flooding event in any single compartment outside the diving system is not to interrupt essential services.

(2) The diving system is to be physically separated and protected from the rest of the diving unit with suitable structural fire protection to allow a full evacuation of the divers.

(3) The provisions for a diving platform carrying out saturation diving operations, are intended to provide 60 minutes for evacuation. This time is to account for:

(a) recovery of the bell and mating with the chamber complex;

(b) pressurization time required to evacuate divers at differing diving depths; and

(c) moving divers to the HBSC and subsequent launch and clear.

The evacuation procedure, including pressurization, is to be tested and timed to ensure it is within this time limit. Should this not be possible, depth limitations are to be introduced.

(4) For surface orientated diving systems (not those including planned surface decompression) evacuation are to be completed within 15 minutes. This time is to account for:

(a) emergency decompression from the deepest treatment depth;

(b) moving divers and any required medical supplies to the diving platform's life-saving appliances; and

(c) subsequent launch of the life-saving appliance and until it is clear of the diving unit. The evacuation procedure including pressurization is to be tested and timed to ensure it is within this time limit. Should this not be possible, structural fire protection is to be added to protect the diving system.

(5) For surface orientated diving systems with planned surface decompression that are unable to evacuate the diver within 15 minutes, the diving system is to be protected as for saturation diving (see **3.5.2-2(3)** above) and allow decompression and evacuation within 60 minutes. If this cannot be achieved with the planned or emergency decompression schedule, an HBSC is to be provided.

3.6 Integration of the diving system and diving platform to create the diving unit (2023 Diving Code 2.6)

3.6.1 Goal (2023 Diving Code 2.6.1)

The goal of this section is to provide a basis for ensuring that integration of the diving system into the diving platform is managed and documented.

3.6.2 Functional criteria (2023 Diving Code 2.6.2 and 2.6.3)

1 In order to achieve the goal set out in section **3.6.1** above, the boundaries of the diving system and the diving platform are to be defined allowing them to function as a diving unit.

2 In order to comply with the functional criteria of section **-1** above, the following requirements are to be complied with.

(1) A block diagram showing the diving system located on board the diving platform is to be produced.

(2) Any service or supply to or from the diving system are to be marked at the boundary location including specifications of the supply and its status as an essential service. All systems that are affected by the marked supplies are to be tested after integration.

(3) The provisions of this Code, in particular **Chapter 6**, are verified by the diving platform company in compliance with the *ISM* Code part B. **Chapter 6** is to be considered the equivalent of a mandatory code when reviewing the *ISM* Code part A, 1.2.3.1.

(4) Mustering locations and evacuation plans, particularly if diving platform crew will man the HBSC, is to be reviewed.

(5) The performance of life support and environmental controls for the diving system is to be verified after integration.

(6) The integrated diving unit is to be tested as provided for in section **3.4**.

Chapter 4 OPERATIONAL CAPABILITIES AND LIMITATIONS OF DIVING PLATFORMS FOR CONDUCTING SAFE DIVING OPERATIONS

4.1 Goal

4.1.1 General (2023 Diving Code 3.1)

The goal of this chapter is to define the operational capabilities and limitations of a diving platform from which safe diving operations will be conducted.

4.2 Functional Criteria

4.2.1 General (2023 Diving Code 3.2)

In order to achieve its goal in **4.1** above, this chapter embodies the following provision.

4.3 Geographic Location and Environmental Conditions (2023 Diving Code 3.3)

4.3.1 Goal (2023 Diving Code 3.3.1)

The goal of this section is to ensure that the diving unit is capable of conducting safe diving operations, including any necessary hyperbaric evacuation, in the anticipated environmental conditions.

4.3.2 Functional Criteria (2023 Diving Code 3.3.2 and 3.3.3)

1 In order to achieve the goal set out in **4.3.1** above, the diving unit should provide full functionality under the anticipated environmental conditions, taking into account.

(1) Diving platform response
(2) Air temperature range (minimum and maximum)
(3) Solar radiation
(4) Water depth
(5) Water temperature range (minimum and maximum)
(6) Wind and sea state

2 In order to comply with the functional criteria of in **-1** above, the following applies:

(1) The diving unit is to provide full functionality to the intended diving depth in the anticipated environmental conditions.
(2) The diving unit is to have a safe operating envelope defined for the intended operational diving conditions and for standby conditions when divers are not operating in the water. These operational limits are determined from the limiting criteria of the combined diving system and diving platform.

4.4 Structural Integrity and Imposed Loads (2023 Diving Code 3.4)

4.4.1 Goal (2023 Diving Code 3.4.1)

The goal of this section is to define the minimum standards for diving platform structural loads, imposed loads and connections.

4.4.2 Functional Criteria (2023 Diving Code 3.4.2 and 3.4.3)

1 In order to achieve the goal set out in **4.4.1** above, the following functional criteria are embodied. Supporting structures are to comply with the following:

(1) ensure that the surface compression chamber complex is adequately supported and not subjected to imposed loads due to deck loading or deflection;
(2) allow for any expansions or contractions of the surface compression chamber complex due to pressure and temperature changes;
(3) support the surface compression chamber complex in all required service conditions including damage conditions and in the event of a collision; and

(4) for launch and recovery systems (LARS), be designed to withstand imposed loads expected in the worst environmental design conditions at its installed position on the diving platform.

2 In order to comply with the functional criteria of **-1** above, the following are to be applied:

(1) Supporting structures are to be designed, constructed and tested in accordance with international or national standards recognized by the Administration or proprietary specifications acceptable to the Administration.

(2) Loads applied to the surface compression chamber complex are to be based on the same probability level as the global strength for the diving platform.

(3) Collision loads are to be at least one half the weight of the surface compression chamber complex in the forward direction and one quarter the weight in the aft direction.

4.5 Placement and Configuration of Diving System on Diving Platform (2023 Diving Code 3.5)

4.5.1 Goal (2023 Diving Code 3.5.1)*

The goal of this section is to ensure that diving systems are placed and configured on diving platforms so as to ensure the safe operation of the diving unit.

4.5.2 Functional Criteria (2023 Diving Code 3.5.2 and 3.5.3)*

1 In order to achieve the goal set out in **4.5.1** above, the following functional criteria are embodied.

(1) The diving unit is to be configured such that propulsion, anchoring and mooring systems or intakes, do not pose a risk to the diving operation.

(2) When any part of the diving system is sited on deck, particular consideration is to be given to providing reasonable protection from the sea, icing, solar radiation, dropped objects, lifting operations or any damage which may result from other activities on board the diving platform.

(3) The diving system is to be protected from hazardous gases and materials.

(4) Gases required by the diving system are to be stored in a safe manner.

(5) Pressure vessel for human occupancy (PVHO) occupants are to be protected from noise and vibration produced by diving platform systems.

(6) Personnel on the diving platform is to be protected from noise and vibration created by the diving operation.

(7) The HBSC is to be protected from impacts and green seas.

(8) Gases vented from the diving system is to be vented to a safe position where they cannot accumulate.

2 In order to comply with the functional criteria of **-1** above, the following are to be applied:

(1) The diving systems and breathing gas storage facilities are not to be sited in machinery spaces if the machinery is not associated with the diving system. Gases required by the diving system is to be stored and distributed in a safe manner.

(2) Siting of diving systems in hazardous areas are to be avoided as far as reasonably practicable. Where, due to the requirements of diving operations, systems are sited in hazardous areas, the electrical equipment is to comply with the requirements for such equipment in in the particular class of hazardous areas. Diving systems are not to be permitted in hazardous areas designated as Zone 0.

(3) HBSC are to be stored inboard of the diving platform's sides. When an HBSC is on the main deck or near the waterline then risk of impacts and green seas are to be considered.

(4) Diving systems on open decks are not to be located in the vicinity of ventilation openings from machinery spaces, exhausts or ventilation outlets from galley.

(5) If any dangerous goods as defined by the International Maritime Dangerous Goods (IMDG) Code, as amended, are to be carried on deck, there are to be a specific assessment of risks to the diving system and the necessary measures are to be put in place to mitigate these risks.

(6) Gases vented from the diving system are to be vented to the open air away from sources of ignition, personnel or any area where the presence of those gases could be hazardous.

(7) Means are to be provided to prevent any hazardous accumulation of gases. The discharge from overpressure-relief devices and exhausts should be directed to a location where any risk is minimized.

(8) The diving system and breathing gas storage and distribution facilities are to be arranged in compartments or locations which

are adequately ventilated.

(9) Piping and gas distribution systems carrying mixed gas with oxygen content greater than 22 % or oxygen under high pressure are not to be inside living compartments, engine rooms or similar compartments. Piping systems are to comply with applicable international or national regulations, be separated from electrical cables and protected from damage.

(10) Where gas mixtures with oxygen content less than 20 % or higher than 22 % are stored in enclosed compartments, there are to be means of analysing the atmosphere inside the compartment with an audiovisual high/low level alarm mounted at the entrance to such compartments. The alarm is to be repeated at a manned control station for the diving platform.

(11) Diving systems are to be sited such that during diving operations the noise and vibration exposure of personnel on the diving platform, PVHO occupants and operators, is within occupational exposure limits acceptable to the Society.

4.6 Subdivision and Stability (2023 Diving Code 3.6)

4.6.1 Goal (2023 Diving Code 3.6.1)*

The goal of this section is to ensure that the diving platform, with the diving system, project plant and equipment on board.

(1) The diving platform is not to be liable to heel excessively or capsize in the anticipated environmental conditions.

(2) The diving platform is to provide all personnel (including divers) with sufficient time to carry out an orderly evacuation should this become necessary.

4.6.2 Functional Criteria (2023 Diving Code 3.6.2 and 3.6.3)

1 In order to achieve the goal set out in **4.6.1** above, the following functional criteria are embodied.

(1) The diving platform is to provide a stable platform for the continued operation of the surface compression chamber or surface compression chamber complex and be able to recover any item deployed by a LARS after sustaining damage that may be expected in the operational area.

(2) The diving platform is to provide increased protection to allow divers to be recovered from their operational location and allow sufficient time to carry out a safe evacuation.

2 In order to comply with the functional criteria of **-1** above, the following (or alternative codes providing the same performance for diving units other than ships) are to be complied with.

(1) The diving unit is to be able to recover any diving basket, wet bell, or diving bell deployed by a LARS after sustaining side damage within the extents given in the Guidelines for the design and construction of offshore supply vessels, 2006 (*IMO* Resolution *MSC*.235(82), as amended). The final list and trim in these conditions are to be within the design limits of list and trim for the LARS system; ballasting post damage may be used as a means to achieve this.

(2) The diving unit is to comply with the damage stability requirements given in the Code of Safety for Special Purpose Ships, 2008, as amended at the appropriate R value.

(3) Essential diving equipment, including that on or above main deck is to remain accessible and operable in any stage of flooding for compliance with **(1)** and **(2)** above. Equipment below the main deck for Special Purpose Ships will be considered protected if watertight bulkheads are provided fore and aft and side divisions are provided equivalent to that required under the Guidelines for the design and construction of offshore supply vessels, 2006 (*IMO* Resolution *MSC*.235(82), as amended).

(4) Diving units only conducting surface orientated diving is to comply with the requirements for cargo ships, as a minimum.

4.7 Position Keeping (2023 Diving Code 3.7)

4.7.1 Goal (2023 Diving Code 3.7.1)

The goal of this section is to ensure that the diving unit maintains position when conducting diving operations.

4.7.2 Functional Criteria (2023 Diving Code 3.7.2 and 3.7.3)*

1 In order to achieve the goal set out in **4.7.1** above, the following functional criteria applies.

Where divers enter the water directly from the diving platform, a position keeping system is required that does not expose any divers working subsea to an unsafe situation in the event of a single failure.

2 In order to comply with the functional criteria of **-1** above, the following are to be complied with.

(1) Where a dynamic positioning system is used, this is to be at least of equipment class 2, for vessels and in accordance with the

Guidelines for vessels with dynamic positioning systems (*MSC/Circ.*645) or the Guidelines for vessels with dynamic positioning (DP) systems (*MSC.*1/*Circ.*1580), as appropriate.

(2) Where mooring systems with anchors are used, these are to comply with the MODU Code, Chapter 4.12, with reference to the Guidelines on anchoring systems for MODUs (*MSC/Circ.*737).

4.8 Fire Safety (2023 Diving Code 3.8)

4.8.1 Goal (2023 Diving Code 3.8.1)

The goal of this section is to define the minimum fire safety standards needed for the diving unit to conduct safe operations.

4.8.2 Functional Criteria (2023 Diving Code 3.8.2 and 3.8.3)

1 In order to achieve the goal set out in **4.8.1** above, the following functional criteria are embodied.

(1) Protection of pressure vessels in the diving system from excessive heat.

(2) Protection of essential equipment supplying the diving system from fires originating in the rest of the diving platform.

(3) Suitable fire detection and extinguishing within the diving system, which affords sufficient protection for control station operators and divers to carry out a safe evacuation.

2 In order to comply with the functional criteria of **-1** above, the following are to be applied.

(1) Non-metallic materials used in connection with the diving system are to be, as far as is reasonably practicable, of fire-retardant type and non-hazardous in accordance with the *FTP* Code, part 2 and 5 (**3.2.23, Part R of the Rules for the Survey and Construction of Steel Ships**).

(2) Compartments in the interior of the diving platform, in which the diving system or its auxiliary equipment is carried, are to be provided with class *A*-60 standard structural fire protection as specified in **3.2.2, Part R of the Rules for the Survey and Construction of Steel Ships**, arranged to protect against an external fire.

(3) When diving systems are installed on open decks or similar structures that are directly adjacent to category *A* machinery spaces, the systems are to be separated from the machinery spaces by class *A*-60 bulkheads or decks as specified in **3.2.2, Part R of the Rules for the Survey and Construction of Steel Ships**.

(4) Piping and cables essential for the operation of the diving system are regarded as part of the system. Where these transit from other compartments such as main switch board room or engine room into an outer area, they are to be laid in separate structural ducts insulated to class *A*-60 as specified in **3.2.2, Part R of the Rules for the Survey and Construction of Steel Ships**.

(5) Enclosed spaces containing essential diving equipment, such as surface compression chambers, diving bells, gas storage, compressors and control stands, are to be covered with an automatic fire detection and alarm system and a fixed fire-extinguishing system.

(6) When diving system pressure vessels are situated in enclosed compartments, to provide appropriate cooling a manually actuated water spray system, having an application rate of 10 l/m^2 per minute of the horizontal projected area, are to be provided to cool and protect such pressure vessels in the event of external fire. When pressure vessels are situated on open decks, fire hoses may be considered as providing the necessary protection.

(7) Surface orientated diving systems that do not include planned surface decompression do not need to comply with **(2)** and **(5)** above.

4.9 Electrical Power (2023 Diving Code 3.9)

4.9.1 Goal (2023 Diving Code 3.9.1)

The goal of this section is to define the minimum electrical power standards needed for the diving unit to conduct safe operations.

4.9.2 Functional Criteria (2023 Diving Code 3.9.2 and 3.9.3)

1 In order to achieve the goal set out in **4.9.1** above, the following functional criterion is to be complied with.

The diving unit is to be provided with an electrical power supply capable of supporting all essential services in the diving system for all planned operations, including evacuation, and in the event of any single failure in the electrical power supply system that would lead to a hazardous situation.

2 In order to comply with the functional criteria of **-1** above, the following are to be complied with.

(1) All electrical equipment and installation, including electrical power supply arrangements, are to be designed for the environment in which they will operate to minimize the risk of fire, explosion, electrical shock, emission of toxic gases to personnel and galvanic action of any pressure vessel or PVHO.

(2) In the event of failure of the main source of electrical power to the diving system an independent source of electrical power is to be available for the safe termination of the diving operation. It is admissible to use the diving platform's emergency source of electrical power as an emergency source of electrical power if it has sufficient electrical power capacity to supply the diving system and the emergency load for the diving platform at the same time.

(3) Any alternative source of electrical power is to be located outside the machinery casings to ensure its functioning in the event of fire or other casualty causing failure to the main electrical installation.

(4) Adequate means of normal and emergency lighting are to be provided to allow full operation of the diving system during planned operations, decompression and emergency situations.

(5) Two electric lamps supplied from separate circuits are to be provided in the diving bell. However, one of the lamps may be substituted by an accumulator lamp.

(6) Where electrical power necessary for the diving system is supplied from the inboard source in the attendant ship, it is to be supplied through an electric power receiving system exclusively used for the diving system, except for the electrical power supply for the handling system.

(7) The electric power receiving system specified in **(6)** is to be powered by separate circuits from the main switchboard of the attendant ship. Where, however, deemed appropriate by the Society in consideration of the kind of load of the electric power receiving system, the system may be powered from a suitable distribution board.

(8) The electric power receiving system is to be provided with the following instruments and equipment.

(a) Circuit breaker of fuse and disconnecting switch.

(b) Pilot lamp for power source, voltmeter and ammeter. Where, however, the load powered from the electric power receiving system is small, the ammeter may be dispensed with.

(c) Earth fault detecting alarm or protective device for earth fault on the load side.

4.10 Other Services（2023 Diving Code 3.10）

4.10.1 Goal（2023 Diving Code 3.10.1）

The goal of this section is to define the minimum standards of the essential and other services needed for the diving unit to conduct safe operations.

4.10.2 Functional criteria（2023 Diving Code 3.10.2 and 3.10.3）

1 In order to achieve the goal set out in **4.10.1** above, the following functional criteria are to be complied with.

(1) The diving unit is to be able to support all essential services required by the diving system, including in the event of a failure that may result in a hazardous situation.

(2) All services are to be configured to allow safe transfer to or from the diving system.

2 In order to comply with the functional criteria of **-1** above, the following are to be complied with.

(1) Essential services to the diving system are to also have separate independent back-ups.

(2) Services are to be configured so as to prevent hazardous transfer of material or power to or from the diving system.

(3) All essential services required by the diving system are to be in accordance with the diving system requirements.

Chapter 5 DIVING SYSTEM DESIGN, CONSTRUCTION, INSTALLATION, TESTING AND SURVEY

5.1 Goal

5.1.1 General (2023 Diving Code 4.1)

The goal of this chapter is to provide a minimum international standard for the design, construction, installation, testing and survey of diving systems on diving platforms engaged in diving operations.

5.2 Functional Criteria

5.2.1 General (2023 Diving Code 4.2)

In order to achieve its goal in 5.1.1 above, this chapter embodies the following provision.

5.3 Diving System Design (2023 Diving Code 4.3)

5.3.1 Goal (2023 Diving Code 4.3.1)*

The goal of this section is to define the design and environmental requirements needed for a diving system to conduct safe diving operations.

5.3.2 Functional Criteria (2023 Diving Code 4.3.2 and 4.3.3)

1 In order to achieve the goal set out in 5.3.1 above, the following **(1)** to **(4)** functional criteria are to be complied with.

(1) Diving system design is to minimize the potential and effect of human error.

(2) The diving system is to be appropriate for the environmental conditions under which it will be used including material selection, manufacture and installation in accordance with the Administration.

(3) There is to be a systematic engineering assessment of the diving system to confirm that the equipment is adequate, fit for purpose and safe to use.

(4) Safety, control and operational requirements are to be included in design considerations.

2 In order to comply with the functional criteria of -1 above, the following **(1)** to **(7)** are to be complied with.

(1) As far as reasonable and practicable, a diving system is to be designed to minimize the potential and effect of human error in the operation of the system, and constructed so that the failure of any single component (determined, if necessary, by an appropriate risk assessment) will not lead to a hazardous situation.

(2) Diving systems and their components are to be designed for the conditions under which they are certificated to operate.

(3) Material for diving system components is to be suitable for their intended use.

(4) All components in a diving system are to be designed, constructed, installed and tested in accordance with international or national standards recognized by the Administration or proprietary specifications acceptable to the Administration.

(5) In the design of pressure vessels, including accessories such as doors, hinges, closing mechanisms and penetrators, the effects of rough handling and accidents are to be considered in addition to design parameters such as pressure, temperature, vibration and operating and environmental conditions.

(6) All components in a diving system are to be so designed, constructed and arranged as to permit easy cleaning, disinfection, inspection and maintenance.

(7) A diving system is to include equipment and controls necessary for the safe performance of diving operations.

5.4 Pressure Vessels for Human Occupancy(PVHO) (2023 Diving Code 4.4)

5.4.1 Goal (2023 Diving Code 4.4.1)*

The goal of this section is to ensure a safe environment for personnel operating within and around a PVHO forming part of a

diving system.

5.4.2 Functional Criteria (2023 Diving Code 4.4.2)

In order to achieve the goal set out in 5.4.1 this chapter embodies the following provisions.

5.4.3 Surface Compression Chambers (2023 Diving Code 4.4.3)*

1 The goal of this sub-section is to ensure that a PVHO used as a surface compression chamber is fit for purpose and safe to use.

2 In order to achieve the goal set out in -1 above, the following **(1)** to **(3)** functional criteria are embodied.

(1) A surface compression chamber is to provide a safe and suitable environment and facilities for the persons who use it, having regard to sizing, ergonomic design and the type and duration of the diving operation.

(2) A surface compression chamber is to allow transfer in and out of material and personnel and where required allow separation of divers during operations

(3) A surface compression chamber is to connect to the diving bell and HBSC if used for closed-bell diving to allow the transfer of personnel.

3 In order to comply with the functional criteria of -2 above, the following **(1)** to **(9)** are to be complied with.

(1) A diving system is to, as a minimum, include either one surface compression chamber with two separate compartments, or two interconnected separate chambers so designed as to permit ingress or egress of personnel while one compartment or chamber remains pressurized. Compartments are to have a specified maximum number of occupants. This capacity will define the required outfitting of the compartment or chamber including the number of bunks, built in breathing systems (BIBS) and the ergonomic design.

(2) Where a surface compression chamber is to be used in circumstances which a person is intended to remain under pressure for a continuous period of more than 12 hours, it is to be so arranged as to allow most divers to stand upright and to stretch out comfortably on their bunks. The smaller of the two compartments is to be large enough for at least two persons. One of these compartments is to be a living compartment.

(3) Where the chamber is intended to be occupied for more than 8 hours, fixed toilet facilities are to be provided. Toilet facilities capable of discharging the waste to the outside are to be fitted with suitable interlocks.

(4) All doors are to be designed to prevent accidental opening and if any locking mechanisms is provided, it is to be able to be operated from both sides.

(5) A surface compression chamber is to be arranged to allow the occupants to be observed. Viewports are to be protected and situated so that the risk of damage is minimized.

(6) Living compartments intended to be used for decompression, including any emergency decompression, are to have a service lock through which provisions, medicine and equipment may be passed into the chamber while its occupants remain under pressure. The dimensions of the service lock are to be adequate to enable essential supplies to be transferred into the surface compression chamber.

(7) Service locks are to be designed to prevent opening under pressure or being pressurized when not fully secure and, where necessary, interlocks are to be provided for this purpose.

(8) The diving system is to be capable of allowing the safe transfer of a person under pressure from the diving bell or HBSC to a surface compression chamber (and vice versa).

(9) Saturation systems are to have facilities available to use one of the compartments to provide emergency medical treatment to an injured diver while under pressure.

5.4.4 Diving Bell (2023 Diving Code 4.4.4)

1 The goal of this sub-section is to ensure that a PVHO used as a diving bell is fit for purpose and safe to use.

2 In order to achieve the goal set out in -1 above, the following **(1)** to **(3)** functional criteria are embodied.

(1) The diving bell is to provide a manned subsea working space, ergonomically sized to allow safe transfer of material and personnel.

(2) The diving bell is to provide protection from damage during handling operations (e.g., deployment and recovery processes).

(3) The diving bell is to provide emergency provisions for survival and recovery if separated from the diving system.

3 In order to comply with the functional criteria of -2 above, the following **(1)** to **(11)** are to be complied with.

(1) The diving bell is to provide a suitable environment and facilities for the persons who use it, having regard to the type and duration of the diving operation.

(2) Diving bells are to be so designed as to provide adequate space for the number of occupants envisaged, together with any equipment carried.

(3) The diving bell is to be provided with adequate protection against mechanical damage during handling operation, be equipped with one extra lifting point designed to recover the bell including ballast and equipment as well as the weight of the divers staying in the bell.

(4) Interlocks are to be provided to prevent the inadvertent release of the diving bell from the surface compression chamber while the access trunking is pressurized. The mating flange and clamp are to be protected from damage at all times including during the launch and recovery stages.

(5) All doors are to be designed to prevent accidental opening during normal operations. All doors are to be so designed that locking mechanisms, if provided, can be operated from both sides.

(6) The diving bell is to be equipped with means whereby each diver using the bell is able to enter and leave it safely as well as with means for taking a helpless diver up into a dry bell. The seating and other arrangements provided are to be designed for the maximum number of occupants and provide protection to the divers.

(7) The diving bell is to have a service lock through which provisions, medicine and equipment may be passed into the diving bell while its occupants remain under pressure. Service locks are to be designed to prevent accidental opening under pressure and, where necessary, interlocks are to be provided for this purpose. The dimensions of the service lock are to be adequate to enable essential supplies to be transferred into the diving bell.

(8) The diving bell is to be provided to allow the occupants to be observed and as far as practicable allow an occupant to observe divers outside the bell. Viewports are to be protected and situated so that the risk of damage is minimized.

(9) For diving systems with only one diving bell a suitable arrangement is to be in place to reconnect a lost bell to the diving system and allow the divers to return safely to the surface compression chamber.

(10) The diving bell is to be fitted with a manifold at a suitable point close to the main lifting attachment. The manifold is to incorporate a universal set of fittings and couplers for the following **(a)** and **(b)** services conforming.

(a) 3/4 *inch* NPT（female）- for hot water

(b) 1/2 *inch* NPT（female）- for breathing mixture

(11) The manifold specified in **(10)** above is also incorporate connectors for the following **(a)** to **(d)**, be clearly marked and suitably protected.

(a) Internal pressure

(b) Sampling of internal gas

(c) Communication

(d) Electrical power

5.4.5 Hyperbaric Survival Craft(HBSC) PVHO (2023 Diving Code 4.4.5)*

1 The goal of this sub-section is to ensure that the PVHO forming part of an HBSC is fit for purpose and safe to use.

2 In order to achieve the goal set out in **-1** above, the following **(1)** to **(3)** functional criteria are embodied.

(1) The HBSC is to provide a manned evacuation living compartment, ergonomically sized to allow transfer of material and divers.

(2) The HBSC is to provide protection from damage during handling operations (e.g., deployment and recovery processes).

(3) The HBSC is to provide emergency provisions for survival and recovery when separated from the diving system.

3 In order to comply with the functional criteria of **-2** above, the following **(1)** to **(13)** are to be complied with.

(1) The PVHO is to provide a suitable environment and facilities for the persons who use it, having regard to the type and duration of the evacuation.

(2) Where the PVHO is intended to be occupied for more than 8 hours, toilet facilities are to be provided. Toilet facilities capable of discharging the waste to the outside are to be fitted with suitable interlocks.

(3) The means provided for access into the PVHO are to be such as to allow safe access to or from the surface compression chambers. Interlocks are to be provided to prevent the inadvertent release of the HBSC from the surface compression chamber while the access trunking is pressurized. The mating flange is to be adequately protected from damage at all times including during the launch and recovery stages.

(4) All doors are to be designed to prevent accidental opening during normal operations and if any locking mechanism is provided, it is to be able to be operated from both sides.

(5) Arrangements are to be provided to enable a helpless diver to be taken into the HBSC PVHO.

(6) The seating or other arrangements provided are to be designed for the maximum number of occupants and provide an adequate degree of protection to the divers from impact collisions during launch and while the HBSC is deployed.

(7) The PVHO is to have a service lock through which provisions, medicine and equipment may be passed into the PVHO while its occupants remain under pressure. Locks are to be designed to prevent accidental opening under pressure and, where necessary, interlocks are to be provided for this purpose. The dimensions of the service lock are to be adequate to enable essential supplies to be transferred into the PVHO.

(8) The HBSC is to be provided to allow the occupants to be observed and as far as practicable allow an occupant to observe divers outside the bell. Viewports are to be protected and situated so that the risk of damage is minimized.

(9) Where it is intended to carry out decompression of the divers after hyperbaric evacuation in another surface compression chamber, then consideration is to be given to the suitability of the mating arrangements on that surface compression chamber. Where necessary, a suitable adapter and clamping arrangements are to be provided on the HBSC conforming to **Fig. 5.1** and on the other surface compression chamber (e.g., a hyperbaric reception facility) conforming to **Fig. 5.2**.

(10) The HBSC is to be fitted with a manifold at a suitable point. The manifold is to incorporate international standard connections for the following services **(a)** to **(l)**.

(a) Internal pressure (Diving depth monitoring)
(b) Communication
(c) Electric power supply
(d) Analysis of HBSC PVHO internal environment
(e) Oxygen addition
(f) Built In Breathing System (BIBS) supply
(g) Blow-down (Pressurisation)
(h) Exhaust
(i) Hot water supply
(j) Hot water return
(k) Chilled water supply
(l) Chilled water return

(11) PVHO locks and openings that are, or may be, submerged are to be designed to be mechanically restrained to prevent loss of seal and water ingress at lower hyperbaric pressures during deployment and in any sea state. This design is to include the effects of the hydrodynamic impacts of free-fall HBSC launch requirements.

(12) All open flange faces, that may be exposed both when in air and water, are to be suitably protected or provided with easily replaceable sealing faces.

(13) When the HBSC is waterborne, it is to be possible to access and egress the HBSC from atmospheric pressure.

Fig. 5.1 Arrangement of adapter and clamping with HBSC

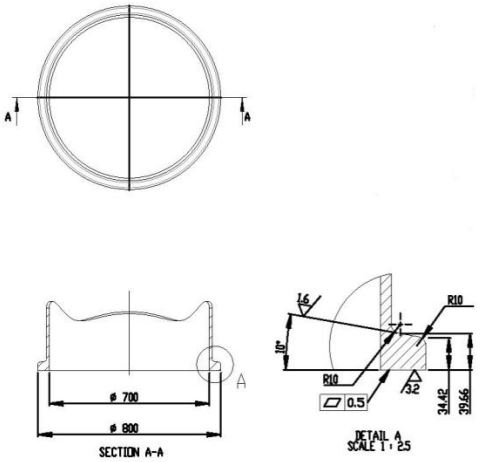
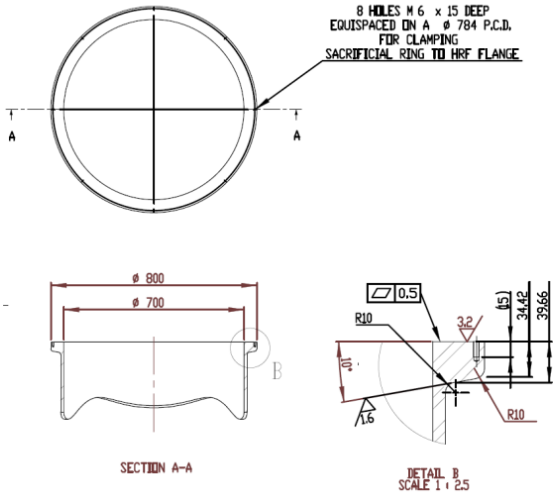


Fig. 5.2 Arrangement of adapter and clamping with the surface compression chamber



5.5 Other Pressure Vessels Not Intended for Human Occupancy (2023 Diving Code 4.5)

5.5.1 Goal (2023 Diving Code 4.5.1)

The goal of this section is to ensure that pressure vessels not intended for human occupancy are fit for purpose and safe to use.

5.5.2 Functional Criteria (2023 Diving Code 4.5.2 and 4.5.3)

1 In order to achieve the goal set out in 5.5.1 above, the following functional criteria are embodied.

Ensure safe standards are used that are applicable to the environment and intended duty.

2 In order to comply with the functional criteria of -1 above, the following **(1)** to **(3)** are to be complied with.

(1) Special attention is to be paid to the design and choice of material for the construction of pressure vessels containing a volume percentage higher than 22 % oxygen.

(2) Oxygen and gases with an oxygen volume percentage higher than 22 % are to be stored in cylinders or pressure vessels exclusively intended for such gases.

(3) All pressure vessels not intended for use as a PVHO are to be suitable for the intended duty and conform to a national or international standard acceptable to the Administration for the design, construction and testing of such pressure vessels.

5.6 Wet Bells and Dive Baskets Used for the Deployment and Recovery of Surface Orientated Divers (2023 Diving Code 4.6)

5.6.1 Goal (2023 Diving Code 4.6.1)

The goal of this section is to ensure that wet bells and dive baskets are fit for purpose and safe to use.

5.6.2 Functional Criteria (2023 Diving Code 4.6.2 and 4.6.3)

1 In order to achieve the goal set out in 5.6.1 above, the following **(1)** and **(2)** functional criteria are embodied.

(1) The wet bell or dive basket is required to provide protection for the divers during deployment and recovery operations and to enable the recovery of a helpless diver in a controlled and safe manner.

(2) The wet bell or dive basket is required to provide a safe haven during subsea work, including onboard gas and for wet bell communication and lighting at the underwater dive site.

2 In order to comply with the functional criteria of -1 above, the following **(1)** to **(4)** are to be complied with.

(1) All diving platforms are to provide for safe deployment and recovery of the divers, including during a diving emergency. During any deployment, fully dressed divers are not to have to climb a ladder more than 2 *m*, or stairs that are to be fitted with a handrail more than 4 *m*, down to or up from the water surface.

(2) Wet bells and dive baskets, with the exception of those specifically for a rescue diver, are to be fitted out to carry a minimum of two divers. The structure is to prevent the divers from falling out during operations and enable the recovery of a helpless diver while maintaining the safety of the rescue diver.

(3) For wet bell gas services, the onboard control point is to ensure a primary and secondary supply to both a working diver and an in-water standby diver. A diver's bail-out is an emergency supply and not considered to be a secondary supply.

(4) A minimum of 30 minutes of onboard emergency gas at the maximum planned depth is to be provided. This includes a breathing system for each diver independent of their main and bail-out diving equipment.

5.7 Pipes, Valves, Fittings and Hoses (2023 Diving Code 4.7)

5.7.1 Goal (2023 Diving Code 4.7.1)

The goal of this section is to ensure that pipes, valves, fittings and hoses are fit for purpose and safe to use.

5.7.2 Functional Criteria (2023 Diving Code 4.7.2 and 4.7.3)*

1 In order to achieve the goal set out in 5.7.1 above, the following **(1)** and **(2)** functional criteria are embodied.

(1) The configuration of manned diving compartments and control rooms are to take into account, noise, vibration, isolation devices, over-pressure alarms, oxygen compatibility and the selection of appropriate material for the gases in use.

(2) Piping systems are to be protected from damage or inadvertent use.

2 In order to comply with the functional criteria of -1 above, the following **(1)** to **(17)** are to be complied with.

(1) Pipe systems are to be so designed as to minimize noise and vibration inside the PVHO during normal operation.

(2) The PVHO is to be equipped with such valves, gauges and other fittings as are necessary to control and indicate the internal pressure and safe environment of each compartment from a centralized control position.

(3) Valves, gauges and other fittings are to be provided outside a submerged PVHO as necessary to control and indicate the pressure and safe environment within the PVHO. The external pressure on the submerged PVHO is also to be indicated inside the PVHO.

(4) All pipe penetrations on a PVHO are to be fitted with two shutoff devices as close to the penetration as practicable. Where appropriate, one device is to be a non-return valve. Large diameter piping is to be fitted with a flow fuse isolator for exhaust valves.

(5) All PVHO which may be pressurized separately are to be fitted with over-pressure alarms or pressure-relief valves. If pressure-relief valves are fitted, a quick-operating manual shutoff valve is to be installed between the chamber and the pressure-relief valve and is to be held opened with a frangible wire or equivalent. This valve is to be readily accessible to the attendant monitoring the operation of the PVHO. All other pressure vessels and cylinders are to be fitted with a pressure-relief device.

(6) Piping systems which may be subjected to a higher pressure than designed for are to be fitted with a pressure-relief device. PVHO pressure-relief devices and associated pipework are to be tested for maximum gas volume flow.

(7) Non-metallic materials used in oxygen systems are to be compatible with oxygen at the working pressure and flow rate.

(8) The use of high-pressure oxygen piping is to be minimized by the fitting of pressure-reducing devices, as close as practicable to the storage cylinders or pressure vessels.

(9) Flexible hoses, except for umbilicals, are to be reduced to a minimum.

(10) Hoses for gases containing greater than 22 % oxygen are to, as far as practicable, be of fire-retardant construction.

(11) Exhaust lines are to be fitted with an anti-suction device on the inlet side.

(12) The function of all valves is to be clearly marked, and all high-pressure piping is to be well protected against mechanical damage.

(13) Piping systems containing gases with more than 22 % oxygen are to be treated as systems containing pure oxygen.

(14) Systems for gases containing greater than 22 % oxygen with pressure greater than 1.72 *bar* are to have slow-opening shutoff valves except pressure-boundary shutoff valves.

(15) Pressure gauge full scale, divisions and accuracy are to be suitable for the application. Gauges are to be positioned so that they can be easily read.

(16) Piping systems where cross-over valves are used are to be designed to prevent incorrect pressure readings.

(17) Regulators and valves are to be selected so as to provide the appropriate sensitivity and control for the required function.

5.8 Breathing Gas Supply, Storage and Temperature Control (2023 Diving Code 4.8)

5.8.1 Goal (2023 Diving Code 4.8.1)

The goal of this section is to define the minimum standards for breathing gases used during diving operations.

5.8.2 Functional Criteria (2023 Diving Code 4.8.2 and 4.8.3)*

1 In order to achieve the goal set out in 5.8.1 above, the following **(1)** to **(3)** functional criteria are embodied.

(1) The diving unit is to provide breathing gas, at the required quantity (including primary, secondary, emergency and operational contingency supplies), quality and composition for the required depth of operation.

(2) The diving unit is to provide equipment for storing and supplying appropriate breathing gases.

(3) The diving unit is to provide temperature control systems to maintain thermal balance for divers and PVHO occupants.

2 In order to comply with the functional criteria of -1 above, the following **(1)** to **(10)** are to be complied with.

(1) Each PVHO is to be fitted with adequate equipment for supplying and maintaining the appropriate breathing mixtures to its occupants including adequate ventilation to prevent temperature differences and gas stratification, at all depths down to maximum operating depth.

(2) Equipment and surface coatings designated for use within the PVHO are not to off-gas volatiles such as to create an unacceptable exposure level.

(3) When adding pure oxygen to the PVHO, a separate piping system is to be provided. Internal oxygen inlets are to be positioned so as to ensure appropriate mixing of oxygen within the PVHO.

(4) All breathing gases, including reclaimed and processed gases, are to conform to recognized national and international standards.

(5) Breathing air intakes to be at safe distance/location from exhausts, or other sources of contamination.

(6) In addition to the system in **(1)** above each PVHO is to contain a separately controlled built-in breathing system for oxygen, therapeutic gas or gas with at least one mask per occupant stored inside each separately pressurized compartment and means are to be provided to prevent any hazardous accumulation of gases. A spare mask and its inlet and outlet connection points are also to be provided per compartment.

(7) PVHO is to include adequate plant and equipment to maintain the divers in safe thermal balance during normal operations.

(8) In an emergency the diving bell and HBSC are to be designed for survivability of at least 24 hours for the Diving Bell and 72 hours for the HBSC at its maximum operating depth. In order to meet this provision, equipment specified in **(a)** and **(b)** below is to be provided.

(a) A self-contained breathing gas system capable of maintaining a satisfactory concentration of breathing gas including oxygen for the occupants.

(b) Equipment and controls for temperature control and thermal balance for occupants.

(9) For piping systems and gas storage cylinders/pressure vessels, the colour code in Table 5.1 is to be used.

(10) Each cylinder/pressure vessel is to be marked with the name and symbol given in Table 5.1 of the gases it contains. The marking and colour coding of the gas storage cylinders are to be visible from the valve end.

Table 5.1 Colour code for gas storage and piping systems

Name	Symbol	Colour code
Oxygen	(O_2)	White
Nitrogen	(N_2)	Black
Air	(Air)	White and black
Carbon dioxide	(CO_2)	Grey
Helium	(He)	Brown
Hydrogen	(H_2)	Red
Oxygen-helium gas mixture	(O_2-He)	White and brown

5.9 Diving Launch and Recovery Systems(LARS) (2023 Diving Code 4.9)

5.9.1 Goal (2023 Diving Code 4.9.1)*

The goal of this section is to ensure diving systems are equipped with suitable LARS to provide safe deployment and recovery of the divers.

5.9.2 Functional Criteria (2023 Diving Code 4.9.2)

In order to achieve the goal set out in 5.9.1 above, the following 5.9.3 to 5.9.5 functional criteria are embodied.

5.9.3 Diving Bell LARS (2023 Diving Code 4.9.3)*

1 The goal of this sub-section is to ensure that diving bell diving systems are equipped with LARS, providing safe deployment and recovery of the divers between the surface compression chamber and the maximum deployment depth.

2 In order to achieve the goal set out in -1 above, the following **(1)** and **(2)** functional criteria are embodied.

(1) There is to be a LARS that considers all environmental and operational conditions at the work site.

(2) There is to be a LARS that operates such that any failure are not to create a hazardous situation.

3 In order to comply with the functional criteria of -2 above, the following **(1)** to **(10)** are to be complied with.

(1) A diving system is to be equipped with a LARS to ensure safe deployment and recovery of the diving bell between the surface compression chamber and the maximum deployment depth.

(2) LARS is to be designed with adequate safety factors considering the environmental and operating conditions, including the dynamic loads which are encountered while handling the diving bell through the air–water interface.

(3) LARS is to enable smooth and easily controllable handling of the diving bell.

(4) LARS and mating devices are to enable easy and firm connection or disconnection of a diving bell to a surface compression chamber, even under conditions where the diving platform is rolling, pitching or listing to predetermined degrees.

(5) LARS is to be equipped with mechanisms to prevent the inadvertent or inappropriate operation or overloading of any part of the diving system.

(6) The lowering of diving bells under normal conditions are not to be controlled by brakes, but by the drive system of the winches.

(7) Winches used for lifting personnel are to comply with **Part 1 of the Rules for Lifting Appliances and Anchor Handling Winches**, and where the power supply to the LARS fails, brakes are to be engaged automatically.

(8) In the event of a single component failure of the LARS primary means of recovery, a secondary means of recovery is to be provided whereby the bell can be returned to the surface compression chamber. In addition, provision is to be made for safe emergency retrieval of the bell occupants to a surface compression chamber if the primary and secondary means fail.

(9) Where a powered actuating system is used for mating operations, an auxiliary power actuating system or an appropriate alternative means are to be provided to connect a diving bell to a surface compression chamber in the event of failure of the normal power actuating system.

(10) The design of LARS for diving bells is to consider the protection and routing of the diving umbilical to prevent damage.

5.9.4 Surface Orientated Diving LARS (2023 Diving Code 4.9.4)*

1 The goal of this sub-section is to ensure that surface orientated diving systems are equipped with LARS, providing safe deployment and recovery of the divers to and from the maximum deployment depth.

2 In order to achieve the goal set out in -1 above, the following **(1)** and **(2)** functional criteria are embodied.

(1) There is to be a LARS that considers all environmental and operational conditions at the work site.

(2) There is to be a LARS that operates such that any failure is not to create a hazardous situation.

3 In order to comply with the functional criteria of -2 above, the following **(1)** to **(9)** are to be complied with.

(1) A diving system is to be equipped with a LARS to ensure deployment and recovery of a dive basket or wet bell to and from the maximum deployment depth.

(2) Where applicable, a diving system is to be equipped with a LARS to ensure the safe launch and recovery of a diving daughter-craft to and from the water.

(3) LARS is to be designed with adequate safety factors considering the environmental and operating conditions, including the dynamic loads which are encountered while launching and recovering the dive basket or wet bell through the air–water interface.

(4) LARS is to enable smooth and easily controllable handling of the dive basket, wet bell or daughter-craft. LARS and restraint devices are to enable easy and controlled handling of the dive basket, wet bell or daughter-craft when recovered to the embarkation point, even under conditions where the diving platform is rolling, pitching or listing to predetermined degrees.

(5) The lowering of dive basket, wet bell or daughter-craft under normal conditions are not to be controlled by brakes, but by the drive system of the winches.

(6) Winches used for lifting personnel are to comply with the **Part 1 of the Rules for Lifting Appliances and Anchor Handling Winches**, and where the power supply to the LARS fails, brakes are to be engaged automatically.

(7) In the event of a single component failure of the LARS, an alternative means is to be provided whereby the dive basket, wet bell, divers or daughter-craft occupants can be returned to the embarkation point. Where the working divers and the standby divers LARS are combined then the failure of a single component is not to compromise the ability of the standby system to perform an emergency recovery.

(8) The design of LARS that manage the diver's umbilical is to consider the protection and routing of the diving umbilical to prevent damage.

(9) LARS for primary access and egress is not required where the diver has to climb no more than 2 *m* above the water surface on a ladder, or no more than 4 *m* on stairs. However, the stairs are to be fitted with a handrail and provided with the following means **(a)** and **(b)**.

(a) Means for diver access and egress from the water.

(b) Means to recover a helpless diver in an emergency.

5.9.5 Hyperbaric Survival Craft(HBSC) Launching Appliance (2023 Diving Code 4.9.5)

1 The goal of this sub-section is to ensure that HBSC are equipped with a suitable launching appliance, providing safe deployment of the divers from the diving system to a position where the HBSC is in the water and released from the diving platform.

2 In order to achieve the goal set out in **-1** above, the following **(1)** to **(3)** functional criteria are embodied.

(1) Provision of a suitable launching appliance that considers all environmental and operational conditions.

(2) Provision of a launching appliance that operates in a manner such that any failure is not to create a hazardous situation.

(3) The launching appliance is to meet the requirements of the *LSA* Code, as amended with due consideration to the requirements of hyperbaric evacuation.

3 In order to comply with the functional criteria of **-2** above, the following **(1)** to **(3)** are to be complied with.

(1) A diving unit is to be equipped with a launching appliance to ensure safe deployment of the HBSC between the mating interface of the surface compression chamber and the water. A float-free HBSC is permissible but not as the primary deployment technique.

(2) The launching appliance is to comply with the launching and embarkation appliances requirements as defined in the *LSA* Code (as amended by *IMO* Resolution *MSC*.459(101)), with the deviations as defined **(a)** to **(j)** below.

(a) The launching appliance and its attachments other than winches are to be of sufficient strength to withstand added weight in case of water entrainment.

(b) The launching appliance is to enable smooth and controlled deployment of the HBSC.

(c) Launching appliance and mating devices are to enable easy and firm connection or disconnection of an HBSC to a surface compression chamber, even under conditions where the diving platform is rolling, pitching or listing to predetermined degrees.

(d) The lowering of the HBSC under normal conditions is not to be controlled by brakes, but by the drive system of the winches.

(e) In the event of an electrical power failure of the launching appliance, in addition to the requirement for gravity or stored mechanical power in the *LSA* Code, an emergency power supply is to be provided.

(f) The launching appliance does not require hand gear as required by Chapter 6.1.2.6 of the *LSA* Code.

(g) Where a power actuated system is used for the mating/un-mating operations, an independent manual or stored mechanical power means is to be provided as a backup in the event of failure of the normal power supply.

(h) The launching arrangements provided are to be designed to ensure easy connection or disconnection of the HBSC from the surface compression chamber and for transportation and releasing of the HBSC from the diving platform under the same conditions of trim and list as those for the diving platform’s other survival craft.

(i) The means provided for release of the falls or lift wire after the HBSC is afloat are to provide for easy disconnection. Particular attention being given to HBSC not provided with an attendant crew.

(j) Interlocks are to be provided to prevent the inadvertent release of the HBSC from the surface compression chamber complex while the PVHO adapter and clamping arrangement is pressurized.

(3) For free-fall launched HBSC the ability of the launching appliance to release the HBSC is to be confirmed at all required angles of list and trim.

5.10 Fire Protection (2023 Diving Code 4.10)

5.10.1 Goal (2023 Diving Code 4.10.1)

The goal of this section is to ensure that the fire protection integral to the diving system is fit for purpose and safe to use.

5.10.2 Functional Criteria (2023 Diving Code 4.10.2 and 4.10.3)*

1 In order to achieve the goal set out in **5.10.1** above, the following functional criteria is embodied.

(1) To provide fire protection to the diving system considering fire prevention and extinguishing.

2 In order to comply with the functional criteria of **-1** above, the following **(1)** to **(3)** are to be complied with.

(1) Non-metallic materials used in connection with the diving system are to be, as far as is reasonably practicable, of fire-retardant type and non-hazardous in accordance with the *FTP* Code, parts 2 and 5, as amended.

(2) Each compartment in a surface compression chamber is to have a suitable means of extinguishing a fire in the interior which provides rapid and efficient distribution of the extinguishing agent to any part of the chamber. The living compartments of a surface compression chamber are to be equipped with a fixed, manually actuated fire extinguishing system with such a layout as to cover the compartments. It is to be possible to actuate the extinguisher both from within the compartments and from outside. The extinguishing agent is to be water or an alternative agent approved by the Society.

(3) Where applicable, systems are to comply with the *FSS* Code, as amended. In addition, fire prevention and extinguishing systems are to be adjusted for use at the planned operational pressure.

5.11 Electrical System (2023 Diving Code 4.11)

5.11.1 Goal (2023 Diving Code 4.11.1)*

The goal of this section is to ensure that electrical systems of the diving system are fit for purpose and safe to use.

5.11.2 Functional Criteria (2023 Diving Code 4.11.2 and 4.11.3)*

1 In order to achieve the goal set out in **5.11.1** above, the following **(1)** to **(4)** functional criteria are embodied.

(1) All electrical services necessary for maintaining the diving system in normal operational and habitable conditions are to be assured, without recourse to the emergency source of electrical power.

(2) Electrical services essential for safety are to be maintained, in case of failure of the main source of electrical power.

(3) Electromagnetic compatibility of electrical and electronic equipment is to be assured.

(4) The safety of personnel and the diving system from electrical hazards are to be assured.

2 In order to comply with the functional criteria of **-1** above, the following **(1)** to **(10)** are to be complied with.

(1) All electrical equipment is to comply with the relevant regulations pertaining to the requirements of passenger and cargo ships, as defined in the applicable requirements of *SOLAS*. The systematic engineering analysis, evaluation and approval of the electrical design and arrangements are to be carried out in accordance with *SOLAS* regulation II-1/55.

(2) Essential services as defined in **3.4**, as well as other services to ensure minimum comfortable conditions of habitability are to be identified and the system is to have the capacity to supply all essential services during the planned operations.

(3) In an emergency the diving bell and HBSC are to have sufficient electrical power for survivability of at least 24 hours for the diving bell and 72 hours for the HBSC.

(4) The diving system switchboards (main and emergency) are to be installed in separate compartments. All emergency electric lighting systems are to be separated from the compartments housing the main and emergency switchboards.

(5) An emergency source of electrical power for the diving system is to meet the minimum requirement of *SOLAS* regulation II-1/43, as well as the following**(a)** to **(e)**:

(a) where using the diving platform's emergency electrical power, there is to be enough electrical power capacity to supply the emergency load for the diving system and for the diving platform simultaneously;

(b) have a minimum fuel capacity of 18 hours and be able to be refuelled;

(c) be able to safely terminate the diving operation, including decompression of the divers;

(d) be suitably protected within a deck house structure; and

(e) be suitably ventilated, to ensure continuous operations in the design environment.

(6) Emergency lighting as defined in *SOLAS* regulations II-1/43.2.1 and 43.2.2 is to be additionally provided for **(a)** to **(c)**:

(a) each PVHO location;
(b) each LARS; and
(c) associated diving equipment not housed within the control room or machinery spaces of the diving system.

(7) Battery charging arrangements are to be designed to prevent overcharging under normal or fault conditions. Battery storage compartments are to be provided with means to prevent over pressurization and vent to a safe place. When battery charger/battery combinations are used as DC power supply systems, adequate measures are to be taken to keep the voltage within specified limits.

(8) Electrical equipment fitted within the PVHO is to be suitable for the intended specified in **(a)** to **(d)**, including hyperbaric use and the specified gas, and high humidity levels and marine applications.
(a) Electrical enclosures subject to pressure are to include suitable gas relief devices, where applicable.
(b) Cabling and electrical components are not to off-gas toxic volatiles so as to create a hazardous environment.
(c) Equipment supply voltage is to be kept at a minimum.
(d) Electrical power services, including battery arrangements, suitable for hyperbaric use.

(9) Electrical and electronic diving equipment are to follow the requirements for electromagnetic compatibility in the General requirements for electromagnetic compatibility (EMC) for all electrical and electronic ship's equipment (*IMO* Resolution *A*.813(19)).

(10) In-water and hyperbaric electrical equipment are to meet the following **(a)** to **(d)** safe voltage requirements.
(a) Safe voltage, body resistance and current (See **Table 5.2**)
(b) For electrically heated suits, the diver's body resistance is to be 100 *Ω* and the safe body current is to be divided by 2.5 for all applications.
(c) Electrical equipment used subsea and in hyperbaric conditions is to be supplied from a transformer with the secondary winding isolated, such that there is not an obvious path if a fault develops. Isolation requirements are to include high-integrity isolation components and a safe insulator barrier.
(d) Residual current devices fitted are to have a reaction time of less than 20 *ms*.

Table 5.2 Safe voltage, body resistance and current

Supply	Safe Body Current (mA)		Body Route Resistance (Ω)		Safe Voltage	
					Maximum (V)	Nominal (V)
	(I)	×	(R)	=	(V)	(V)
DC without a suitable trip device	40		750		30	24
AC without a suitable trip device	10		750		7.5	6
DC with a suitable trip device	570		500		285	250
AC with a suitable trip device	500		500		250	220

Note:
A suitable trip device is one with a reaction time of 20 *ms* or less.

5.12 Control Systems (2023 Diving Code 4.12)

5.12.1 Goal (2023 Diving Code 4.12.1)

The goal of this section is to ensure that all control systems are fit for purpose and maintain a safe working environment.

5.12.2 Functional Criteria (2023 Diving Code 4.12.2 and 4.12.3)*

1 In order to achieve the goal set out in **5.12.1** above, the following functional criteria is embodied.

To provide control systems for the diving system considering centralized control for the relevant operators, including adequate protection from environmental factors and emergency situations.

2 In order to comply with the functional criteria of **-1** above, the following **(1)** to **(6)** are to be complied with.

(1) The diving system centralized control is to be arranged so as to operate safely under all applicable environmental conditions and is to be designed such that any single failure is not to cause a hazardous situation.

(2) Provision is to be made within the diving bell and HBSC for an independent means of continuously monitoring oxygen and carbon dioxide levels.

(3) Oxygen injection systems are to be designed to prevent an uncontrolled flow of oxygen.

(4) Confined areas with gas control systems using gases with an oxygen content less than 20 % or greater than 22 % are to have continuous oxygen monitoring with high- and low-level audio-visual alarms.

(5) Control systems, including automated systems, are to be compliant with a national or international standard acceptable to the Administration.

(6) Facilities are to be provided at the central control position to monitor and provide appropriate alarms for when any life support parameter is outside of acceptable limits.

5.13 Communication and Location Systems (2023 Diving Code 4.13)

5.13.1 Goal (2023 Diving Code 4.13.1)

The goal of this section is to ensure that all communication and location systems provide effective communications between relevant parties.

5.13.2 Functional Criteria (2023 Diving Code 4.13.2 and 4.13.3)

1 In order to achieve the goal set out in **5.13.1** above, the following **(1)** and **(2)** functional criteria are embodied.

(1) The diving system communications are to be arranged so as to ensure complete coverage of all operational control points of the diving system.

(2) During emergency situations communication systems are to be available.

2 In order to comply with the functional criteria of **-1** above, the following **(1)** to **(10)** are to be complied with.

(1) The communication system is to be arranged for direct two-way voice communication between the control stand and the following **(a)** to **(o)**. Systems are to be hard-wired unless stated otherwise:

(a) divers in water;

(b) standby diver;

(c) each compartment of the surface compression chambers including the HBSC;

(d) service lock positions when not located in the immediate vicinity of the control stand;

(e) back-up control panels;

(f) diving system LARS positions;

(g) dynamic positioning control station, only when required by **4.7**;

(h) diving platform bridge, command centre or any other operational control area;

(i) diving bell, wet bell, dive basket and HBSC (if applicable);

(j) HBSC launch position (if applicable);

(k) HBSC operator's position (if applicable);

(l) deck operations (wireless communications acceptable) (if applicable);

(m) crane operator (wireless communications acceptable) (if applicable);

(n) Remotely Operated Vehicle (ROV) operator (if applicable); and

(o) a control stand on the daughter-craft and the diving platform bridge (wireless communications acceptable) (if applicable).

(2) A secondary means of communication with divers in the surface compression chamber, diving bell and HBSC are to be available. All secondary communication systems are to operate for a minimum of 30 minutes without main electrical power.

(3) Each PVHO main and secondary communications system, are to include a speech unscrambler when used with gas systems which include helium.

(4) A self-contained through-water communication system, with a minimum operating duration of 24 hours, is to be provided for

emergency communication with diving bells when operating under water.

(5) Communications between dive control, the diving bell or wet bell, the standby diver and the divers in the water are to be recorded (audio and video) and retained for a minimum of 24 hours after the dive is completed.

(6) Where diving is carried out from a diving platform operating with dynamic positioning (hereinafter referred to as "DP"), then an audio and visual alarm activated by the DP operator is to be fitted at the dive control stand/station to inform the supervisor of the DP status. It is to be able to be tested before each dive when operating on DP.

(7) Primary and secondary means of communication between dive control and the bridge is to be provided and available at all times. One of the means of communication is to operate without the need for external electrical power supply. If the vessel is operating in DP, the primary means of communication is to be a direct hard-wired two-way link.

(8) The diving unit general alarm is to be able to be heard in the dive and saturation control stands. This alarm is to be mutable to ensure communication is not interrupted with the divers. Muting of the alarm is to be time-limited and there is to be visual indication of the alarm status.

(9) A diving bell is to have an emergency locating device with a frequency of 37.5 *kHz* designed to assist personnel on the surface in establishing and maintaining contact with the submerged diving bell if the umbilical to the surface is severed. The device is to include the following components:

(a) Transponder:

i) The transponder is to be provided with a pressure housing capable of operating to at least the maximum operating depth of the diving bell containing batteries and equipped with saltwater activation contacts.

ii) The transponder is to be designed to operate with characteristics shown in **Table 5.3**.

(b) Portable (diver-held or ROV mounted) interrogator/receiver:

i) The interrogator/receiver is to be provided with a pressure housing capable of operating to the maximum operating depth of the diving bell with pistol grip and compass. The front end is to contain the directional hydrophone array and the rear end the three-digit LED display readout calibrated in metres. Controls are to be provided for "on/off receiver gain" and "channel selection".

ii) The interrogator/receiver is to be designed to operate with characteristics shown in **Table 5.4**.

(10) In addition to the communication systems **(1)** and **(9)** above, a standard bell emergency communication tapping code is to be adopted (See **Table 5.5**), for use between persons in the bell and rescue divers. A copy of this tapping code is to be displayed inside and outside the bell and also in the dive control room.

Table 5.3 Transponder Characteristics

Characteristic	Standard
Common emergency reply frequency	37.5 *kHz*
Individual interrogation frequencies	• channel A 38.5 + 0.05 *kHz* • channel B 39.5 + 0.05 *kHz*
Receiver sensitivity	+15 *dB* referred to 1 *mbar*
Minimum interrogation pulse width	4 *ms*
Turnaround delay	125.7+0.2 *ms*
Reply frequency	37.5 + 0.05 *kHz*
Maximum interrogation rates	• more than 20% of battery life remaining Once *per second* • less than 20% of battery life remaining Once *per* 2 *second*
Minimum transponder output power	85 *dB* referred to 1 *mbar* at 1 *m*
Minimum transducer polar diagram	-6 *dB* at +135° solid angle(1)
Minimum listening life in water	10 *weeks*
Minimum battery life replying at 85 *dB*	5 *days*

Note:

Centred on the transponder vertical axis and transmitting towards the surface.

Table 5.4 Interrogator/receiver Characteristics

Characteristic	Standard
Common emergency reply frequency	37.5 *kHz*
Individual interrogation frequencies	• channel A 38.5 + 0.05 *kHz* • channel B 39.5 + 0.05 *kHz*
Minimum transmitter output power	85 *dB* referred to 1 *mbar* at 1 *m*
Transmit pulse	4 *ms*
Directivity (Capability to zero range on transponder)	+ 158
Maximum detectable range	more than 500 *m*

Table 5.5 Bell emergency communication tapping code

Tapping code	Situation
3.3.3	Communication opening procedure (inside and outside)
1	Yes or affirmative or agreed
3	No or negative or disagreed
2.2	Repeat please
2	Stop
5	Have you got a seal?
6	Stand by to be pulled up
1.2.1.2	Get ready for through water transfer (open your hatch)
2.3.2.3	You will NOT release your ballast
4.4	Do release your ballast in 30 *minutes* from now
1.2.3	Do increase your pressure
3.3.3	Communication closing procedure (inside and outside)

5.14 Maintenance and Testing (2023 Diving Code 4.14)

5.14.1 Goal (2023 Diving Code 4.14.1)*

The goal of this section is to ensure that diving systems and associated diving platform interfaces are able to be maintained in a safe working condition.

5.14.2 Functional Criteria (2023 Diving Code 4.14.2 and 4.14.3)

1 In order to achieve the goal set out in **5.14.1** above, the following **(1)** and **(2)** functional criteria are embodied.

(1) All diving plant and equipment and related services are to have a risk based planned maintenance system.

(2) Only diving plant and equipment able to be maintained in a safe working condition is to be used.

2 In order to comply with the functional criteria of **-1** above, the following **(1)** to **(3)** are to be complied with.

(1) All diving equipment is to be identified, marked and controlled within a planned maintenance system. Records are to be available, demonstrating that the diving equipment is being maintained and tested.

(2) Equipment maintenance requirements and records are to consider the following **(a)** to **(d)**:

(a) manufacture's guidelines;

(b) industry good practice;

(c) national and international standards acceptable to the Administration; and

(d) applicable national regulatory requirements.

(3) All diving plant and equipment are to be tested and verified after installation to ensure compliance to national and international standards acceptable to the Administration.

5.15 Hyperbaric Survival Craft (HBSC) (2023 Diving Code 4.15)

5.15.1 Goal (2023 Diving Code 4.15.1)

The goal of this section is to ensure that the Hyperbaric Survival Craft provides an equivalent escape capability, for divers under pressure, as that provided under the *LSA* Code, as amended.

5.15.2 Functional Criteria (2023 Diving Code 4.15.2 and 4.15.3)*

1 In order to achieve the goal set out in **5.15.1** above, the following functional criteria is embodied.

The HBSC is designed, constructed and tested in accordance with applicable aspects of the *LSA* Code, Chapter IV (Survival craft).

2 In order to comply with the functional criteria of **-1** above, the following **(1)** to **(13)** are to be complied with.

(1) HBSC is to comply the requirements specified in **(a)** and **(b)** below:

(a) "General requirements for lifeboats" as defined in Chapter 4.4 of the *LSA* Code with the following deviation:

i) When assessing an HBSC in the damaged condition flooding or holes within the PVHO pressure hull do not need to be considered; and

(b) The requirements for "Totally enclosed lifeboat" as defined in Chapter 4.6 of the *LSA* Code or "Free-fall lifeboat" as defined in Chapter 4.7 of the *LSA* Code, with the additional deviations as defined in this provision.

(2) HBSC is to comply with the "Construction of lifeboats" as defined in Chapter 4.4.1 of the *LSA* Code with the deviations as defined **(a)** to **(k)** below:

(a) The design and construction of the HBSC are to be such that it is suitable for the environmental conditions envisaged, account being taken of the horizontal or vertical dynamic snatch loads that may be imposed on the system and its lifting points particularly during evacuation and recovery.

(b) The HBSC is to be fitted with a single lift point. Safe means are to be provided to connect a recovery hook, at sea, to the single lift point.

(c) Attachment points for the HBSC are to be provided to enable it to be secured to the deck of a rescue vessel.

(d) A single lift point and associated lift load path are to be designed for a load 3 *times* the weight of the fully loaded HBSC. A minimum factor of safety of 2 to yield is to be applied for structures and 4 for loose gear including suspension chains, links and blocks. A static proof load test of not less than 3 *times* the weight of the fully loaded HBSC is to be applied.

(e) The HBSC is to be fitted with a tow arrangement suitable in function and strength for towing the HBSC in the following conditions. The tow arrangement is to be designed to minimize human operation when connecting the tow.

i) 3 *knots* to the top of sea state 3.

ii) Holding the HBSC in position in up to sea state 7.

(f) Where HBSC are Semi-Submerged PVHO, the pressure boundary of the PVHO may be the HBSC hull.

(g) HBSC on ships required to be provided with fire-protected lifeboats, is to be provided with a similar degree of fire protection and self-contained air support systems in accordance with the relevant sections of the *LSA* Code.

(h) Where HBSC are semi-submerged PVHO and may be used to transport divers through fires, consideration is to be given, where practicable, to providing an external water spray system for cooling purposes.

(i) The operating position for the HBSC control panel is to be accessible and allow the operator to monitor and operate the equipment in a seaway and have egress and access to these positions from within the HBSC.

(j) The area of the HBSC enclosure that is 1.7 *m* or higher, may be less than 50 *%* of the floor area but is to be sufficient to allow the crew to operate effectively.

(k) Surfaces within a PVHO pressure hull are not required to have a non-skid finish.

(3) HBSC is to comply with the "Carrying capacity of lifeboat" as defined in Chapter 4.4.2 of the *LSA* Code with the deviations as defined **(a)** and **(b)** below:

(a) All equipment and consumables required for support of the HBSC PVHO and its operation are to be included in the design of the HBSC and are to be based on occupancy and a minimum of 72 hours duration from launch without external support; and

(b) For the carrying capacity of the HBSC, the average mass of survivors inside HBSC is to be 82.5 *kg*.

(4) HBSC is to comply with the "Access into lifeboats" as defined in Chapter 4.4.3 of the *LSA* Code with the deviations as defined **(a)** to **(c)** below:

(a) Access into the HBSC from the diving system internal muster point and for crew members is to be so arranged that it can be boarded by the crew and diving complement in less than 15 minutes;

(b) A helpless person within the diving system is to be able to be transported easily to the HBSC on a stretcher from the diving system; and

(c) Surfaces within a PVHO pressure hull are not required to have a non-skid finish.

(5) HBSC is to comply with the "Lifeboat buoyancy" as defined in Chapter 4.4.4 of the *LSA* Code with the deviations as defined **(a)** and **(b)** below:

(a) Semi-Submerged PVHO HBSC buoyant material can be located external to the hull and is to be protected against impact, e.g., during launch in accordance with Chapter 4.7 "Free-fall lifeboats" of the *LSA* Code, and is not to be adversely affected by seawater, oil or oil products; and

(b) For stability and buoyancy requirements the HBSC PVHO are to be considered sealed and pressurized.

(6) HBSC is to comply with the "Lifeboat freeboard and stability" as defined in Chapter 4.4.5 of the *LSA* Code with the deviations as defined **(a)** to **(c)** below:

(a) Semi-submerged PVHO HBSC is to be provided with adequate stability for all envisaged operating and environmental conditions and be self-righting.

(b) Semi-submerged PVHO HBSC is to have sufficient reserves of buoyancy to enable the necessary rescue crew and equipment to be carried.

(c) Towing attachment points are to be so situated that there is no likelihood of the HBSC being capsized as a result of the direction of the tow line. Where towing harnesses are provided, they are to be lightly clipped or secured to the unit and, so far as is possible, be free from snagging when pulled free.

(7) HBSC is to comply with the "Lifeboat propulsion" as defined in Chapter 4.4.6 of the *LSA* Code with the deviations as defined **(a)** to **(d)** below:

(a) The HBSC is to be capable of moving away from the diving platform, maintaining a safe position and being adequately protected from a surface oil fire;

(b) Provisions for autonomous operation are to be for 72 hours, where fuel allowances are to be based on:

i) first hour at 6 *knots*, full sprinkler system and PVHO life support functioning;

ii) average speed for first 24 hours is 6 *knots* and all life support functioning;

iii) average speed for subsequent 48 hours is 5 *knots* and all life support functioning; and

iv) maintaining adequate ventilation for the boat crew;

(c) The HBSC may be battery powered providing enough electrical power is available for 72 hours of autonomous operation including all life-support functions; and

(d) HBSC units without propulsion (submerged or floating) are to only be permitted if a suitably powered rescue boat, as defined in Chapter V of the *LSA* Code, is available to tow the HBSC to a safe position.

(8) For semi-submerged PVHO HBSC the following **(a)** and **(b)** applies:

(a) HBSC launched by fall or falls are to comply with the requirement for release mechanisms as defined in paragraph 4.4.7.6 of the *LSA* Code; and

(b) HBSC is to have skates and fenders as necessary to facilitate launching.

(9) HBSC is to comply with the "Lifeboat fittings" as defined in Chapter 4.4.7 of the *LSA* Code with the deviations as defined **(a)** to **(d)** below:

(a) Drainage points as per paragraph 4.4.7.1 of the *LSA* Code are not required to be automatic when they are part of the PVHO pressure hull.

(b) An HBSC without propulsion is not required to have a rudder and tiller.

(c) Storage within the PVHO pressure hull is not required to be watertight and is not to hold pressure unless designed to do so.

(d) Where an HBSC is without propulsion and assisted by a rescue craft the operation is to be possible without input from the survivors within the HBSC. Should this not be possible, the required view and communications are to be specially considered.

(10) HBSC is to comply with the "Lifeboat equipment" as defined in Chapter 4.4.8 of the *LSA* Code with the deviations as defined **(a)** to **(d)** below:

(a) Survivors outside the PVHO pressure hull are to have access to all lifeboat equipment except oars. They are also to have the following with a minimum endurance of 72 hours:

i) VHF radio;

ii) strobe light;

iii) Emergency Position-Indicating Radio Beacon (EPIRB);

iv) Search and Rescue Transponder (SART);

v) drinking water, 6 ℓ per person (i.e., 2 ℓ per day); and

vi) food ration totalling 15,000 *kJ* per person.

(b) Survivors inside any PVHO pressure hull are to have the following available:

i) survival information and emergency procedures;
ii) drinking water, 6 ℓ per person (i.e., 2 ℓ per day);
iii) a rust proof graduated drinking vessel
iv) food ration totalling 15,000 *kJ* per person.
v) first-aid equipment, paper towels, waste disposal bags and all necessary operational instructions for equipment within the HBSC PVHO; and
vi) anti-sea sickness medicine and bags (for 72 h).

(c) For a semi-submerged PVHO HBSC the following external equipment is to be available and either permanently fitted, or available for fitting or activation by a dedicated rescue craft. Electronic devices are to have a minimum endurance of 72 hours:
i) radar reflector or transponder;
ii) sea anchor;
iii) strobe light; and
iv) EPIRB

(d) For a fully submerged PVHO HBSC the following external equipment is to be available and able to be activated in an emergency:
i) acoustic transponder suitable for operation in accordance with **5.13** Communications and relocation systems; and
ii) Tethered surfaced EPIRB.

(11) HBSC is to comply with the "Lifeboat markings" as defined in Chapter 4.4.9 of the *LSA* Code with the deviations as defined **(a)** to **(d)** below:

(a) Dedicated HBSC is to be coloured orange and be provided with retro-reflective material to assist in their location during hours of darkness.

(b) Each HBSC is to be marked with at least three identical signs, **Fig. 5.3**. One of these markings is to be on top of the unit and be clearly visible from the air and the other two be mounted vertically on both sides and as high as possible and be capable of being seen while the unit is afloat.

(c) The following **(i)** to **(vi)** instructions and equipment are to be clearly visible and be kept readily available while the HBSC is afloat:
i) towing arrangements and buoyant towline;
ii) all external connections, for essential services;
iii) maximum gross weight of the HBSC in air;
iv) lifting point and load rating;
v) name of the diving unit and port of registration; and
vi) emergency contact details.

(d) Where appropriate, the following **(i)** to **(v)** warning instructions are to be permanently displayed on every HBSC in two separate locations so as to be clearly visible while the craft is afloat:
"Unless specialized diving assistance is available:
i) do not touch any valves or other controls;
ii) do not try to get occupants out;
iii) do not connect any gas, air, water or other services;
iv) do not attempt to give food, drinks or medical supplies to the occupants; and
v) do not open any hatches."

(12) HBSC is to comply with the "Totally enclosed lifeboats" as defined in Chapter 4.6 of the *LSA* Code with the deviations as defined **(a)** to **(c)** below:

(a) HBSC are not required to be rowable;

(b) The requirements to access hatches/handrails and windows apply to parts of the enclosure that are not also part of the PVHO pressure hull; and

(c) Ventilation requirements apply to the survivors outside the PVHO pressure hull (boat crew) for a period of not less than 72 hours.

(13) HBSC is to comply with the "Free-fall lifeboat" as defined in Chapter 4.7 of the *LSA* Code with the deviations as defined **(a)** to **(d)** below:

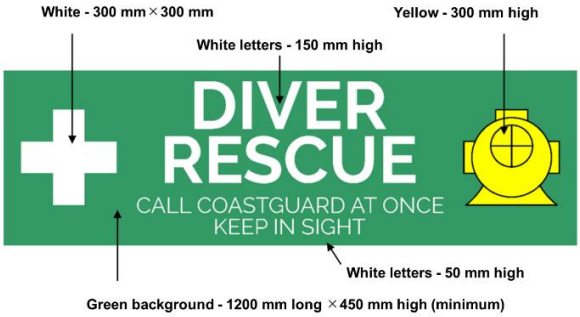
(a) During launching of a free-fall HBSC PVHO access doors are to be mechanically prevented from opening;

(b) Any externally attached items are to be designed for the impact loads of a free-fall launch;

(c) Provision is to be made for safely enabling activation systems, for release from outside of the HBSC, where such systems are not accessible from the inside of the HBSC; and

(d) Recognizing that seating design and orientations for the occupants may be other than facing backwards, arrangements are to be made to protect the occupants from the effects of acceleration and deceleration.

Fig. 5.3 HBSC diver rescue sign



Chapter 6 DIVING OPERATIONS AND SAFETY MANAGEMENT

6.1 Goals

6.1.1 General (2023 Diving Code 5.1)

The goal of this chapter is to provide a minimum international standard for the conduct of diving operations from a diving unit in accordance with the intent of the *ISM* Code.

6.2 Functional criteria

6.2.1 General (2023 Diving Code 5.2)

In order to achieve its goal in **6.1.1** above, this chapter embodies the following provisions:

6.3 Diving operations from the diving unit (2023 Diving Code 5.3)

6.3.1 Goal (2023 Diving Code 5.3.1)*

The goal of this section is to provide owners, operators, masters, crews and specialist personnel, including all diving personnel, with sufficient procedures, plans and instructions to operate a diving unit safely and effectively and in accordance with the intent of part A-7 (Shipboard Operations) of the International Safety Management Code (*ISM* Code).

6.3.2 Functional criteria (2023 Diving Code 5.3.2 and 5.3.3)*

1 In order to achieve the goal set out in section **6.3.1** above, the following functional criteria are embodied in the provisions of this section:

(1) diving operations should be included in the diving platform's safety management system for compliance with the *ISM* Code;

(2) the diving unit should not be used outside of its design capabilities;

(3) sufficient procedures, plans and instructions should be available to ensure safe diving operations from the diving unit; and

(4) competent personnel should be available to ensure safe operation of the diving unit.

2 In order to comply with the functional criteria of section **-1** above, the company responsible for the diving unit is to:

(1) define and document the responsibility, authority and interrelation of the diving organization's personnel towards the diving platform's personnel;

(2) ensure that the diving organization has procedures, plans and instructions in place for maintaining the condition and certification of the diving system and equipment while it is on board the diving platform;

(3) ensure that the diving organization has procedures in place to ensure that relevant survey, inspection or audit findings, conditions and memoranda are communicated to the diving unit and its Administration or recognized organization;

(4) identify any diving platform support activities which are critical for the diving operation

(5) in cooperation with the diving organization, identify which equipment and technical systems' sudden operational failure may result in hazardous situations;

(6) ensure that the diving organization's procedures or diving operations manual, safety management system and associated integration documentation, as they apply to the diving unit, are implemented under part A-7 (Shipboard operations) of the *ISM* Code;

(7) ensure that when undertaking new diving tasks or changing geographical location the above are reviewed and updated where necessary by the persons defined in **6.3.2-2(1)**; and

(8) ensure that documentation covering the procedures, plans and instructions for diving operations is included in or referenced by the diving platform's safety management system and contains the following:

(a) means to ensure compliance with section **4.3** "Geographic location and environmental conditions";

(b) means to ensure the operational capabilities and limitations of the diving unit to conduct diving operations are not exceeded;

(c) details of the diving organization's procedures or diving operations manual, safety management system and associated integration documentation11 as applied to the diving unit; and

(d) emergency and contingency procedures.

6.4 Diving organization's occupational health and safety management system (2023 Diving Code 5.4)

6.4.1 Goal (2023 Diving Code 5.4.1)*

The goal of this section is to ensure that the Diving organization has an effective occupational health and safety management system.

6.4.2 Functional criteria (2023 Diving Code 5.4.2 and 5.4.3)*

1 In order to achieve the goal set out in section **6.4.1** above, the following functional criteria are embodied in the provisions of this section:

(1) there is to be a certified occupational health and safety management system covering plans, procedures, instructions and methods of diving; and

(2) the occupational health and safety management system are to provide the information required to allow integration with the diving unit safety management system.

2 In order to comply with the functional criteria of section **-1** above, the following is to be complied with:

(1) the diving organization's occupational health and safety management system are to be certified to a standard that is acceptable to the Society;

(2) the procedures within the diving organization's occupational health and safety management system are to be in accordance with national or international diving regulations, diving codes of practice and diving standards acceptable to the Society;

(3) the diving organization is to identify services from the diving platform and any equipment or technical systems within the diving system where operational failure may result in hazardous situations; and

(4) where the diving organization and the company responsible for the diving unit are the same entity, the diving organization's occupational health and safety management system may be integrated with the diving unit safety management system.

6.5 Manning and training (2023 Diving Code 5.5)

6.5.1 Goal (2023 Diving Code 5.5.1)*

The goal of this section is to ensure that diving units conducting diving operations are appropriately manned by suitably qualified, trained and experienced personnel, in accordance with the intent of part A-6 (Resources and personnel) of the *ISM* Code.

6.5.2 Functional criteria (2023 Diving Code 5.5.2 and 5.5.3)

1 In order to achieve the goal set out in section **6.5.1** above, the following functional criteria are embodied in the provisions of this section:

(1) the diving unit is to be manned by personnel who are certified as being qualified and medically fit; and

(2) the diving unit is to establish and maintain procedures for identifying any training which may be required in support of the diving operation.

2 In order to comply with the functional criteria of section **-1** above, the following is to be complied with:

(1) The diving unit is to be manned by personnel certified as qualified and medically fit. All qualifications and certifications provided by the diving organization are to be valid and in date.

(2) The roles and duties of the diving organization personnel required to operate the diving system are to be defined, including:

(a) the minimum number of diving personnel required to safely man the diving unit at any time during the diving operation;

(b) a list of personnel positions and the role of each position;

(c) a list of duties and responsibilities of each personnel position; and

(d) the required competence of each personnel position in accordance with national and international requirements; qualifications and associated certificates are to be issued by an agency acceptable to the Administration.

(3) The diving unit is to establish and maintain procedures for identifying any training or additional manning which may be required in support of the diving operation and ensure that such training is provided for all personnel concerned and that all personnel

involved in diving operations have an adequate understanding of relevant rules, regulations, codes and guidelines.

(4) The diving unit is to establish procedures by which the ship's personnel receive relevant information on the diving operation in a working language or languages understood by them.

6.6 Emergency preparedness (2023 Diving Code 5.6)

6.6.1 Goal (2023 Diving Code 5.6.1)*

The goal of this section is to ensure the diving unit provides for safe escape and evacuation of diving personnel to a place of safety, in accordance with the intent of part A-8 (Emergency preparedness) of the *ISM* Code.

6.6.2 Functional criteria (2023 Diving Code 5.6.2 and 5.6.3)*

1 In order to achieve the goal set out in section **6.6.1** above, the following functional criteria are embodied in the provisions of this chapter;

(1) potential emergency situations are to be identified and procedures established to respond to them;

(2) emergency escape and evacuation preparations are to ensure that diving personnel are able to be evacuated to a place of safety;

(3) programmes are to be established with drills and/or exercises conducted to prepare for diving-related emergency actions; and

(4) the safety management system is to provide for measures ensuring that the diving unit can respond at any time to hazards, accidents and emergency situations involving its diving operations.

2 In order to comply with the functional criteria of section **-1** above, the following is to be complied with:

(1) Suitable measures are to be implemented to mitigate the hazards identified in **6.3** and **6.4**.

(2) A plan is to be developed to evacuate diving personnel to a place of safety and, if the diving operation requires the use of an HBSC, there is to also be a plan for hyperbaric evacuation.

(3) The diving unit is to have on board a plan for cooperation with appropriate SAR services in the event of an emergency.

(4) The plans specified in **(2)** and **(3)** are to:

(a) be developed in cooperation between the platform, the company, as defined in *SOLAS* regulation IX/1, and the search and rescue services;

(b) include provisions for periodic exercises to be undertaken to test their effectiveness; and

(c) include documented emergency notification that identifies the responsible persons both onshore and on the diving unit.

(5) Standby diving units do not require hyperbaric evacuation for received survivors and are to be considered as part of the contingency planning for the diving unit being supported.

6.7 Voyage planning (2023 Diving Code 5.7)

6.7.1 Goal (2023 Diving Code 5.7.1)

The goal of this section is to ensure that the company, master and crew are provided with sufficient information to enable operations to be conducted with due consideration to safety of ship and persons on board and, as appropriate, environmental protection.

6.7.2 Functional criteria (2023 Diving Code 5.7.2 and 5.7.3)

1 In order to achieve the goal set out in section **6.7.1** above, the voyage plan is to take into account the potential hazards of the intended voyage while a diving unit is under way.

2 In order to comply with the functional criteria of section **-1** above, while the vessel is a diving unit, the master is to consider a route, taking into account the following:

(1) Any limitations of the hydrographic information and aids to navigation available. Published information is to be supplemented with the latest available site-specific information for locations that diving or underwater operations are to be carried out.

(2) Current information on fixed structures and moored vessels at the planned underwater operational locations. This is to include the increased effective draught of the diving unit while submersible parts of the diving system, still attached to the diving platform, are deployed in mooring patterns and catenaries of mooring lines of vessels and/or suspended hazards which will be in close proximity to the intended underwater operations. The information also needs to include the maximum and minimum catenary heights and details or reference to the safe system of work to be used to control the interfaces with these hazards.

(3) Limitations placed on the voyage due to the provisions implemented in **Chapter 4**.

(4) Limitations on the diving platform's geographical location and operating conditions in order to remain compliant with the hyperbaric rescue plan.

(5) Limitations on geographical location or duration of operation imposed by diving platform endurance such as fuel tankage, freshwater capacity, provision stores, gas and diving consumables.

(6) A diving unit operating in polar waters is to comply with Chapter 11 (Voyage planning) of the Polar Code, as amended.

Contents

GUIDANCE FOR DIVING SYSTEMS

Chapter 2 SURVEYS OF THE DIVING UNIT AND SYSTEMS

2.1 General

2.1.2 Survey Intervals

The wording "the Society may approve the survey methods which it considers to be appropriate." in **2.1.2-2(3) of the Rules** means survey methods which the Society considers to be able to obtain information equivalent to that obtained through traditional ordinary surveys where a surveyor is in attendance.

2.1.4 Procedure for Tests, Wear and Tear, etc.

With respect to **2.1.4-5 of the Rules**, surveyors are to confirm at periodical surveys that asbestos-free declarations and supporting documents are provided for any replaced or newly installed fittings, equipment, parts, etc. The wording "materials containing asbestos" means that asbestos is present in the product/material above the threshold value stipulated in Appendix 1 of *IMO* resolution *MEPC*.379(80).

2.2 Registration Surveys

2.2.1 Registration Surveys

1 The wording "the Society may approve other survey methods which it considers to be appropriate" in **2.2.1-1 of the Rules** means survey methods which it considers to be able to obtain information equivalent to that obtained through traditional ordinary surveys and tests where the Surveyor is in attendance.

2 With respect to **2.2.1-5 of the Rules**, surveyors confirm the asbestos-free declarations and supporting documents specified in **2.2.2-2(9) of the Rules**. The wording "materials containing asbestos" means that asbestos is present in the product/material above the threshold value stipulated in Appendix 1 of *IMO* resolution *MEPC*.379(80).

Chapter 4 OPERATIONAL CAPABILITIES AND LIMITATIONS OF DIVING PLATFORMS FOR CONDUCTING SAFE DIVING OPERATIONS

4.5 Placement and Configuration of Diving System on Diving Platform (2023 Diving Code 3.5)

4.5.1 Goal (2023 Diving Code 3.5.1)

1 There is to be sufficient deck area for the diving system, including the provision of a level of access allowing operational personnel the ability to carry out their duties safely and efficiently.

2 The placement and configuration of the diving system plant and equipment are to ensure compliance with **4.3 of the Rules,** "Geographic location and environmental conditions".

3 The placement and configuration of the diving system are to comply with **4.8 of the Rules,** "Fire safety".

4.5.2 Functional Criteria (2023 Diving Code 3.5.2 and 3.5.3)

Regarding the "Zone 0" specified in **4.5.2-2(2) of the Rules,** diving systems are not to be permitted in hazardous area designated as Zone 0 in *IEC* 60079-10-1 and electrical equipment is to be suitable for the Zone in which it is located.

4.6 Subdivision and Stability (2023 Diving Code 3.6)

4.6.1 Goal (2023 Diving Code 3.6.1)

The diving platform is to have a sufficient freeboard height. Diving platforms where decks are constantly awash, even in moderate seas, are to be considered unsuitable for diving operations.

4.7 Position Keeping (2023 Diving Code 3.7)

4.7.2 Functional Criteria (2023 Diving Code 3.7.2 and 3.7.3)

Where divers enter the water directly from the diving platform specified in **4.7.2-1 of the Rules,** a daughter-craft is not considered to be the diving platform.

Chapter 5 DIVING SYSTEM DESIGN, CONSTRUCTION, INSTALLATION, TESTING AND SURVEY

5.3 Diving System Design (2023 Diving Code 4.3)

5.3.1 Goal (2023 Diving Code 4.3.1)

1 Design and interface of the diving system on the diving platform are to consider different dynamic loads when operating over-the-side, through a moonpool or from the stern.

2 For diving equipment and plant that have automated functions, a systematic engineering assessment of the diving system and its sub-systems is to be completed. The assessment is to identify all components and control systems that contain automated functions during normal operation, maintenance and testing phases within the diving system.

5.4 Pressure Vessels for Human Occupancy(PVHO) (2023 Diving Code 4.4)

5.4.1 Goal (2023 Diving Code 4.4.1)

All interlocks on PVHO are to prevent inadvertent opening of the mechanism/door if pressure is still inside the lock and prevent obtaining a gas tight seal on the lock if the mechanism/door is not properly closed.

5.4.3 Surface Compression Chambers (2023 Diving Code 4.4.3)

The minimum internal diameter of the “surface compression chamber” referred to in **5.4.3 of the Rules**, is to allow for the management of a casualty (See **Table 5.4.3**).

Table 5.4.3 Surface compression chamber minimum diameter

Surface Compression Chamber Use	Minimum internal diameter (*m*)
Surface Orientated Diving Support	1.50
Saturation Diving	1.80
Hyperbaric Survival Craft	1.70

5.4.5 Hyperbaric Survival Craft(HBSC) PVHO (2023 Diving Code 4.4.5)

It is recommended that the “manifold” referred to in **5.4.5-2(10) of the Rules**, is to include the international standard connections and configurations shown in **Table 5.4.5**, or equivalent.

Table 5.4.5 HBSC manifold is to include the international standard connections and configurations

HBSC Manifold service	Standard connector(1)
Internal pressure (Diving depth monitoring)	Snap-tite SVHN 4-4F
Communications	Crouse Hinds Electro Products (also referred to as an Electro Oceanics (EO) or Watermate) female, Series 53, model 53F8F-1 with 4 sockets and 2 contacts per socket.
	Communications are two wire and utilize the inboard (odd number) contact from each of the sockets either side of the polarizing hole.
Electrical power supply	Crouse Hinds Electro Products (also referred to as an Electro Oceanics (EO) or Watermate) male, Series 53, model 53E4M-1 with 4 sockets and 1 contact per pin.
	Electrical power supply, single phase 240 VAC either 50 or 60 Hz. Current should be limited to 15 A.
	Viewed end-on with the polarizing pin at the top, first pin clockwise is live contact, second neutral contact and the third ground.
Analysis of HBSC PVHO internal environment	Snap-tite SVHN 4-4F
Oxygen addition	Snap-tite BVHN 6-6F
Built-in breathing system (BIBS) supply	Snap-tite BVHN 12-12F
Blow-down (Pressurization)	Snap-tite BVHN 12-12F
Exhaust	Snap-tite BVHN 12-12F
Hot water supply	Snap-tite BVHN 12-12F
Hot water return	Snap-tite BVHN 12-12F

Note:

Other products to a similar specification may be available.

5.7 Pipes, Valves, Fittings and Hoses (2023 Diving Code 4.7)

5.7.2 Functional Criteria (2023 Diving Code 4.7.2 and 4.7.3)

All pipework systems and associated valves for gases containing greater than 22 % oxygen as specified in **5.7.2-2(10)** and **(13) of the Rules,** is to be designed to reduce temperature increases due to adiabatic compression. Where required by the Society, systems may need to be subject to oxygen pressure surge testing.

5.8 Breathing Gas Supply, Storage and Temperature Control (2023 Diving Code 4.8)

5.8.2 Functional Criteria (2023 Diving Code 4.8.2 and 4.8.3)

1 Critical equipment for survival of the divers inside a lost diving bell as specified in **5.8.2-2(8) of the Rules,** is to be tested to ensure that it is capable of keeping the divers alive and reasonably healthy for a minimum period of 24 hours.

2 All life-support systems and other critical equipment for survival of the divers inside an HBSC as specified in **5.8.2-2(8) of the Rules,** are to be tested to ensure that the hyperbaric evacuation systems are capable of keeping the divers alive and fit for purpose for a minimum period of 72 hours.

3 The colour coding for piping systems and gas storage cylinders/pressure vessels as specified in **5.8.2-2(9) of the Rules,** is to comply with *EN* 1089-3 Transportable gas cylinders-Gas cylinder identification (excluding LPG) Part 3: Colour coding, or equivalent standards.

5.9 Diving Launch and Recovery Systems(LARS) (2023 Diving Code 4.9)

5.9.1 Goal (2023 Diving Code 4.9.1)

1 For LARS that have automated functions, a systematic engineering assessment of the diving system and its sub-systems is to be completed. The assessment is to identify all components and control systems that contain automated functions during normal operation, maintenance and testing phases within the dive system. Particular attention is to be given to the connection and disconnection of a PVHO.

2 Any crane that may be required for an emergency recovery of a system deployed by a launching appliance or a LARS is to have sufficient lift capacity and length of wire.

5.9.3 Diving Bell LARS (2023 Diving Code 4.9.3)

1 Techniques for safe emergency retrieval of the bell occupants to the surface compression chamber (surface orientated Transfer Under Pressure diving may require special consideration) if the primary and secondary means fail as specified in **5.9.3-3(8) of the Rules**, may include bell to bell through water transfer or buoyant ascent of the bell.

2 If the emergency retrieval described in **-1** above involves buoyant ascent, the bell is to have sufficient stability to maintain a substantially upright position and means are to be provided to prevent accidental release of the ballast weights.

5.9.4 Surface Orientated Diving LARS (2023 Diving Code 4.9.4)

1 If a ladder as specified in **5.9.4-3(9) of the Rules** is to be used as a means of access to and egress from the water, then it is to be securely mounted, extend at least 2 *m* below the water and have sufficient hand holds above water to allow the diver to step easily on to the embarkation point.

2 If stairs as specified in **5.9.4-3(9) of the Rules** are to be used as a means of access to and egress from the water, then they are to be securely mounted, extend at least 2 *m* below the water and have a hand rail above water to allow the diver to step easily on to the embarkation point.

5.10 Fire Protection (2023 Diving Code 4.10)

5.10.2 Functional Criteria (2023 Diving Code 4.10.2 and 4.10.3)

Any extinguishing agent specified in **5.10.2-2(2) of the Rules** is to have a cooling effect equivalent to or better than water.

5.11 Electrical System (2023 Diving Code 4.11)

5.11.1 Goal (2023 Diving Code 4.11.1)

The safe use of electrical systems for diving operations may be achieved by following industry good practice, such as IMCA D 045 “Code of practice for the safe use of electricity underwater”.

5.11.2 Functional Criteria (2023 Diving Code 4.11.2 and 4.11.3)

1 Diving system switchboards specified in **5.11.2-2(4) of the Rules** are to be considered to extend to the switchboards to which the emergency consumers are first connected to the emergency electrical power source.

2 The emergency load for the diving system specified in **5.11.2-2(5)(a) of the Rules** needs to include electrical power to systems that are essential for maintaining life-support and for returning divers to a point of safety. However, the distribution system may be designed for staged reconnection/disconnection of emergency consumers. Consumers, such as LARS/diver hot water, may be disconnected after divers in the water are recovered to the surface compression chamber complex. Similarly emergency consumers such as environmental control of the surface compression chamber complex (that are not time critical) may be connected manually after switchover to emergency electrical power. Where manual intervention is required to manage the emergency electrical power system these switchboards are to be easily accessible within the diving system area.

5.12 Control Systems (2023 Diving Code 4.12)

5.12.2 Functional Criteria (2023 Diving Code 4.12.2 and 4.12.3)

1 Equipment is to be provided at the central control position specified in **5.12.2-2(6) of the Rules,** to monitor the values of the following parameters **(1)** to **(4)** for:

(1) Each occupied compartment (See **Table 5.12.2-1**)

(2) Divers (See **Table 5.12.2-2**)

(3) Central dive control should have monitored pressurisation and breathing gas sources (See **Table 5.12.2-3**)

(4) Central saturation control should have the following monitored pressurisation and breathing gas sources (See **Table 5.12.2-4**)

2 The term "source" is used, in **(3)** and **(4)** above, to describe a means of providing the breathing or pressurization gas going into the control panel, and the term "supply" is used, in **5.8 of the Rules,** to refer to the breathing or pressurisation gas going to the diver/dive basket/wet-bell/PVHO from the control panel (See **Fig 5.12.2-1**).

3 The fundamental principle to the provision of breathing gas to divers is that any diver is to have ready access to two sources of breathing gas (a primary and a secondary source), at least one of which is to be supplied solely for the individual's own use, i.e., provide an independent supply of breathing gas.

4 The diver's bail-out is not considered as a primary or secondary source. The air supply to each diver is to be arranged such that if one line fails then this does not interfere with the supply to another diver.

Table 5.12.2-1 PVHO compartment monitoring

Parameter	Compartments		
	Surface compression chamber (Each Lock)	Diving bell	HBSC
Pressure or diving depth (1)(2)	X	X(2)	X
Temperature (1)(3)	X	-	X
Humidity	X	-	X
Oxygen partial pressure (1)(3)	X	X	X
Carbon dioxide partial pressure (1)(3)	X	X	X
Video Surveillance	X	X	X
Special Environments			
Contaminants (4)	-	X	-

Notes:

(1) These parameters are to be indicated continuously.

(2) Pressure or diving depth both inside and outside the bell is to be indicated.

(3) High and low alarms are to be provided (audible and visible).

(4) As identified in project working areas requiring this monitoring, such as H_2S and hydrocarbon contaminated worksites.

Table 5.12.2-2 Diver monitoring

Parameters					
	Diver 1	Diver 2	Standby Diver	Reclaim Gas	Machinery
Pressure or diving depth(1)	X	X	X	-	-
Oxygen partial pressure (1)(2)	X	X	X	X	-
Carbon dioxide partial pressure (1)(2)	-	-	-	X	-
Carbon Monoxide (1)(2)	-	-	-	X	-
Diver Suit heating medium (1)(2)	X	X	X	-	X

Note:
(1) These parameters are to be indicated continuously.
(2) A high and low alarm is to be fitted (audible and visible).

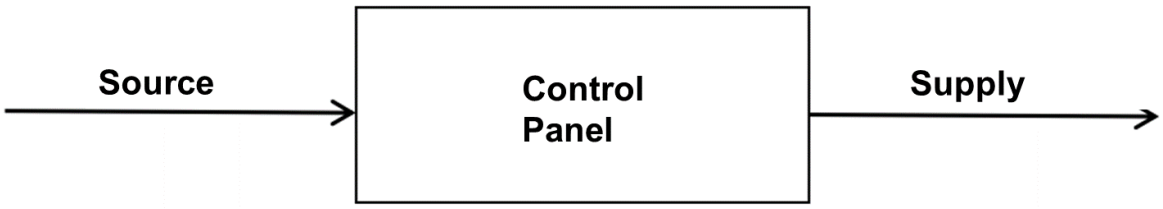
Table 5.12.2-3 Central dive control monitored pressurization and breathing gas sources

	Primary Source of Gas	Independent Secondary Source of Gas
Surface Orientated Diving		
One Working Diver	One	One
Two Working Divers (Alternative 1)	One per diver	One per two divers
Two Working Divers (Alternative 2)	One for two divers	One per diver
Surface Standby Diver	One (separate from working divers)	One (common with working diver's secondary source)
Wet Bell Services	One	One (can be from onboard gas)
Saturation Diving		
Diving Bell	One (from surface)	One (can be from surface or onboard gas)
Working Divers	One (from surface)	-
Bell Man	One onboard gas or surface	One common with working divers
Oxygen	One onboard gas	-

Table 5.12.2-4 Central saturation control monitored pressurization and breathing gas sources

	Primary Source of Gas	Independent Secondary Source of Gas
Each Chamber Compartment	One	One (this can be a separate source and common pipe to the compartment)

Fig. 5.12.2-1 Illustration of source and supply



5.14 Maintenance and Testing (2023 Diving Code 4.14)

5.14.1 Goal (2023 Diving Code 4.14.1)

1 The availability of any hyperbaric evacuation system provided is dependent on the regular testing and maintenance of the

system. A planned maintenance and testing programme are to be devised with the responsibility for carrying out the maintenance tasks being allocated to specific crew members. A maintenance and testing schedule are to be available for recording the execution of the tasks and the signatures of the persons allocated the tasks. Such schedules are to be maintained on board and be available for inspection.

2 The Diving organization is to appoint persons who are competent for the purposes of maintaining, testing and certifying diving equipment.

5.15 Hyperbaric Survival Craft(HBSC) (2023 Diving Code 4.15)

5.15.2 Functional Criteria (2023 Diving Code 4.15.2 and 4.15.3)

1 Where the HBSC has fuel tanks, these need to be completely full at all times to ensure that it is capable of surviving autonomously for 72 hours.

2 Medical equipment in accordance with DMAC 15 “Medical Equipment to be held at the Site of an Offshore Diving Operation” or similar is to be available to the occupants of an HBSC PVHO.

(Note)

(DMAC15 has been developed by the Diving Medical Advisory Committee (DMAC), which is an independent advisory body comprised of hyperbaric medical physicians supporting the international diving industry.)

3 In determining the degree of stability to be provided for self-righting, consideration is to be given to the adverse effects of large righting moments on the divers. Consideration is also to be given to the effect which equipment and rescue personnel, required to be placed on the top of the system to carry out a recovery from the sea, may have on the stability of the semi-submerged PVHO HBSC.

Chapter 6 DIVING OPERATIONS AND SAFETY MANAGEMENT

6.3 Diving operations from the diving unit (2023 Diving Code 5.3)

6.3.1 Goal (2023 Diving Code 5.3.1)

1 The entity which owns the diving unit may or may not be the company which performs the diving operations. Third-party companies may charter or hire a diving unit temporarily. Organizations which may charter a diving unit include diving service contractors, marine salvage companies, scientific organizations, military, or public/civil service divers. Procedures, plans and instructions for diving operations to be included in or referenced by the diving platform safety management system are to include, but are not be limited to, the following **(1)** to **(13)**:

(1) personnel familiarization with dive equipment and processes;

(2) equipment preparation checklists;

(3) pre-dive and post-dive inspections and checklists;

(4) diver deployment and recovery instructions;

(5) diver communication and monitoring instructions;

(6) diver tether/umbilical management instructions;

(7) diver standard and emergency decompression instructions;

(8) PVHO pressurization and decompression instructions;

(9) life-support/atmosphere monitoring and control instructions;

(10) diving gases management instructions;

(11) diver health management instructions;

(12) catering, hygiene and cleaning instructions; and

(13) instructions for diver interface with ROV, ships tools and equipment.

2 With respect to the items specified in **-1** above, it can be addressed through a bridging document between the safety management systems of the diving platform and the diving contractor.

6.3.2 Functional criteria（2023 Diving Code 5.3.2 and 5.3.3）

With regard to the integration documentation specified in **6.3.2-2(8) of the Rules**, it is to be implemented in accordance with the Revised guidelines for the operational implementation of the International Safety Management (*ISM*) Code by companies (*MSC-MEPC*.7/Circ.8).

6.4 Diving organization's occupational health and safety management system (2023 Diving Code 5.4)

6.4.1 Goal (2023 Diving Code 5.4.1)

1 When diving operations are performed by a diving organization from a diving unit that is not the owner or operator of the diving platform, the diving organization is to have an occupational health and safety management system which can be aligned with the diving platform's safety management system.

2 The occupational health and safety management system specified in **-1** above, is to list or include by reference occupational/commercial diving practices and methods which are proven to reduce risks relevant to the diving tasks being carried out by the diving unit.

3 The safety management system is to be approved by a relevant coastal State and/or accredited to, or comply with, a recognized system, such as *ISO* 45001.

4 Where an Administration does not have a national diving standard, international diving standards available to the Administration for consideration of diving safe practices include, but are not limited to, the following **(1)** to **(3)**:

(1) International Marine Contractors Association (IMCA);

(2) International Association of Oil and Gas Producers (IOGP); and

(3) Association of Diving Contractors International (ADCI).

6.4.2 Functional criteria (2023 Diving Code 5.4.2 and 5.4.3)

The occupational health and safety management system specified in **6.4.2-2(1) of the Rules** is to be approved by a relevant coastal State and/or accredited to, or comply with, a recognized system, such as *ISO* 45001.

6.5 Manning and training (2023 Diving Code 5.5)

6.5.1 Goal (2023 Diving Code 5.5.1)

1 Medical fitness for divers requires periodic evaluation and assessment, by medical doctors with training and experience in diving medicine. Administrations may recognize fitness to dive medical exams conducted to a national legislation where it exists, or an international standard, such as the Diving Medical Advisory Committee (DMAC), or the Undersea Hyperbaric and Medical Society (UHMS).

2 Divers require specialized training in diving physics, physiology, methods of diving and diving equipment. Administrations may recognize training and certification intended for occupational and commercial divers which meet national legislation requirements where they exist, or an international standard, such as those established by IMCA or ADCI.

6.6 Emergency preparedness (2023 Diving Code 5.6)

6.6.1 Goal (2023 Diving Code 5.6.1)

1 Procedures for emergencies specified in **6.6 of the Rules** are to include, but not be limited to, the following **(1)** to **(6)**:

(1) loss and malfunction of critical diving system components;

(2) loss of pressure containment and suitable atmosphere inside a PVHO;

(3) recovery of diver(s), diving basket(s) and diving bell(s) when operating limitations are exceeded;

(4) location and recovery of diver(s), diving basket(s) and diving bell(s) when lost;

(5) loss of position and position keeping; and

(6) diving illness and injury of a diver while in the water or inside a PVHO.

2 Oxygen is to be provided for divers using conventional lifeboats during an evacuation who may be injured or have decompression illness.

6.6.2 Functional criteria (2023 Diving Code 5.6.2 and 5.6.3)

1 The hyperbaric evacuation planning guidelines specified in **6.6.2-2 of the Rules** are to be developed with a view to promoting the safety of all divers in saturation and achieving a standard of safety for divers which corresponds, so far as is practicable, to that provided for other seagoing personnel.

2 The hyperbaric evacuation planning guidelines specified in **-1** above, are to be considered following situation **(1)** to **(3)**.

(1) A potentially hazardous situation can arise if a diving unit from which saturation diving operations are being carried out has to be abandoned with a diving team under pressure. While this hazard is to be reduced by pre-planning, under extreme conditions consideration may have to be given to hyperbaric evacuation of the divers. The hyperbaric evacuation arrangements is to be studied prior to the commencement of the dive operation and suitable written contingency plans made.

(2) Once an HBSC has been launched, the divers and any support personnel may be in a precarious situation where recovery into another facility may not be possible and exposure to seasickness and accompanying dehydration will present further hazards. It is, therefore, necessary that diving organizations ensure that any such contingency plans include appropriate solutions.

(3) In preparing the contingency plans, various possible emergency situations are to be identified taking into consideration the geographical area of operation, the environmental conditions, the proximity of other vessels, and the availability and suitability of any onshore or offshore facilities. The facilities for rescue, recovery and subsequent medical treatment of divers evacuated in such circumstances are to be considered as part of the contingency plan.

3 The hyperbaric evacuation planning guidelines specified in **-1** above, are to be considered following items **(1)** to **(3)**.

(1) It is recognized that there are various methods available for evacuating divers in an emergency and that the suitability of the various options for safe hyperbaric evacuation depends on a number of factors. The risk associated with divers being inside an HBSC increases with exposure to that environment and, therefore, the time spent being exposed to this risk should be as low as reasonably practicable (ALARP).

(2) The hyperbaric evacuation plan is to allow execution of the plan such that the divers can reach a place of safety (typically a hyperbaric reception facility (HRF)) in a time frame which is less than 75% of the HBSC survival endurance capability (which typically equates to 54 hours). Such planning is to be based on the capability of the HBSC, support vessel and systems at best speed based on expected mean weather conditions for the region and the time of year.

(3) A vessel may be required to provide contingency facilities to a diving unit, e.g. carry a standby recompression facility on deck for use in the event of a hyperbaric evacuation from a diving unit. Due to the restricted nature of the recompression facility, only relevant sections of this Code will apply to this vessel and the recompression facility. See **-5** below on Standby diving units.

4 The hyperbaric evacuation planning guidelines specified in **-1** above, are to be considered following additional items **(1)** to **(5)**.

(1) As part of every project preparation, it is recommended that a meeting take place to agree the hyperbaric evacuation requirements. This is to be captured in the risk assessment process.

(2) The planning for the reception site(s) needs to include a consideration of all the assets, resources and services that are available. This is to include a suitable crane, electrical power supplies, water supplies, food supplies for the chamber occupants and human effluent management, accommodation and food for the life-support team and other personnel. If there are suitable personnel available, for example if there is a hyperbaric facility or another diving organization in the vicinity that has on call life-support personnel, they are to be informed of the potential request for their help in dealing with an emergency.

(3) If the reception site cannot be established at the quayside at which the HBSC will arrive, then a method of transporting the HBSC to the reception facility is to need to be included in the plan.

(4) Lifting appliances that will lift an HBSC at sea are to have a cargo rated capacity at the actual radius of lift of not less than 2 times the weight of the loaded HBSC and be further derated taking into account following **(a)** to **(i)**:

(a) weight of the loaded HBSC;

(b) radius of the lift;

(c) specific pendant arrangement and hook;

(d) risk of damage to HBSC from pendant and hook;

(e) lift speed and HBSC movement;

(f) static or dynamic lift;

(g) sea state;

(h) wind speed; and

(i) load offset from the vertical.

(5) For lifting appliances that will lift the HBSC onshore or from a vessel in harbour, the cargo rated capacity at the actual radius of lift is not to be less than two times the weight of the loaded HBSC (when divers/personnel are on board the HBSC).

5 The standby diving units specified in **-3(3)** above, are to be considered following situation **(1)** to **(3)**.

(1) Standby diving units are solely for the purpose of rescuing divers from a diving unit. This rescue may be for recovery, transport to or acting as a place of safety. It may also be considered as a surface unit for submarine escape and rescue activities.

(2) The plant and equipment that may be required on a standby diving unit varies considerably both in terms of operation and type.

(3) Survey requirements for the following **(a)** to **(d)** standby diving units are as follows.

(a) Standby diving units that receive surface orientated survivors not involving the use of an HBSC is not to require survey in accordance with section **6.2 of the Rules**. However, the related plant and equipment on board are to be surveyed in accordance with section **6.3 of the Rules** as applicable.

(b) Standby diving units that recover HBSC and/or transport them to a place of safety on land are not to require survey in accordance with section **6.2 of the Rules**. However, the related plant and equipment on board are to be surveyed in accordance with section **6.3 of the Rules** as applicable. Lifting appliances for the recovery of an HBSC are to be surveyed after installation.

(c) Standby diving units that act as a place of safety at sea is to be surveyed in accordance with both section **6.2** and **6.3 of the Rules** as applicable. Hyperbaric evacuation arrangements from a standby diving unit are to be surveyed only with respect to diving operations that may be carried out during trials of such units.

(d) Standby diving units that in an emergency situation use portable equipment to create a standby diving unit (as per **(2)** or **(a)** to **(c)** above) do not require a survey to section **6.2 of the Rules** provided a procedure for mobilization has been

approved by the certifying authority issuing Part II of the DUSC for that equipment.

6 The training and evacuation drills are to be considered following situation **(1)** to **(5)**.

(1) Periodic training exercises are to be carried out to test the operation of the hyperbaric evacuation system and the efficiency of the personnel responsible for the hyperbaric evacuation of the divers. Such training exercises are not to normally be carried out while the chambers are pressurized, but are to be carried out at each available opportunity.

(2) All safety-critical equipment and procedures are to be tested, trialled and periodically drilled. HBSC is to be tested on a similar periodicity to the life-saving appliances within *SOLAS*.

(3) In cases where the hyperbaric evacuation system cannot be launched due to the dive system being pressurized, an entry is to be recorded in such logbook as may be prescribed by the Administration explaining why the drill could not be undertaken, and the launch is to take place at the first available opportunity.

(4) It is recommended that the crew assigned to launching of the hyperbaric evacuation system "walk through" the procedures for launch at regular intervals, so that they are familiar with the operation of the launching system.

(5) The following **(a)** to **(f)** are to be considered, where appropriate, in conjunction with a SAR Cooperation plan:

(a) HBSC recovery;

(b) connection of support vessel life-support systems to HBSC;

(c) HBSC towing trials with emergency life-support umbilical;

(d) HBSC shore-side recovery;

(e) HBSC road transport with life-support package systems; and

(f) HBSC mating trials with hyperbaric reception facility (HRF).

7 The additional items of hyperbaric evacuation planning are to be confirmed according to the following **(1)** and **(2)**.

(1) IMCA D 052, Guidance on Hyperbaric Evacuation Systems; and

(2) IOGP Report 478, Performance of saturation diving emergency hyperbaric evacuation and recovery.