PART II RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF VESSELS IDENTIFIED BY THEIR MISSIONS

TITLE 48 DIVING SUPPORT VESSELS

SECTION 1 NAVAL ARCHITECTURE

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CHAPTER A
APPROACH

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A1. APPLICATION

A2. DEFINITIONS

A1. APPLICATION

100. Scope

101. The Title 48 of the Rules applies to all vessels intended for inland or open sea navigation designed to give support for shallow water operation class notation SDSV and deep diving class notation DSV operations as defined in Part I Title 01 Section 1, B3.326.

102. For the Class Notation DSV or SDSV to be assigned to a vessel, it is mandatory that the Diving Support System is certified according to the IMO Code of Safety for diving systems adopted 23 November 1995 as res. A.831(19).).

Guidance

A diving support vessel, as the name suggests is a vessel that is used for the objective of diving into oceans. Divers, who dive into the middle of the seas as a part of professional diving process, need proper diving support. This necessary support is provided by such a dive support vessel.

The concept of a diving support vessel came into existence four to five decades ago. From that time onwards, these ships have been extremely important to the field of commercial diving which forms a vital part of professional diving.

It has to be noted that professional diving means diving for the prospect of construction, repairing and maintenance of oil-rigs and other important offshore naval constructions.

Such support vessels are typically flat-based or flat-bottomed because it makes the diving part easy for the divers. Additionally it has to be noted that such ships are equipped with a Dynamic Positioning System or an anchor mooring positioning system in order to help the vessel used for diving support stay steady on the water.

In the absence of the Dynamic Positioning System or anchor mooring positioning system, what could happen is that the ship could move away from the intended diving spot which would cause complications to the diver.

Another important feature in vessels that enable diving support is the saturation diving system. The saturation diving system enforces the presence of combination of certain important gases like helium and oxygen for the diver. Without proper saturation diving system, as the diver has to go very deep into the oceanic water, this could cause complications like lack of air leading to suffocation.

To state it in simple terms, a diving support vessel can be termed as a helper who helps trained professionals to take care of the maintenance of the technological developments.

As a marine support system, a dive support vessel stands completely unique and alone.

End of guidance

A2. DEFINITIONS

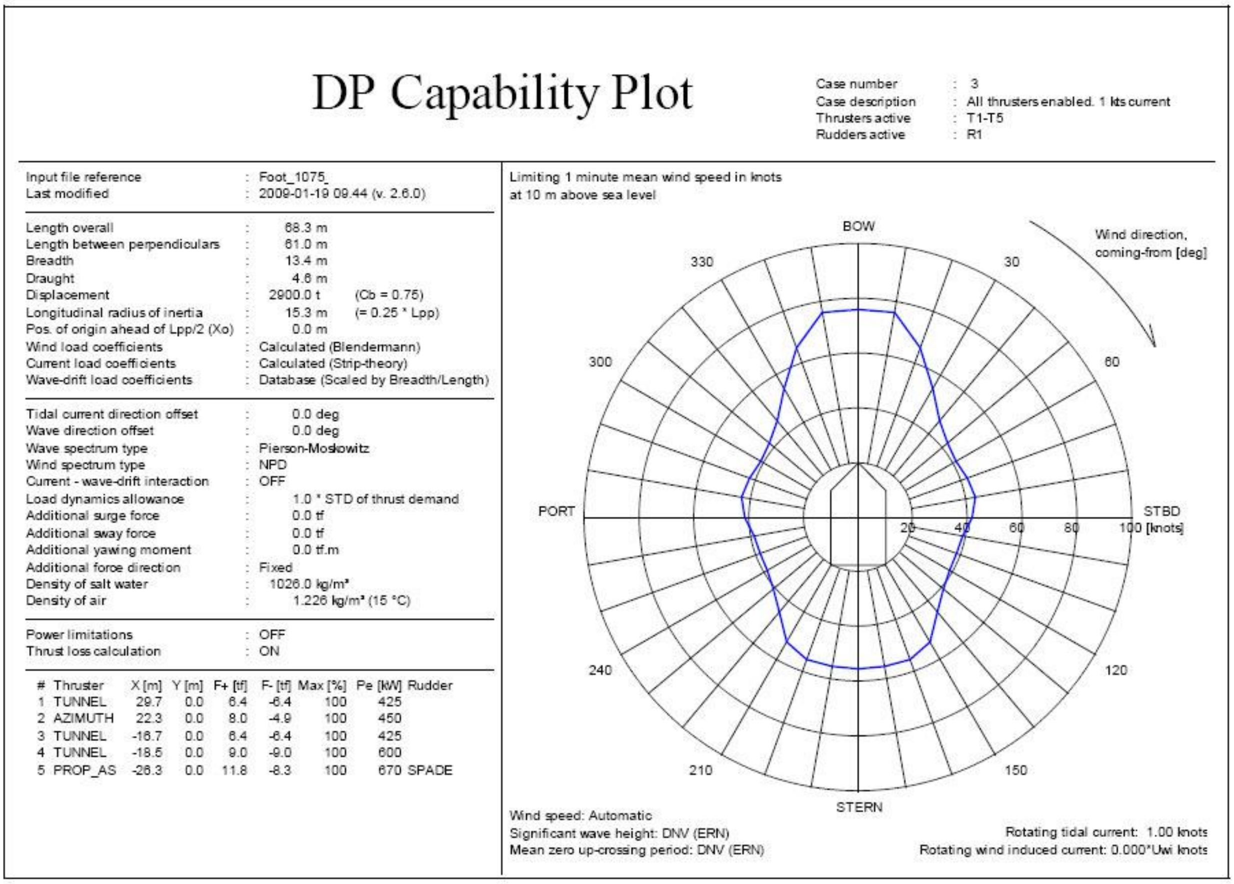
100. Glossary of Terms and Abbreviations

101**.** **Blackout:** Loss of all main electrical power to thrusters or DP control system. Loss of electrical power that prevents the DP control system operating is known as DP Blackout.

102. **BOP Blow-out preventer**: Blackout prevention.

103. **Capability plot** A theoretical polar plot of the vessel’s capability for particular conditions of wind, waves and current from different directions. These can be determined for different thruster combinations.

Guidance
Example of a DP capability plot chart



End of guidance

104. **CCTV** Closed circuit television.

105. **Controlled disconnection** Release in a planned and controlled manner of all physical connections linking the vessels/units involved in two-vessel operations and their physical separation.

106. **Diving bell** means a submersible compression chamber, including its fitted equipment, for transfer of diving personnel under pressure between the work location and the surface compression chamber. [IMO Diving Code]

a. **Open diving bell** means a submersible chamber where the lower part is open and fitted with a grilled floor, for the transportation of at least two divers from the surface to the working site, fitted with a communication system, emergency gas supply, air bubble or artificial respiratory mixture for the breathing of the divers without the use of masks/helmets and scuttles to observe the external environment. [NORMAM 15].

107 **Hyperbaric chamber (CH)**:
A **sealable diving chamber**, **closed bell** or **dry bell** - Pressure vessel specially designed for human occupation, in which the occupants may be subjected to hyperbaric conditions, and which is employed for decompressions of divers as well as for the treatment of hyperbaric accidents [NORMAM 15, Chapter 1].

Guidance

A hyperbaric chamber is a pressure vessel with hatches large enough for people to enter and exit, and a compressed breathing gas supply to control the internal air pressure.

Such chambers provide a supply of oxygen for the user, and are usually called hyperbaric chambers whether used underwater or at the water surface or on land to produce underwater pressures.

However, some use submersible chamber to refer to those used underwater and hyperbaric chamber for those used out of water.

The IMO Diving Code designates hyperbaric chamber as a "Surface compression chamber", a pressure vessel for human occupancy with means of controlling the pressure inside the chamber.

There are two related terms which reflect particular usages rather than technically different types:

- *Decompression chamber, a hyperbaric chamber used by surface-supplied divers to make their surface decompression stops*

- Recompression *chamber, a hyperbaric chamber used to treat or prevent decompression sickness.*

When used underwater there are two ways to prevent water flooding in when the submersible hyperbaric chamber's hatch is opened.

- *The hatch could open into a moon pool chamber, and then its internal pressure must first be equalised to that of the moon pool chamber.*

- *More commonly the hatch opens into an underwater airlock, in which case the main chamber's pressure can stay constant, while it is the airlock pressure which shifts. This common design is called a **lock-out chamber**, and is used in submarines, submersibles, and underwater habitats as well as diving chambers.*

End of guidance

108, **Life chamber:** Hyperbaric chamber employed in saturated diving operations or in diving operations required its occupation for more than twelve (12) hours. Its interior is fitted with an infra-structure suitable for supplying the minimum habitability condition for the divers for the period of occupation, such as: showers, sanitary installations, sleeping quarters, environmental control, etc. [NORMAM 15, Chapter 1].

109. **DGPS** GPS plus a differential correction supplied by one or more receivers at a known fixed location, to increase the accuracy of the position fix.

110. **DP Dynamic positioning**: automatic control of vessel’s position and heading by the use of thrusters with respect to one or more position references. May also be used to mean dynamically positioned.

111. **DP control location** Permanently manned location(s) onboard a DP vessel or unit where the DPO is able to monitor the performance of the DP system and where the DPO is able to interface with the DP system, intervening as necessary.

112. **DP downtime** Position keeping instability, loss of redundancy which would not warrant either a red or yellow alert, however loss of confidence has resulted in a stand down from operational status for investigation, rectifications, trials etc.

113. **DP incident** Loss of automatic control, loss of position or any incident which has resulted in or should have resulted in a red alert.

114. **DP near-miss** Occurrence which has had a detrimental effect on DP performance, reliability or redundancy but has not escalated into ‘DP incident’, ‘undesired event’ or ‘downtime’.

115. **DP system** All equipment that supports automatic position keeping control.

116. **DP undesired event** Loss of position or other event which is unexpected/uncontrolled and has resulted in or should have resulted in a yellow alert.

117. **DP vessel** Dynamically positioned vessel.

118. **DPO** Operator of the DP control system.

119. **DSV** Class notation for diving support vessels for water depths larger than 50 metres. See Part I, Title 01, Section 1, B3.326, requiring hyperbaric evacuation systems.

120. **Duplex DP** DP control system with full redundancy including smooth automatic changeover between the two DP control systems.

121. **ECR** Engine Control Room.

122. **EDS** Emergency Disconnect Sequence.

123. **Emergency disconnection** Unscheduled rapid shutdown and release of all physical connections to enable separation of vessels/units.

a. **ESD 1** Emergency shutdown and disconnect 1.

b. **ESD 2** Emergency shutdown and disconnect 2.

124. **FMEA** Failure mode and effects analysis.

125. **Footprint** A graphic illustration of a set of real observations of a vessel’s DP station keeping ability in particular environmental conditions.

126. **FPU** / **FPSO** Floating production unit / Floating production storage and offloading unit / .

127. **GPS** Global positioning system using satellites to establish a vessel’s position, e.g. Navstar or GLONASS.

128. **GPS relative** Differential and relative position system (note DGPS is used generally in this document but the same principles apply both for dual DGPS as dual DARPS or dual GPS).

129. **Green status** Normal operational status; adequate DP equipment is on line to meet the required performance within the declared safe working limits.

130. **HAZID** Hazard identification.

131. **HAZOP** Hazardous operation.

132. **HPR** Any hydroacoustic position reference system.

133. **Hazardous areas** are those locations in which an explosive gas-air mixture is continuously present, or present for long periods (zone O); in which an explosive gas-air

mixture is likely to occur in normal operation (zone 1); in which an explosive gas-air mixture it not likely to occur, and if it does it will only exist for a short time (zone 2).

134. **Hyperbaric evacuation system** means the whole plant and equipment necessary for the evacuation of divers in saturation from a surface compression chamber to a place where decompression can be carried out. The main components of a hyperbaric evacuation system include the hyperbaric evacuation unit, handling system and life-support system.

135. **Hyperbaric evacuation unit** (**HEU**) means a unit whereby divers under pressure can be safely evacuated from a ship or floating structure to a place where decompression can be carried out.

136. **I/O** Input/output.

137. **Independent joystick** A joystick that is independent of the DP control system.

138. **Limit alarms** Selectable values for position and heading excursions at which points an alarm will activate.

139. **Loss of position** Movement(s) of vessel and/or unit from the intended or target position.

140. **OIM** Offshore Installation Manager.

141. **Offshore diving support vessels**: ships whose mission is to give support for diving operations in the proximity of platforms (see A2.142 below). Reference is made to Part II, Title 47 of the Rules.

Guidance

Offshore vessels are classified by the Brazilian Maritime Authority as complying with the coastal navigation regulations (DVC, visual distance from the shore) having, however, the 20 miles from shore boundary extended to 200 miles from shore in areas inside Brazilian Jurisdictional Waters inside the "Zona Economica Exclusiva" (Exclusive Economical Zone).

End of guidance

142. **Platform** Any structure that is fixed relative to the DP vessel.

143. **Plough** Towed unit generally used to bury cables.

144. **Red alert DP emergency status**: Position and/or heading loss have happened or are inevitable.

145. **Redundancy** The ability of a component or system to maintain or restore its function, when a single failure has occurred. Redundancy can be achieved, for instance, by installation of multiple components, systems or alternate means of performing a function.

146. **Responder** A transponder in which the interrogation is by an electronic pulse sent down a cable. This is generally fitted to an ROV and interrogated down the ROV's umbilical.

147. **ROV** Remotely operated vehicle that operates subsea.

148. **Safe working limits** The environmental limits that a vessel or company sets for safely working on DP taking into account specified equipment failures and limitations imposed by the current worksite.

149**.** **SDSV -** Class notation for diving support vessels for shallow water depths equal or less than 50 metres and time of dive less than 12 hours. See Part I, Title 01, Section 1, B3.326.

150. **Shallow water** A depth of water of 60 metres or less, in which, depending upon the work being undertaken by the DP vessel, further considerations may be necessary.

151. **SIMOPS** Simultaneous operations.

152. **Thruster** Any propulsion device used by the DP control system.

153. **Transponder** Device on the seabed that responds to acoustic interrogation from the HPR on the vessel and gives vessel relative position.

154. **Trencher** Subsea vehicle used for pipe or control line burial.

155. **Umbilical** Connection carrying life support and communication systems between a support vessel and a diving bell, an ROV or similar device (also diver's umbilical between diver and bell).

156. **UPS Uninterruptible power supply** – unit to provide electricity continuously to DP control system in the event of a blackout of the vessel's main power.

157. **Worst case failure** The worst case failure of a DP system is the failure that has been the basis of the design and proved by the FMEA. This usually relates to a number of thrusters and generators that can simultaneously fail and that are used in consequence analysis.

158. **Yellow alert** Degraded DP status for which the DP vessel has a pre-planned response to prepare for the risks associated with a DP red alert.

CHAPTER B
DOCUMENTS, REGULATIONS AND STANDARDS

CHAPTER CONTENTS

B1. DOCUMENTS FOR RBNA

B2. REGULATIONS

B3. TECHNICAL STANDARDS **– See Title 11**

B1. DOCUMENTS FOR RBNA

100. Documents for reference

– See Title 11

200. Documents for approval

201. In addition to the requirements of the Part II, Title 11, Section 1 the following data and specifications of the diving system installation is to be submitted for RBNA approval:

a. General arrangement showing the locations of the diving support systems

b. Capacity data

c. Stability and Trim Booklet including intact and damaged stability

300. Documents for the construction

- See Title 11

B2. REGULATIONS AND STANDARDS

100. National Administration

101. These rules include compliance with the requirements of NORMAM 15 – DPC – Chapter 13 –“ *Emprego de Embarcações de Posicionamento Dinâmico para Apoio às Operações de Mergulho”* (Use of dynamic positioning ships for the support of diving operations).

200. Other regulations / guidelines

201. These rules are in compliance with the following regulations / guidelines:

a. IMCA - IMCA M 103 Rev. 1 - Guidelines for the Design and Operation of Dynamically Positioned Vessels – Chapter 2 – Diving Support Vessels

b. IMCA M 175 – Guidance on operational communications: Part 1 – Bridge and dive control

c. OTH 90 336 – Offshore Technology Report – Department of Energy – UK - 1991 – ISBN 011 413345 X

d. IMO Code of Safety for diving systems adopted 23 November 1995 as res. A.831(19).).

e. IMCA – MCA D 052 May 2013 – Guidance on Hyperbaric Evacuation Systems.

f. IMO.Resolution MSC.235(84) Guideline for the Design and Construction of Supply Vessels

CHAPTER E
CONFIGURATIONS

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E1. ADEQUACY OF THE HULL **– See Title 11**

E3. BASIC ARRANGEMENT

E4. WATER ON DECK

E5. SHALLOW DEPTH OPERATION LIMITATIONS

E3. BASIC ARRANGEMENT

100. Position keeping

101. A Diving support vessel shall be able to keep its position safely throughout the diving operations.

The position keeping may be achieved:

a. by a pattern of anchors around the ship, if in open water;

b. by a combination of anchors and moorings to fixed installations;

c. by a Dynamic Positioning (DP) system in compliance with the requirements for DP-2 vessels in Part II, Title 103, Section 8 of the Rules.

200. Diver’s accommodation

201. In addition to National and International Standards for Habitability, adequate accommodation arrangements should be provided for the divers not less than the minimum below:

a. No more than two diving personnel should be accommodated in one cabin;

b. Diving supervisors should be allocated in single cabins;

c. Cabins should be effectively ventilated and kept at comfortable temperatures and levels of humidity;

d. Noise and vibration levels should be retained within the National and International standards. Noise levels are not to exceed 60 dB (A);

e. Washing and toilet facilities for divers should be provided in the vicinity of the diving station as well as in accommodation areas. At least one shower and toilet for every four diving personnel should be provided.

f. Stowage should be provided for diver's clothing and foul weather gear.

300. Diver deployment and recovery

301. The location for the deployment of divers should be carefully selected to achieve optimum access to the work site as well as minimum possible motion.

400. Diver support equipment and deck surface hyperbaric chambers (DCH)

401. When preparing for the installation of equipment to support air range diving operations, two main factors should be considered:

a. Accessibility

b. Protection

402. Equipment not specifically required to be located on deck should be positioned clear of this area.

403. Deck compression chambers must be mounted in the immediate vicinity of the diver deployment position in such a way that it is possible for divers in emergency to be recompressed within 2 minutes of leaving the water.

404. Where possible DCH should be on the same deck as the diver deployment position, but never more than one deck above or below.

405 The number of hatches, doors and ladders should be kept to a minimum and allow the passage of an incapacitated diver

406. There should be sufficient space around DCH to ensure clear access for their operation, maintenance, and a 2 metre clearance in front of the access hatches to enable injured divers to be manoeuvred into the DCH on stretchers.

407. DCH and their control panels should be protected from the elements and from mechanical damage, and properly secured to avoid movement in heavy weather.

408. DCH should always be located clear of potential fire hazard.

409. Diving systems and gas storage facilities are not to be installed in machinery spaces that have machinery not associated with the diving systems.

410. Diving systems are not to be installed in the vicinity of exhaust / ventilation outlets from machinery spaces and galleys.

411. It is recommended that pressure vessels for human occupancy be arranged along the longitudinal (fore-aft) direction of the vessel in order to minimize the rolling effect on divers within them.

412. Where there are impressed current system anodes, such system must be turned off during diving operations.

413. Requirements for the use of Hyperbaric Chambers:

TABLE T.E3.413.1 – REQUIREMENTS FOR THE USE OF HYPERBARIC CHAMBERS

Diving characteristics	Requirements for CH	Class notation
Depth of dive 50 metres or under Maximum time of permanence 12 hours	Open or closed CH Hyperbaric evacuation system not required	SDSV
Time of dive over 12 hours	Closed CH with environmental temperature and humidity control and complete sanitary system including bowl, shower and lavatory with hot and cold water	SDSV DSV
Depth of dive larger than 50 metres	Closed CH with environmental temperature and humidity control and complete sanitary system including bowl, shower and lavatory with hot and cold w Hypberbaric Evacuation System **required**	DSV
Offshore Diving Support Vessels	Further to the above, offshore diving support vessels, as defined in A2.141 above,having L ≥ 24 m, GT ≥ 500 and notation DSV working in the proximity of platforms (see A2.142 above) where there is a possibility of collision during manoeuvres, damage should be assumed to occur anywhere in the vessel' s length between transverse watertight bulkheads.	OFFSHORE, DSV

500 Compressors

501. Compressors should be mounted in positions which ensure good access for maintenance and protection from the elements.

502. They should be clear of accommodation and working deck areas.

503. Air intakes should be so located as to avoid possible contamination from funnel and exhaust fumes and from spray.

504. Where two compressors are fitted their intakes should be separate.

505. Carbon monoxide should be removed at the compressor outlets to ensure the quality of air is up to the required standards such as:

a. NORMAM 15 item 1209;

b. British BS4001 Part I.

506. An alarm should be positioned at the dive control position to warn of low pressure.

507. Reserve capacity shall always be available to ensure that divers can be safely recovered and decompressed.

508. Great care shall be taken to minimize the risk of fire posed by fuel leaks and spills from diesel powered compressors.

600. Gas bottles

601. Gas bottles should be located clear of fire hazards and carefully protected from damage and movement induced by vessel motion. Where stowed on deck, they are to be effectively protected from weather (seas and heat) and mechanical damage.

602. They should be clearly marked.

603. Bottles containing oxygen or gases with oxygen content greater than 25% should be stored on an upper deck and have a dedicated water deluge system.

604. Where gas bottles are stored in enclosed spaces, the following requirements apply:

a. Boundaries of the enclosed space to other enclosed spaces are to be gas tight;

b. Access doors are to open outwards;

c. Outlet relief valves are to be led to the open deck away from sources of ignition;

d. Enclosed spaces containing the breathing gas bottles are to be fitted with ventilation providing at least eight air changes per hour, independent of other ventilation systems, and drawn from a non-hazardous area. Ventilation system fans are to be of the non-sparking type.

e. In case the gas mixture contains less than 18% of oxygen by volume, the enclosed space is to be fitted with oxygen analyzers, one monitoring the upper areas and the other the lower areas of the enclosed space, fitted with audio-visual alarms.

700. Dive control position and stand-by divers' position

701. The diver control position should be located in such a position as to ensure good physical access to and visibility of the working deck, diver deployment positions and DCH and, in particular, protected from equipment having high noise levels.

702. Closed circuit TV with and independent back-up may be used to achieve the visibility requirements.

703. Breathing equipment with built-in communication should be provided for the personnel required to continue working in the Dive Control Position if the area becomes smoke filled.

704. Positions should be allocated to stand-by divers which provide protection from the elements, from noisy equipment and allow sufficient space for stowage of umbilicals and divers' equipment.

705. Stand-by divers' position should ensure their speedy and unrestricted deployment using the secondary means of deployment whenever possible.

800. Clear deck space

801. The arrangement of the equipment should ensure that sufficient clear deck space is available to enable the task to be carried out without introducing risk to personnel or equipment.

802. Clear walkways and escape routes should be unobstructed and clearly marked on either side of the working deck.

900. Other arrangements

901. **Cable, pipes, hoses**

a. All cables, pipes and hoses providing diving support systems should be run in such a way and so protected as to minimize the risk of damage.

b. Routing of cables and piping should avoid areas of high physical activity

c. Long runs of flexible hoses for oxygen should always be avoided as well as sharp bends in piping.

d. Proper securing arrangements should be fitted to avoid movement

e. Suitable protection from mechanical damage should be provided including the use, whenever possible, of rigid rather than flexible hoses.

f. Deck and bulkhead penetrations are to be approved by RBNA.

g. Electric junction boxes related to diving should be insulated to IP 65 rating and installed in positions which introduce minimum risk of damage.

902. **Hot water machines**

a. Hot water machines shall be sited in positions which protect them from the elements and mechanical damage and are clear of the working deck and accommodation areas.

b. Hot water machines should have electrical heaters. Diesel fired hot water heaters should only be used as secondary back-up systems.

c. Diesel units should always be provided with effective ventilation and precautions taken to detect and extinguish fires. Cofferdams or trays of sufficient capacity should be provided around them to accommodate any foreseeable spillage with large gravity drains to remove any spilt or burning fuel to a safe place.

903. **ROV Operations**

a. If ROV and diver operations are being carried out simultaneously from the same vessel then the operational areas of each should be sufficiently separated to ensure that diving operations are not jeopardised and down-lines for the diving operations and position references are not interfered with.

b. Hard wire communications and back up communications shall be maintained between the ROV Supervisor and the Diving Supervisor whenever ROVs are being operated.

c. Repeats of the ROV video monitor(s) should be provided in the Dive Control position.

E4. WATER ON DECK

100. Water on deck

101. Non slip working surfaces shall be provided. Personnel protection equipment such as hard hats, boots, life vests are to be available.

102. When calculating the freeboard, deck flooding as well as the time for the divers to climb and enter the decompression chambers is to be taken into account.

103. Appropriate means of efficient water exit from the deck are to be provided.

Guidance

While a higher freeboard and bulwark will reduce the ingress of water on deck, the increased height will require more difficult conditions for the divers to climb and reach the compression chamber.

End of guidance

E5. SHALLOW DEPTH OPERATION LIMITATIONS – A GUIDELINE

100. Guidelines for shallow depth operation limitations for vessels fitted with SPD-2 systems

101. **Vessel Draught**

a. While the appropriate clearance the vessel needs between the seabed and the keel or lowest thruster is to be determined by the master of the DP vessel taking into account the weather forecast, heights of the tides, vessel motion and the presence of subsea obstructions, design consideration should also be given to the clearance that is required by the divers' deployment device.

b. The above factors will determine the shallow water limits of a SDSV with a SPD-2 positioning system.

102. **Vessel Capability:** the vessel's capability plots may not accurately give the limiting environmental conditions for shallow water and operators should expect higher thruster and generator loads than for the same wind speed in deeper water and, as a consequence, termination of diving support operations earlier than might otherwise have been expected. For vessels with a consequence analysis warning, the reduced capability should automatically be taken into account.

103. **Position References**

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

b. Each of the vessel's position references should provide position information accurate to ±2% of the water depth. For example in 30m of water the information provided by the reference systems should have a standard deviation of ±0.6m.

c. There should always be at least three position reference systems on line of which one should be a radio or surface position reference.

d. When working in water depths of less than 50m the scope (radius of operation) of each of the three position references should be equal to or greater than 30% of the water depth, and never less than 5m for example water depth =30m, radius of operation 9m.

e. In general terms, the shallower the water depth the smaller the scope for movement before seabed position reference sensors need relocation. In particular:

e.1. the scope of vertical taut wires is greatly reduced depending on the height of the suspension point;

e.2. acoustics are more susceptible to interference from the vessel;

e.3. the peak natural excursion of the vessel can exceed the scope of a bottom position reference.

f. Surface reference systems, not being susceptible to water depth, may offer greater reliability. These may, however, have limitations, the acceptability of which should be assessed.

g. The standard deviation of the vessel's natural excursions should not exceed one third of the scope of any position reference.

h. Reference is made to IMCA D 010 – Diving operations from vessels operating in dynamically positioned mode.

CHAPTER H
LOADING CONDITIONS, BUOYANCY AND STABILITY

CHAPTER CONTENTS

H1. FREEBOARD
- See Title 11

H2. LIGHTSHIP WEIGHT
- **See Title 11**

H3. LOADING CONDITIONS
- **See Title 11**

H4. BUOYANCY, HULL SUBDIVISION

H5. STABILITY

H6. DAMAGED STABILITY

H4. BUOYANCY, HULL SUBDIVISION [IMO Resolution MSC 235 (82)]

100. General

101. Taking into account, as initial conditions before flooding, the standard loading conditions required by the relevant provisions of Part B of the IMO IS Code and the damage assumptions in Subchapter H4 the vessel should comply with the damage stability criteria as specified in Subchapter H6 below.

200. Damage assumptions for offshore dive supporting vessel s

201. In offshore diving support vessels havng GT ≥ 500, as defined in A2.141 above, for which the notation DSV has been assigned, working in the proximity of platforms (see A2.142 above) where there is a possibility of collision during manoeuvres, damage should be assumed to occur anywhere in the vessel' s length between transverse watertight bulkheads.

202. The assumed extent of damage should be as follows:

a. longitudinal extent:

a.1. for a vessel the keel of which is laid or which is at a similar stage of construction before 22 November 2012

Guidance

A similar stage of construction means the stage at which:

i. construction identifiable with a specific ship begins; and

ii. assembly of that ship has commenced comprising at least 50 tonnes or one per cent of the estimated mass of all structural material, whichever is less.

- *with length (L) not greater than 43 m: 10% of L; and*

- *with length (L) greater than 43 m: 3 m plus 3% of L*;

iii. for a vessel the keel of which is laid or which is at a similar stage of construction on or after 22 November 2012:

- *with length (L) not greater than 43 m: 10% of L;*

- *with length (L) greater than 43 m and less than 80 m: 3 m plus 3% of L; and*

- *with length (L) from 80 m to 100 m: 1/3L2/3;*

End of guidance

b. transverse extent:

b.1. for a vessel the keel of which is laid or which is at a similar stage of construction before 22 November 2012:

i. 760 mm measured inboard from the side of the vessel perpendicularly to the centreline at the level of the summer load waterline;

b.2. for a vessel the keel of which is laid or which is at a similar stage of construction on or after 22 November 2012:

i. with length (L) less than 80 m: 760 mm; and

ii. with length (L) from 80 m to 100 m: B/20, but not less than 760 mm;

b.3. The transverse extent should be measured inboard from the side of the vessel perpendicularly to the centreline at the level of the summer load waterline; and

c. vertical extent:

c.1. from the underside of the cargo deck, or the continuation thereof, for the full depth of the vessel.

203. For a vessel the keel of which is laid or which is at a similar stage of construction:

a. before 22 November 2012:

a.1. A transverse watertight bulkhead extending from the vessel's side to a distance inboard of 760 mm or more at the level of the summer load line joining longitudinal watertight bulkheads may be considered as a transverse watertight bulkhead for the purpose of the damage calculations.

b. on or after 22 November 2012:

c. For a vessel with length (L) less than 80 m, a transverse watertight bulkhead extending from the vessel's side to a distance inboard of 760 mm or more at the level of the summer load line joining longitudinal watertight bulkheads may be considered as a transverse watertight bulkhead for the purpose of the damage calculations. For a vessel with length (L) from 80 m to 100 m, a transverse watertight bulkhead extending from the vessel's side to a distance inboard of B/20 or more (but not less than 760 mm) at the level of the summer load line joining longitudinal watertight bulkheads may be considered as a transverse watertight bulkhead for the purpose of the damage calculations.

204. If pipes, ducts or tunnels are situated within the assumed extent of damage, arrangements should be made to ensure that progressive flooding cannot thereby extend to compartments other than those assumed to be floodable for each case of damage.

205. If damage of a lesser extent than that specified in H4.200 results in a more severe condition, such lesser extent should be assumed.

206. Where a transverse watertight bulkhead is located within the transverse extent of assumed damage and is stepped in way of a double bottom or side tank by more than 3.05 m, the double bottom or side tanks adjacent to the stepped portion of the transverse watertight bulkhead should be considered as flooded simultaneously.

207. If the distance between adjacent transverse watertight bulkheads or the distance between the transverse planes passing through the nearest stepped portions of the bulkheads is less than the longitudinal extent of damage given in H4.202.a, only one of these bulkheads should be regarded as effective for the purpose of H4.201.

300. Subdivision

301. The machinery spaces and other working and living spaces in the hull should be separated by watertight bulkheads.

302. Arrangements made to maintain the watertight integrity of openings in watertight subdivisions should comply with the relevant provisions for cargo ships contained in chapter II-1 of the IMO SOLAS Convention.

303. A collision bulkhead should be fitted that complies with relevant provisions for cargo ships of chapter II-1 of the IMO SOLAS Convention.

304. An after peak bulkhead should be fitted and made watertight up to the freeboard deck. The after peak bulkhead may, however, be stepped below the freeboard deck, provided the degree of safety of the vessel as regards subdivision is not thereby diminished.

H5. STABILITY

100. Weight distribution
- See Part II, Title 11, Section 1, H5.100.

200. Free surface
- See Part II, Title 11, Section 1, H5.200.

300. Intact stability

Guidance

***Risks involved**: all moored vessel are vulnerable to collision. The fact that DSV manoeuvres very close to offshore installations increases the risk.*

End of guidance

301. **Intact stability**: the intact stability calculations shall be in compliance with IMO Intact Stability Code (IS Code) Part A Chapter 2 as amended.

H6. DAMAGE STABILITY [IMO Resolution MSC.235(82)]

100. Applicable regulations

101. Every new decked offshore diving support vessels (see A2.141) with notation DSV of 24 m and over but not more than 100 m in length and GT $\geq$ 500 should comply with the provisions of the present Subchapter H6.

102. Damaged stability calculations shall be in compliance with IMO Resolution MSC.235(82) as amended.

Guidance

Vessels with notation SDSV working in shallow waters need not comply with the requirement H6.101 above.

End of guidance

200. Damage stability criteria for offshore diving support vessels with notation DSV

201. The final waterline, taking into account sinkage, heel and trim, should be below the lower edge of any opening through which progressive flooding may take place. Such openings should include air pipes and those which are capable of being closed by means of weather tight doors or hatch covers and may exclude those openings closed by means of watertight manhole covers and flush scuttles, small watertight cargo tank hatch covers which maintain the high integrity of the deck, remotely operated watertight sliding doors and side scuttles of the non-opening type.

202. In the final stage of flooding, the angle of heel due to unsymmetrical flooding should not exceed 15°. This angle may be increased up to 17° if no deck immersion occurs.

203. The stability in the final stage of flooding should be investigated and may be regarded as sufficient if the righting lever curve has, at least, a range of 20° beyond the position of equilibrium in association with a maximum residual righting lever of at least 100 mm within this range. Unprotected openings should not become immersed at an angle of heel within the prescribed minimum range of residual stability unless the space in question has been included as a floodable space in calculations for damage stability. Within this range, immersion of any of the openings referred to in H6.200 and any other openings capable of being closed weather tight may be authorized.

204. The RBNA should be satisfied that the stability is sufficient during intermediate stages of flooding.

300. Assumptions for calculating damage stability

301. Compliance with Subchapter H6 should be confirmed by calculations which take into consideration the design characteristics of the vessel, the arrangements, configuration and permeability of the damaged compartments and the distribution, specific gravities and the free surface effect of liquids.

302. The permeability of compartments assumed to be damaged should be as follows:

Spaces	Permeability
Appropriated to stores	60
Occupied by accommodation	95
Occupied by machinery r	85
Void spaces	95
Intended for dry cargo	95

The permeability of tanks should be consistent with the amount of liquid carried, as shown in the loading conditions specified in h4.101. The permeability of empty tanks should be assumed to be not less than 95.

303. The free surface effect should be calculated at an angle of heel of 5° for each individual compartment, or the effect of free liquid in a tank should be calculated over the range of positive residual righting arm, by assessing the shift of liquids

304. Free surface for each type of consumable liquid should be assumed for at least one transverse pair of tanks or a single centreline tank. The tank or tanks to be taken into account should be those where the effect of free surface is the greatest.

305. Alternatively, the actual free surface effect may be used provided the methods of calculation are acceptable to the Administration.

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