SOCIALIST REPUBLIC OF VIETNAM

QCVN 58: 2013/BGTVT

NATIONAL TECHNICAL REGULATION ON DIVING SYSTEMS

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Preamble

National Technical Regulation on Diving Systems QCVN 58: 2013/BGTVT is compiled by Vietnam Register, verified by the Ministry of Science and Technology, promulgated by the Minister of Transport under Circular No. 06/2013/TT-BGTVT dated 2 May 2013.

QCVN 58: 2013/BGTVT is complied on the basis of National Standard "Rules for the Survey and Construction of Diving Systems" TCVN 6281: 2003.

NATIONAL TECHNICAL REGULATION ON DIVING SYSTEMS

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1.1 Application and Scope

1.1.1 Application

1 The present National Technical Regulation (hereinafter referred to as “Regulation”) applies to the surveys and constructions of the diving systems of sea-going ships which are subject to the technical surveys and classified by Vietnam Register.

2 Relevant requirements in QCVN 21: 2010/BGTVT "National Technical Regulation - Rules for the classification and construction of sea-going steel ships" also apply to diving systems, except otherwise specified in this Regulation.

1.1.2 Scope

The present Regulation is to apply to organizations and individuals involving activities relating to diving systems and falling under the application as specified in 1.1.1 above, including Vietnam Register (hereinafter referred to as "VR"); ship owners; diving system operators, designers, building yards, renovating and repairing yards.

1.2 References, Definitions and Explanations

1.2.1 References

1 QCVN 21: 2010/BGTVT, "National Technical Regulation - Rules for the classification and construction of sea-going steel ships" promulgated in accordance with Circular 12/2010/TT-BGTVT dated 21 April 2010.

2 QCVN 23: 2010/BGTVT, "National Technical Regulation - Rules for cargo handling appliances of ships" promulgated in accordance with Circular 11/2010/TT-BGTVT dated 20 April 2010.

3 Circular No.32/2011/TT-BGTVT dated 19 April 2011 of the Ministry of Transport stipulated on amendments and supplements to a number of articles of the Regulations on verification registration of ships in Vietnam, accompanying Decision No. 51/2005/QD-BGTVT dated 12 October 2005 of the Minister of Transport.

1.2.2 Definitions and Explanations

Unless expressly provided elsewhere, the definitions in -1 to -10 below are to be applied in this Regulation:

1 “Diving system” is a diving bell capable of submerging and surfacing without depending upon controlling of its buoyancy and such plant and equipment as a deck decompression

chamber, handling systems and a breathing gas supply system installed on board the attendant ship.

2 "Attendant ship" is a ship on board of which diving systems are installed.

3 "Diving bell" is a submersible chamber, including such equipment as a drop weight and a emergency breathing gas supply system, for transfer of divers between the underwater work site and the attendant ship.

4 "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.

5 "Deck decompression chamber" is a pressure vessel installed on board the attendant ship for adjusting the pressure for diving operation and carrying out emergency repressurizing in case where troubles due to high pressure may occur, which is composed of the shell structure, closing means, view ports and their accessories .

6 "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.

7 "Anniversary date" is the day corresponding to the expiry date of the Classification Certificate, excluding expiry date of the Classification Certificate.

8 "Hazardous areas" are those locations in which an explosive gas-air mixture is continuously present, or present for long periods (hazardous areas zone 0); in which an explosive gas-air mixture is likely to occur in normal operation (hazardous areas zone 1); in which an explosive gas-air mixture is not likely to occur, and if it does it will only exist for a short time (hazardous areas zone 2).

9 "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.

10 "Living compartment" means the part of the deck decompression chamber which is intended to be used as the main habitation for the divers during diving operations and which is equipped for such purpose .

II TECHNICAL REGULATIONS

CHAPTER 1 GENERAL

1.1 General

1.1.1 Equivalency

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

1.1.2 Modification of requirements

VR may modify parts of the requirements in the Regulation taking the national requirements of the ship's flag state, and kind and intended service area of the ship into consideration.

1.1.3 Diving systems with novel design features

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

1.1.4 General Requirements

1 As far as reasonable and practicable, a diving system is to be designed to minimize human error an 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.

1.1.5 Evacuation System

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 Regulation.

CHAPTER 2 SURVEYS OF THE DIVING 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 diving systems (hereinafter referred to as "Initial surveys").

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

(a) Special surveys;

(b) Annual surveys;

(c) Occasional surveys.

2.1.2 Survey intervals

1 Initial surveys are to be carried out at times when applications for registration are made.

2 Periodical surveys are to be carried out at the times as prescribed in (1) to (3) below:

(1) Special Surveys are to be carried out at intervals specified in 1.1.3-1(3) Part 1B Section II QCVN 21: 2010/BGTVT.

(2) Annual Surveys are to be carried out at intervals specified in 1.1.3-1(1) Part 1B Section II QCVN 21: 2010/BGTVT.

(3) An Occasional Survey: at a time falling on any of (a) to (c) mentioned below, independently of Special Surveys and Annual Surveys:

(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 VR.

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 1B Section II QCVN 21: 2010/BGTVT.

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 1B Section II QCVN 21: 2010/BGTVT.

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 Regulation 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 VR. 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 case where the replacement of any accessories, equipments or parts, etc. of the diving system is necessary, such replacement is to be in accordance with requirements applied for the manufacure of the diving system. However, where clearly specified by new requirement or deemed necessary by VR, VR may require such replacement to be in accordance with new effective requirements. In addition, such replacement are not to contain asbestos.

2.1.5 Laid-up Ships

1 Laid-up ships are not subject to those Periodical 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 Periodical Survey have not transpired while the ship was laid-up, then the survey having scope equivalent to anual survey specified in 2.3.2 is to be carried out.

(2) If the due dates for Periodical Surveys have transpired while the ship was laid-up, then these Periodical Surveys are, in principal, to be carried out. However, where special survey and anual survey are due, only special survey may be carried out.

2.2 Initial Surveys

2.2.1 Initial Surveys

1 The presence of the Surveyor is required when the tests and inspections specified in 2.2.3 to 2.2.9 are carried out.

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

3 As for the machinery and equipment holding adequate certificates, VR 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 VR to be carried out on real subjects may be substituted by tests on suitable models or samples.

2.2.2 Drawing and data

1 For the diving systems intended to be registered, three copies of the following drawings and data are to be submitted for approval by VR:

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

(2) Details of installation of the diving 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 deck decompression 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 deck decompression chamber by pipes, shafts, cables, etc;

(13) Construction of electrical machinery and equipment and cables installed in the hyperbaric diving bell and the deck decompression chamber;

(14) Construction of cables and cable connectors subjected to external pressure;

(15) Details of welding procedures on the pressure hull and the deck decompression 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 deck decompression 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 2.2.10;

(26) Other plans and documents deemed necessary by VR.

2 For the diving systems intended to be registered, the following drawings and data are to be submitted to VR 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, cover, etc. of the deck decompression chamber;

(5) Calculation of strength of the handling system;

(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) Other plans and documents deemed necessary by VR.

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 VR, 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 3 Section II QCVN 21: 2010/BGTVT;

(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 or 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 deck decompression chamber

1 The shell structure of the deck decompression chamber and its covers, fittings etc. are to undergo tests and inspections in accordance with the requirements for pressure vessels, Group I Chapter 10 Part 3 Section II QCVN 21: 2010/BGTVT.

2 The windows provided on the deck decompressions chamber are to undergo hydrostatic tests at a pressure 1.5 times the approved working pressure of the deck decompression chamber and it is to be confirmed that no leakage nor injurious deformation exists.

3 Upon completion of all works, the deck decompression 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.

2.2.5 Survey of Evacuation System

The survey of the evacuation system is to be in accordance with the requirements for the deck decompression chamber specified in 2.2.4.

2.2.6 Survey of handling system

1 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 QCVN 23: 2010/BGTVT;

(2) Breaking tests are to be carried out for ropes correspondingly in accordance with the requirements in Part 7B Section II QCVN 21: 2010/BGTVT;

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

2.2.7 Survey of pressure vessels, piping systems, etc.

1 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 3 Section II QCVN 21: 2010/BGTVT.

(2) Piping systems as a rule, are to undergo the tests in accordance with the requirements in Chapter 12 Part 3 Section II QCVN 21: 2010/BGTVT. In this case, the important piping systems such as piping systems penetrating the diving bell or the deck decompression 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 3 Section II QCVN 21: 2010/BGTVT;

(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 deck decompression 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 deck decompression chamber. However, omission of tests or modification of test pressure may be made in consideration of their construction and operating procedure.

2.2.8 Survey of electrical installation

1 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 high pressure gas supply system specified in 8.5.5 are to undergo tests in accordance with the requirements in Part 4 Section II QCVN 21: 2010/BGTVT;

(3) Penetrating parts of cables through the diving bell specified in 8.5.8-4 are to be hydrostatically tested by a method approved by VR;

(4) Cables are to undergo tests in accordance with the requirements in Part 4 Section II QCVN 21: 2010/BGTVT. However, for the cables used inside the hyperbaric diving bell and the deck decompression chamber, tests in consideration of the environmental condition, and 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 fitted inside the hyperbaric diving bell and the deck decompression chamber are to undergo tests by a method approved by VR in order to confirm that can be used safely in their environmental condition.

2.2.9 Survey of other equipment

1 Performance tests are to be carried out on the following:

(1) The life support system specified in Chapter 5;

(2) The instruments and communication system specified in Chapter 6;

(3) The emergency surfacing arrangement specified in Chapter 7;

(4) The fixed fire-extinguishing system, the fire detection and alarm system and the water spray system specified in 9.2;

(5) The emergency locating device specified in 6.2.2.

2.2.10 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 Periodical 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 deck decompression 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 deck decompression 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 2.2.6-1(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 VR;

(8) Upon removal by a cable penetrating parts through the diving bell, hydrostatic tests by a method approved by VR. 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 VR;

(9) Pressure tests of pipes 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 deck decompression chamber, where deemed necessary;

(11) Performance tests of the following:

(a) The life support system specified in Chapter 5;

(b) The instruments and the communication system specified in Chapter 6;

(c) The lighting arrangement;

(d) The electric power receiving system specified in 8.5.5;

(e) The emergency surfacing arrangement specified in Chapter 7;

(f) The fire detection and alarm system specified in 9.2.2;

(g) The emergency locating device specified in 6.2.2.

(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 9.2.

(14) Any other inspections deemed necessary by VR.

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 VR and diving tests to the depth deemed appropriate by VR 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 Survey.

CHAPTER 3 DIVING BELL AND DECK DECOMPRESSION CHAMBER

3.1 General

3.1.1 Stability

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

3.1.2 Consideration for corrosion

1 For the parts of the diving bell and deck decompression chamber where corrosion may occur, appropriate anticorrosion measures are to be taken in accordance with 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.

3.1.3 Consideration for fire protection

1 The materials composing the shell structure of the deck decompression chamber are to be non-combustible.

2 The materials composing the pressure hull of the diving bell and the material composing other parts of the deck decompression chamber than those specified in -1 are to be non-combustible as far as practicable.

3 The materials used for the interior of diving bell and deck decompression chamber (including paint) are to be fire-retardant materials which produce little injurious gases due to burning.

3.2 Materials and welding

3.2.1 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 7A Section II QCVN 21: 2010/BGTVT.

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

3.2.2 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 6 Section II QCVN 21: 2010/BGTVT.

3.3 Construction

3.3.1 Construction of diving bell

1 The pressure hull is to be designed so as not to collapse at the external pressure corresponding to twice the maximum diving depth. Where however, the collapsing strength of pressure hull considering the effect of the initial imperfection is deemed to have been sufficiently confirmed by means of experiments and analyses, the external pressure mentioned above may be taken as the pressure corresponding to 1.5 times the maximum diving depth plus 300 m.

2 The pressure hull is to be so designed that stresses in the pressure hull due to the external pressure at the maximum diving depth are sufficiently lower than the yield point of the materials used.

3 Opening parts of the pressure hull are to be of the construction so designed as to have an equivalent strength to that of a pressure hull with no opening.

4 The pressure hull is to be provided with adequate protection against mechanical damage during handling operation.

5 The diving bell is to be equipped with two lifting points designed to take the entire dry weight of the bell including ballast and equipment as well as the weight of the divers staying on in the bell.

6 The diving bell is to be fitted with a manifold at a suitable point close to the main lifting attachment which includes connections for the following services:

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

1/2 inch NPT (female) - for breathing gas

The manifold is to be clearly marked and suitably protected.

7 The diving bell used with the interior pressurized (hereinafter referred to as "hyperbaric diving bell") is to be designed and manufactured in accordance with the requirements for pressure vessels, Group I in Chapter 10 Part 3 Section II QCVN 21: 2010/BGTVT, taking the pressure not less than that at the designed maximum depth, where diver lock-in/lock-out operation is intended, as the approved working pressure. The requirements in 10.4.3 Part 3 Section II QCVN 21: 2010/BGTVT, however, are not applicable.

8 The hyperbaric 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 an unconscious diver up into a dry bell.

9 The hyperbaric diving bell is to be equipped with view ports that allow an occupant to observe divers outside the bell.

10 View ports and covers of the pressure hull are to be so designed as to have the strength equivalent to that of the pressure hull. And further, the view ports which are liable to sustain mechanical damages while submerging or the damages of which may seriously affect the safety of the diving bell are to be properly protected or strengthened.

11 The parts where view ports, covers, valves, etc. are fitted to the pressure hull and the parts where pipes, covers, shafts, etc. penetrate the pressure hull are to have sufficient watertightness against the pressure corresponding to 1.1 times the maximum diving depth.

12 Access openings of the diving bell are to be of the construction capable of being closed both from the inside and from the outside. The covers of these openings are to be such that their opening and closing can be confirmed in the diving bell.

13 Diving bell doors are to be so designed as to prevent accidental opening during normal operations.

3.3.2 Construction of deck decompression chamber

1 The deck decompression chamber is to be designed and manufactured in accordance with the requirements for pressure vessels, Group I in Chapter 10 Part 3 Section II QCVN 21: 2010/BGTVT, taking the maximum working pressure as the approved working pressure. The requirements in 10.4.3 Part 3 Section II QCVN 21: 2010/BGTVT, however, are not applicable.

2 The deck decompression chamber is to be composed of at least two compartments. For the portable decompression chamber, however, this requirement does not apply.

3 As for the deck decompression chamber composed of two compartments, the chamber is to be constructed so that even in a condition that one compartment is pressurized, the other compartment is easy to have access.

4 The door provided between the two compartments is to be capable of being opened from both sides in case where there is no pressure difference.

5 The outer door of deck decompression chamber is to be easily opened and closed from the inside and outside, in case where the internal pressure of chamber is equal to the external pressure. Where, however, the portable decompression chamber is inevitably provided with an outward opening door which is capable of being locked from the outside, the afore-mentioned requirements are not applicable.

6 Doors are to be designed so that locking mechanisms can be operated from both sides.

7 The deck decompression chamber is to be provided with a window through which the interior can be observed from the outside.

8 On the outer surface of the deck decompression chamber, its maximum working pressure is to be indicated.

3.4 Stress relieving

3.4.1 Stress relieving of pressure hull

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

CHAPTER 4 HANDLING SYSTEM AND MATING DEVICE

4.1 General

4.1.1 General

1 The handling system is to be composed of equipment and plant necessary for submerging and surfacing the diving bell and housing it into and fixing it onto the attendant ship.

2 In case where the deck decompression chamber is provided, the mating device for connecting the diving bell to the deck decompression chamber is to be provided.

3 The equipment required by the preceding -1 and -2 are to operate safely and surely under oscillation and inclination assumed for the attendant ship.

4.2 Construction

4.2.1 Winch and derrick arrangement

The winch and derrick arrangement are to be designed and manufactured in accordance with the relevant requirements in QCVN 23: 2010/BGTVT, taking the maximum weight of the diving bell in the air (including the weights of persons and equipments brought in) alternatively the maximum weights of the diving bell in the water (including the weights of persons and equipment brought in) plus the weight in the water of the rope necessary to lower the diving bell to the maximum diving depth, whichever is the greater, (hereinafter referred to as “the maximum weight of the diving bell”) as the safe working load.

4.2.2 Rope

The rope used for the handling systems is to have such strength that the factor of safety based on the breaking strength is not less than five at the load corresponding to the maximum weight of the diving bell.

4.2.3 Fittings

The fittings used for the handling systems such as hooks, shackles, blocks, etc. are to have sufficient strength against the load corresponding to the maximum weight of the diving bell.

4.3 Source of power

4.3.1 General

In case where power is used for the handling systems or the mating devices, the sources of power for the power equipment are to be duplicated and so arranged as to be capable of submerging and surfacing the diving bell, housing it into and fixing it onto the attendant ship and connecting the diving bell to the deck decompression chamber in the event of failure of one of these sources of power.

CHAPTER 5 LIFE SUPPORT SYSTEM

5.1 General

5.1.1 General

1 The breathing gas supply system used for the diving bell and the deck decompression chamber is to be able to supply the appropriate breathing gas to its occupants at all depths down to the maximum diving depth and to be safely controlled.

2 In addition to the system mentioned in -1, the deck decompression chamber and the diving bell are to contain the controlled built-in breathing system for oxygen, therapeutic gas or bottom mix gas with at least one mask per occupant stored inside each separately pressurized compartment and means are to be provided to prevent accumulation of gases.

3 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.

4 The diving system is to include adequate plant to maintain the divers in safe thermal balance during normal operations.

5 The diving bell is to be provided with means to maintain the divers within the bell in thermal balance in an emergency for at least 24 hours.

5.2 Gas storage facilities

5.2.1 General

1 The breathing gas cylinders of the diving bell and the deck decompression chamber are to be installed in a well ventilated location and due considerations are to be given to prevent, as far as practicable, the cylinders from being exposed to the direct rays of the sun.

2 The piping systems and the gas cylinders are to be coloured in accordance with the following colour code. In addition, each gas cylinder is to be marked with the name and symbol given below of the gases it contains. The marking and colour coding are to be visible from the valve end.

Table 5.1 Color code

Name	Symbol	Color code
Oxygen	(O_2)	White
Nitrogen	(N_2)	Black
Air	(Air)	White and Black
Carbon dioxide	(CO_2)	Gray
Helium	(He)	Brown
Oxygen-Helium mix gas	(O_2He)	White and Brown

5.2.2 Oxygen cylinders

1 The oxygen cylinders and their pipes are not to be installed near any equipment which may become the source of ignition and the location where the hydraulic equipment is placed.

2 Oxygen and gases with an oxygen volume percentage higher than 25% are to be stored in the cylinder exclusively intended for such gases.

3 All materials used in oxygen systems are to be compatible with oxygen at the working pressure and flow rate.

4 Pressure reducing devices fitted with the oxygen piping system are to be fitted as close as practicable to the cylinder in order to minimize the use of high pressure oxygen piping.

5 Hoses for oxygen are to be of fire-retardant construction.

6 Piping systems carrying mixed gas or oxygen under high pressure are not to be arranged inside accommodation spaces, engine rooms or similar compartments.

7 Piping systems containing gases with more than 25% oxygen are to be treated as systems containing pure oxygen.

8 Shutoff valves used for oxygen systems with pressure greater than 1.72 bar must not be into the opening condition suddenly, except pressure boundary shutoff valves.

9 When adding pure oxygen to the deck decompression chamber, a separate piping system is to be provided.

5.3 Emergency breathing gas system

5.3.1 General

The hyperbaric diving bell is to be provided with an emergency breathing gas system capable of maintaining breathing gas for all divers in the bell for a period of at least 24 hours at its maximum diving depth in the event of failure of breathing gas supply from the attendant ship. The breathing gas cylinders and breathing gas supply piping used for this device are to be rigidly fixed to the pressure hull and properly protected against damages from the outside.

5.4 Overpressure Protective Device

5.4.1 General

The hyperbaric diving bell and deck decompression chamber are to be provided with an appropriate device to prevent the internal pressure from abnormal rise or to be provided with an alarm for excessive pressure rise. If pressure-relief valves are fitted with the deck decompression chamber, a quick-operating manual shutoff valve is to be installed between the chamber and the pressure-relief valve and to be wired opened with a frangible wire.

This valve is to be readily accessible to the attendant monitoring the operation of the chamber.

5.5 Controlling of breathing gas

5.5.1 Hyperbaric diving bell

Breathing gases of the hyperbaric diving bell are to be controllable from both the inside and the outside.

5.5.2 Deck decompression chamber

Breathing gases of the deck decompression chamber are to be controllable at least from the outside.

CHAPTER 6 INSTRUMENTS AND COMMUNICATING SYSTEMS

6.1 Instruments

6.1.1 Instruments provided in 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.

6.1.2 Instrument provided in deck decompression chamber

A pressure gauge to indicate a pressure in the deck decompression chamber is to be provided in a easily visible position outside the chamber. Where, however, a pressure gauge specified in 6.1.3-2 in provided in a vicinity of the deck decompression chamber, this pressure gauge may be considered as a substitute of that required in this article.

6.1.3 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 6.1 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 6.1 Instruments on attendant ship

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

6.2 Communicating systems

6.2.1 General

1 The diving system is to be provided with the communication system which is arranged for direct two-way communication between the control station and the followings:

(1) Divers in water;

(2) Diving bell;

(3) Each compartment of the deck decompression chamber;

(4) Diving system handling position;

(5) Dynamic positioning room;

(6) Bridge, ship's command center or drilling floor.

2 A through-water communication system is to be provided for emergency communication between the diving bell and the control station. The through-water communication system provided with the bell is to be of a self-contained type.

3 The hyperbaric diving bell is to be provided with the communication system which is arranged for two-way communication between the inside of the diving bell and divers under water.

4 In addition to the main communication systems, alternative communication systems are to be provided between each compartment of the deck decompression chamber and the control station.

5 The system which communicates with divers in the deck decompression chamber and the diving bell is to be connected to a speech unscrambler when used with breathing gases including helium.

6.2.2 Emergency Locating Device

1 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 consist of the following equipment:

(1) Transponder:

(a) The transponder is to be provided with a pressure housing capable of operating to a depth of at least the maximum diving depth containing batteries and equipped with salt water activation contacts. The batteries are to be of the readily available "alkaline" type and, if possible, be interchangeable with those of the diver-held interrogator/receiver specified in (2) and the through-water communication system of the diving bell specified in 6.2.1-2;

(b) The transponder is to have characteristics specified otherwise by VR.

(2) Diver-held interrogator receiver:

(a) The interrogator/receiver is to be provided with a pressure housing capable of operating to a depth of at least the maximum diving depth with pistol grip and compass. The front end is to contain the directional hydrophone array and the rear end the three-digit LED range finder readout calibrated in meters. Controls are to be provided for “on/off receiver gain” and “channel selection”. The battery pack is to be of the readily available “alkaline” type and, if possible, be interchangeable with that of the through-water communication system of the bell and the transponder;

(b) The interrogator receiver is to have characteristics specified otherwise by VR.

6.2.3 Tapping Code

For emergency communication between divers in the bell and rescue divers, a copy of the tapping code specified otherwise by VR is to be displayed inside and outside the bell and also in the control station.

CHAPTER 7 EMERGENCY SURFACING ARRANGEMENT

7.1 Installation of drop weights

7.1.1 General

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.

7.2 Auxiliary hoisting device for emergency surfacing

7.2.1 General

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.

7.2.2 Construction

The auxiliary hoisting device is to be designed and manufactured in accordance with the relevant requirements in QCVN 23: 2010/BGTVT.

CHAPTER 8 PRESSURE VESSELS, PIPING SYSTEMS AND ELECTRICAL INSTALLATIONS

8.1 General

8.1.1 General

1 The pressure vessels, piping systems, electrical installations, etc. installed in the diving bell and the deck decompression chamber are not to be such as to produce or leak inflammable gases or toxic gases. Where such machinery and equipment as likely to leak these gases are inevitably installed, safety measures for gas leakage are subject to the approval of VR.

2 The pressure vessels, piping systems, electrical installations, etc. which are likely to become a source of fire, emitting sparks or getting to high temperature, in a normal operating condition, are not to be installed in the hyperbaric diving bell and the deck decompression chamber. Where these machinery and equipment are inevitably installed in such spaces, their construction, arrangement, application procedure, etc. are to be approved in advance by VR.

3 The materials composing the pressure vessels, piping systems, electrical installations, etc. installed in the diving bell and the deck decompression chamber are to be in accordance with the following requirements:

(1) The materials are to be non-combustible as far as practicable. However, the materials in the diving bell not used for diver lock-out operation may be fire-retardant;

(2) Notwithstanding the requirements in (1), where flammable materials unavoidably used, necessary protective measures are to be taken to minimize the risk of outbreak and spread of fire, and the materials are not to produce any unhealthy gases, as far as practicable, when burnt.

4 Out of the pressure vessels, piping systems, etc. provided outside the diving bell, in the hyperbaric diving bell or in the deck decompression chamber (including electric equipment provided outside the diving bell), those subjected to the pressure corresponding to the diving depth of the diving bell, the internal pressure of the diving bell or the internal pressure of the deck decompression chamber as an external pressure, are to have sufficient strength in case where subjected to the pressure corresponding to the maximum diving depth of the diving bell, the approved working pressure of the diving bell or the approved working pressure of the deck decompression chamber as an external pressure.

5 Out of the pressure vessels, piping systems, electrical installation, etc. provided outside the diving bell, the parts which are likely to be subjected to corrosion are to be provided with appropriate anti-corrosion measures in accordance with the materials used.

8.2 Pressure vessels

8.2.1 General

Materials, welding and construction of cylinders for high pressure gas used for pressurizing and decompressing the diving bell and the deck decompression chamber and other pressure vessels are, to be in accordance with the requirements in Chapter 10 Part 3 Section II QCVN 21: 2010/BGTVT.

8.3 Piping systems

8.3.1 General

1 Materials, welding and construction of pipes, valves and pipe fittings of the piping systems subjected to an internal pressure are to be in accordance with the requirements in Chapter 12 Part 3 Section II QCVN 21: 2010/BGTVT. In this case, the important piping systems such as the piping systems penetrating the diving bell or the deck decompression chamber are to be dealt with as the piping systems belonging to Group I.

2 Out of the piping systems penetrating the diving bell, those having openings outside the diving bell are to be designed in accordance with the requirements in Chapter 12 Part 3 Section II QCVN 21: 2010/BGTVT, taking the pressure corresponding to the maximum diving depth as the designed pressure, and the parts from the shell plate of the pressure hull to the inboard stop valve of the piping systems which have no opening outside the diving bell, are to be designed in accordance with the same requirements, taking the pressure corresponding to the maximum diving depth of the diving bell or the maximum working pressure of the piping systems, whichever is the greater, as the designed pressure.

3 The piping systems are to be installed in such positions that inspections and repair works can be carried out easily as far as practicable and that the leakage of internal fluid can be easily observed.

4 The valves are to be given distinguished marks or other suitable measures to avoid misoperation.

5 Piping systems which may be subjected to a higher pressure than designed for are to be fitted with a pressure- relief device. The breathing gas vented from the pressure- relief device is to be led to a safe position.

6 Piping systems are to be so designed as to minimize the noise inside the diving bell and deck decompression chamber during normal operation.

7 Flexible hoses, except for umbilicals, are to be reduced to a minimum.

8 All high-pressure pipings are to be well protected against mechanical damage.

8.3.2 Piping systems of diving bell

1 The piping systems penetrating the diving bell are to be provided with two stop valves made of steel or other ductile materials approved by VR as close as practicable to the penetrated

part and at an easily operable position in the diving bell. Where appropriate, one valve is to be a non-return valve. These stop valves are to be so arranged that the degree of opening can easily recognized.

2 Exhaust lines are to be fitted with an anti-suction device on the inlet side in the diving bell.

8.3.3 Piping systems of deck decompression chamber

1 The piping systems penetrating the deck decompression chamber are to be provided with two stop valves as close as practicable to the penetrated part. Where appropriate, one valve should be a non-return valve.

2 Exhaust lines are to be fitted with an anti-suction device on the inlet side in the deck decompression champer.

8.4 Umbilical hoses

8.4.1 General

The umbilical hoses between the diving bell and the attendant ship are to be of construction and strength suitable for the condition of operation.

8.5 Electrical installation

8.5.1 General

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.

8.5.2 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.

8.5.3 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.

8.5.4 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.

8.5.5 Source of electrical power

1 Two or more sets of sources of electrical power which supply necessary power to the diving system are to be provided and so arranged as to ensure the safety of the diving system when one of these sets is out of service. One of these sets 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. It is admissible to use the ship'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 vessel at the same time.

2 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.

3 The electric power receiving system specified in -2 is to be powered by separate circuits from the main switchboard of the attendant ship. Where, however, deemed appropriate by VR in consideration of the kind of load of the electric power receiving system, the system may be powered from a suitable distribution board.

4 The electric power receiving system is to be provided with the following instruments and equipment:

(1) Circuit breaker of fuse and disconnecting switch;

(2) 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;

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

8.5.6 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.

8.5.7 Lighting arrangement

1 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.

2 The deck decompression chamber is to have adequate means of normal and emergency lighting within each compartment.

8.5.8 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.

8.5.9 Electrical installation in hyperbaric diving bell and deck decompression chamber

1 The system voltage of the electrical installations in the hyperbaric diving bell and the deck decompression chamber is not to exceed 30 V. Where the system voltage exceeding 30 V is unavoidably adopted, the approval of VR is to be obtained in advance.

2 Cable installed in the hyperbaric diving bell and the deck decompression chamber are to be metallic sheathed 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 VR for approval.

3 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 semi-conductor switch.

4 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.

5 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 -6.

6 Where lighting lamps are provided in the hyperbaric diving bell, they are to be in accordance with the requirements in the following (1) to (4):

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

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

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

(4) 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.

7 Electrical installations installed in hazardous areas are to comply with the requirements specified in Part 8 Section II QCVN 21: 2010/BGTVT.

CHAPTER 9 HABITATION INSTALLATION AND FIRE-EXTINGUISHING SYSTEM

9.1 Habitation Installation of Deck Decompression Chamber

9.1.1 Living Compartment

Where a deck decompression chamber is used in circumstances where 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.

9.1.2 Service Lock

The living compartment and other compartments intended to be used for decompression is to have a service lock through which provisions, medicine and equipment may be passed into the chamber 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.

9.1.3 Other Facilities

A deck decompression chamber 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. Where the chamber is intended to be occupied for more than 12 hours, toilet facilities are to be provided. Toilet facilities capable of discharging the waste to the outside is to be fitted with suitable interlocks.

9.2 Fire-Extinguishing System etc.

9.2.1 Fire-Extinguishing System of Deck Decompression Chamber

Each compartment in a deck decompression chamber is to have a suitable means of extinguishing a fire in the interior which would provide rapid and efficient distribution of the extinguishing agent to any part of the chamber.

9.2.2 Fire Protection and Fire-Extinguishing System in Space containing Diving System

1 Compartment in which the diving system is installed is to be provided with structural fire protection of A-60 class specified in 3.2.2 Part 5 Section II QCVN 21: 2010/BGTVT.

2 Interior spaces containing diving equipment such as deck decompression chambers, diving bells, gas cylinders, compressors and control stands are to be covered with a fixed fire detection and alarm system and a suitable fixed fire-extinguishing system.

3 Portable fire extinguishers of approved types and designs are to be distributed throughout the space containing the diving system. One of the portable fire extinguishers is to be stowed near the entrance to that space.

4 When gas cylinders are situated in enclosed spaces, a manually actuated water spray system having an application rate of 10 l/m^2min of the horizontal projected area is to be provided to cool and protect such pressure vessels in the event of external fire. When gas cylinders are situated on open decks, fire hoses may be used as installation to cool and protect them.

III REGULATIONS ON MANAGEMENT

1.1 General

Where compliance with this Regulation is made, an installation notation "DVS" is affixed to the characters of classification defined in Chapter 2 Part 1A QCVN 21: 2010/BGTVT.

1.2 Regulations on technical supervisions

The diving system is to be subject to surveys specified in Chapter 2 Section II of this Regulation.

1.3 Certification

1.3.1 Certificate

If the system complies with this Regulation, that system is to be issued a certificate of design approval or a classification certificate together with the ship depending on each particular demand.

1.3.2 Procedure for certification

Procedure for certification is to be in accordance with Circular No. 32/2011/TT-BGTVT.

IV RESPONSIBILITIES OF ORGANIZATIONS, INDIVIDUALS

1.1 Responsibilities of ship owners and operators, agency of design, manufacturing, converting, renovating and repairing the systems

1.1.1 Ship owners and Operators

To implement all relevant requirements in this Regulation in manufacturing, converting, renovating, operating the system in order to ascertain and maintain good technical condition of the systems.

1.1.2 Design agency

1 To design the system in compliance with requirements of the Regulation.

2 To submit all required design documentation in accordance with requirements in the Regulation.

1.1.3 Yards of manufacturing, converting, renovating and repairing the systems

1 To be capable in terms of warehouse, manufacturing shop, building facilities etc. and competent manpower to meet requirement for new manufacture, conversions, renovations and repairs of the systems.

2 To comply with standards of quality, safety while manufacturing, converting, renovating and repairing the systems and to comply with approved design.

3 To undergo VR's supervision on the technical quality and safety of the systems.

1.2 Responsibilities of Vietnam Register

1.2.1 Design approval, technical supervision

To assign surveyors having competence and of sufficient standard to carry out the technical supervision during manufacture, conversions, renovations, repairs and operation of the systems in accordance with technical requirements specified in this Regulation.

1.2.2 To give instructions for implementation/application

To give instructions for the application of requirements of this Regulation to ship owners and operators, yards of manufacture, conversions, renovations and repair of the systems, inspection offices of Vietnam Register throughout the country.

1.2.3 To amend and supplement the Regulation

Based on the fact, Vietnam Register is to have responsibility to petition the Ministry of Transport for amendment, supplementation of the Regulation where necessary or on schedule specified in the Law of Standards and Technical Regulations.

1.3 Responsibilities of the Ministry of Transport

The Ministry of Transport (Science and Technology department) is responsible for verifying on the regular or random basis the implementation of this Regulation by relating organizations.

V IMPLEMENTATION

1.1 It is the responsibility of Vietnam Register to manage the survey system, technical supervision, classification and technical registration of diving systems. It is also to include organizing the printing, dissemination and instructions for the application of this Regulation for organizations and individuals falling within the scope of this Regulation.

1.2 In case of inconsistency between the requirements in this Regulation and those in other rules, standards or technical regulations relating to diving systems, the requirements of this Regulation are to prevail over those of others.

1.3 In case the documents referred to in this Regulation are amended, supplemented or replaced, the latter is to prevail over the former.

1.4 This Regulation and its amendment are to apply to diving systems registered on or after effective date of this Regulation.