PART II RULES FOR THE CONSTRUCTION AND CLASSIFICATION OF MOBILE OFFSHORE DRILLING UNITS

TITLE MOBILE OFFSHORE DRILLING UNITS

SECTION 6 PIPING

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100. Piping systems

101. The present Rules apply to piping systems, including pumps, valves and accessories, and are additional to those of the Ship Rules Part II, Title 11, Section 6.

200. List of documents

201. The documents for piping systems to be submitted for approval of the RBNA are given in Part I, Title 01, Section 2, Chapter C.

B1. STANDARDS

100. Application

101. The present Rules do not replace national and international standards in force. Materials with characteristics other than those listed here may be used, provided that their specifications are submitted for approval of the RBNA.

102. The requiremets of the present Section 6 are in accordance with the unified requirements of

– IACS Unified requirements UR P

– Part II Title 11 section 6 Chapter B of the Ship Rules

– IMO MODU Code

– IACS UR D

– API standards for each component

CHAPTER C
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C1. PIPELINE ARRANGEMENT

100. General

101. The requirements of this Chapter are additional to those of the Ship Rules Part II, Title 11, Section 6, Chapter C.

102. Pipes are to be arranged inboard of the zone of assumed damage penetration unless special consideration has been taken in the damage stability review.

103. Piping systems carrying non-hazardous fluids are generally to be separate from piping systems which may contain hazardous fluids. Cross connection of the piping systems may be permitted where means for avoiding possible contamination of the non-hazardous fluid system by the hazardous medium are provided.

104. Where air or steam is used to atomize well bore fluids prior to flaring, a nonreturn valve is to be fitted in the air or steam line. This valve shall be part of the permanently installed piping, readily accessible and as close as possible to the burner boom. Aarrangements shown to provide an equivalent level of safety may be accepted by the RBNA.

200. Valve arrangements

201. **General:** Where valves of piping systems are arranged for remote control and are power operated, a secondary means of operating the valves which may be manual control, is to be provided.

202. **Remote operation of sea-water inlet and discharge valves**: Inlet and discharge valves in compartments situated below the assigned load line (normally unattended compartments) are to be provided with remote controlled valves. Where remote operation is provided by power actuated valves for sea-water inlets and discharges for operation of propulsion and power generating machinery, power supply failure of the control system is not to result in:

a. closing of open valves

b. opening of closed valves.

203. Consideration will be given to accepting bilge alarms in lieu of remote operation for surface type and self-elevating units only.

300. Jacking systems

301. The jacking system is to be designed and constructed to maintain the safety of the unit in the event of failure of a critical component during operation of the jacking system. Suitable monitoring is to be provided at a manned control station to indicate such failure.

C2. SHIP'S SIDE AND BOTTOM CONNECTIONS

100. Protection against flooding

101. Each seawater inlet and discharge in spaces below the assigned load line shall be provided with a valve operable from an accessible position outside the space on:

a. all column-stabilized units;

b. all other units where the space containing the valve is normally unattended and is not provided with high bilge water level detection.

102. The control systems and indicators provided in Part II, Title MODU, Section 1, Chapter H, H6.201.a shall be operable in both normal conditions and in the event of main power failure. Where stored energy is provided for this purpose, its capacity shall be to the satisfaction of the RBNA.

103. Non-metallic expansion joints in piping systems, if located in a system which penetrates the unit's side and both the penetration and the non-metallic expansion joint are located below the deepest load waterline, shall be inspected as part of the dry-dock survey in section 1.6 and replaced as necessary, or at an interval recommended by the manufacturer.

C3. PROTECTION AGAINST OVER- PRESSURE

100. Protection against over-pressure

101. In closed systems, where the fluid can be heated, over-pressure protection devices are to be fitted.

102. Systems which in service may be subject to pressures greater than those for which they were designed are to be fitted with safety valves.

103. Over-pressure protection devices are to trigger when the pressure reaches 110% of the design project.

200. Equipaments and accessories

201. The positive displacement pumps are to be fitted with pressure relief valves which cannot be closed, to protect their casing.

202. Centrifugal pumps are to operate smoothly when the discharge valve is closed.

203. Safety valves are to be installed on the low pressure side of pressure reducing valves.

C4. INDEPENDENT TANKS

100. Structural dimensioning

101. Structural dimensioning of independent tanks is to be accordance with Part II Title 11 Section 2 of the Ship Rules.

200. Accessories

201. The requirements for tank accessories are indicated in the Rules on items relating to each type of fluid.

CHAPTER F
HULL PIPING SYSTEM

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F1. BILGE PUMPING ARRANGEMENTS

100. Bilge pumping arrangements

101. An efficient bilge pumping system shall be provided, capable of pumping from and draining watertight compartments other than spaces permanently appropriated for the carriage of fresh water, water ballast, fuel oill or liquid cargo and for which other efficient means of pumping are provided, under all practical conditions whether the unit is upright or inclined.

102. In general, the bilge system is to be in accordance with the Ship Rule Part II, Title 11, Section 6, F.1. Compartments below deck containing essential equipment for operation and safety of the unit are to have a permanently installed bilge or drainage system. These compartments are to be drained with at least two bilge pumps, or equal.

103. Additional suctions shall be provided in large compartments or compartments of unusual form, as deemed necessary by the RBNA.

104. Arrangements shall be made whereby water in the compartment may find its way to the suction pipes.

105. Compartments not provided with bilge suction may be drained to other spaces provided with bilge pumping capability.

106. Means shall be provided to detect the presence of water in such compartments which are adjacent to the sea or adjacent to tanks containing liquids and in void compartments through which pipes conveying liquids pass.

107. If the RBNA is satisfied that the safety of the unit is not impaired the bilge pumping arrangements and the means to detect the presence of water may be dispensed with in particular compartments.

108. The arrangement of the bilge pumping system shall be such as to prevent the possibility of water passing from the sea into dry spaces, or inadvertently from one compartment to another.

109. All distribution boxes and manually operated valves in connection with the bilge pumping arrangements shall be in positions which are accessible under ordinary circumstances.

110. Where such valves are located in normally unmanned spaces below the assigned load line and not provided with high bilge water level alarms, they shall be operable from outside the space.

111. Special consideration shall be given to the design of bilge lines passing through ballast tanks taking into account effects of corrosion or other deterioration.

112. A means to indicate whether a valve is open or closed shall be provided at each location from which the valve can be controlled. The indicator shall rely on movement of the valve spindle.

113. Drainage of hazardous areas shall be given special consideration having regard to the risk of explosion (see F.2 below).

200. Additional provisions applicable to column-stabilized units

201. The following additional provisions are applicable to column-stabilized units:

a. **.** Chain lockers which, if flooded, could substantially affect the unit's stability shall be provided with a remote means to detect flooding and a permanently installed means of dewatering. Remote indication of flooding shall be provided at the central ballast control station.

b. . At least one of the pumps referred to in paragraph 4.9.2 and pump-room bilge suction valves shall be capable of both remote and local operation.

c. Propulsion rooms and pump-rooms in lower hulls shall be provided with two independent systems for high bilge water level detection providing an audible and visual alarm at the central ballast control station.

300. Size of bilge main

301. The cross-sectional area of the main bilge line is not to be less than the combined areas of the two largest branch suctions.

302. The internal diameter of branch suctions from each compartment is not to be less than stipulated by the following formula, to the nearest 5 mm (0.20 in):

$$d = 2{,}15\sqrt{A} + 25 \text{ mm} \qquad d = \sqrt{A/1500} + 1 \text{ in.}$$

where

A is wetted surface in m2 (ft2) of the compartment, excluding stiffening members when the compartment is half filled with water. The internal diameter of any bilge line is not to be less than 50 mm (2 in.).

400. Size of Bilge Pumps

401. Each bilge pump is to be capable of giving a speed of water through the bilge main of not less than 2 m (6.6 ft.) per second. When more than two pumps are connected to the bilge system, their aggregate capacity is not to be less effective.

500. Chainlockers

501. Chainlockers are to be capable of being drained by a permanently installed bilge or drainage system or by portable means. Means are to be provided for removal of mud and debris from the bilge or drainage system.

600. Void Compartments

601. Void Compartments adjacent to the sea or to tanks containing liquids, and void compartments through which piping conveying liquids passes, are to be drained by permanently installed bilge or drainage systems or by portable means. If portable pumps are used, two are to be provided and both pumps and arrangements for pumping are to be readily accessible.

602. Void compartments as defined above which are not provided with bilge or drainage systems in compliance with the above are to be accounted for in the units stability analysis.

700. Bilge alarm

701. Propulsion rooms or pump rooms in lower hulls of column stabilized units which normally are unattended are to be provided with two independent systems of high level detection.

F2 BILGE SUCTIONS FROM HAZARDOUS AREAS

100. Bilge suction from hazardous areas

101. Hazardous and non-hazardous areas are to be provided with separate drainage or pumping arrangements.

102. The following additional requirements are applicable to column stabilized units:

a. Chain lockers which, if flooded, could substantially affect the unit's stability are to be provided with a remote means to detect flooding and a permanently installed means of dewatering. Remote indication of flooding is to be provided at the central ballast control station.

b. At least one of the pumps referred to in F2.102.a and all pump-room bilge suction valves are to be capable of both remote and local operation.

F3. BALLAST PUMPING ARRANGEMENTS ON COLUMN-STABILIZED UNITS

100. Additional reqluirements for column-stabilized units

101. Units shall be provided with an efficient pumping system capable of ballasting and deballasting any ballast tank under normal operating and transit conditions. Alternatively, RBNAs may permit controlled gravity ballasting.

102. The ballast system shall provide the capability to bring the unit, while in an intact condition, from the maximum normal operating draught to a severe storm draught, or to a greater distance, as may be specified by the RBNA, within three hours.

103. The ballast system shall be arranged to provide at least two independent pumps so that the system remains operational in the event of failure of any one such pump. The pumps provided need not be dedicated ballast pumps, but shall be readily available for such use at all times.

104. The ballast system shall be capable of operating after the damage specified in Part II, Title MODU, Section 1, H6.300 and have the capability of restoring the unit to a level trim and safe draught condition without taking on additional ballast, with any one pump inoperable.

105. The RBNA may permit counter-flooding as an operational procedure.

106. Counter-flooding is not to be considered as a means to improve the suction head available to the ballast pumps when considering the operability of the ballast system after the damage specified inPart II Title MODU Section 1, H6.301.

107. The ballast system shall be arranged and operated so as to prevent inadvertent transfer of ballast water from one tank or hull to another, which could result in moment shifts leading to excessive angles of heel or trim.

108. It shall be possible to supply each ballast pump provided to meet F3.103 from the emergency source of power. The arrangements shall be such that the system is capable of restoring the unit from an inclination specified in Part II, Title MODU, Section 5, D1.302 to a level trim and safe draught condition after loss of any single component in the power supply system.

109. All ballast pipes shall be of steel or other suitable material having properties acceptable to the RBNA. Special consideration shall be given to the design of ballast lines passing through ballast tanks, taking into account effects of corrosion or other deterioration.

110. All valves and operating controls shall be clearly marked to identify the function they serve. Means shall be provided locally to indicate whether a valve is open or closed.

111. Air pipes shall be provided on each ballast tank sufficient in number and cross-sectional area to permit the efficient operation of the ballast pumping system under the conditions referred to in paragraphs F3.101 to F3.110. In order to allow deballasting of the ballast tanks intended to be used to bring the unit back to normal draught and to ensure no inclination after damage, air pipe openings for these tanks shall be above the worst damage waterline specified in Part II, Title MODU, Section 1, H6. Such air pipes shall be positioned outside the extent of damage, as defined in Part II, Title MODU, Section 1, H6.

200. Control and indicating systems

201. A central ballast control station shall be provided. It shall be located above the worst damage waterline and in a space not within the assumed extent of damage referred to in Part II, Title MODU, Section 1, H6 and adequately protected from weather.

The central ballast control station is to include the following:

a. A valve position indicating system.

b. A tank level indicating system.

c. A draft indicating system.

d. A means of communication between the central ballast control station and those spaces containing the alternative means of control for the ballast pumps and valves.

202. It shall be provided with the following control and indicating systems, having appropriate audible and visual alarms, where applicable:

a. ballast pump control system;

b. ballast pump status-indicating system;

c. ballast valve control system;

d. ballast valve position-indicating system;

e. tank level indicating system;

f. draught indicating system;

g. heel and trim indicators;

h. power availability indicating system (main and emergency);

i. ballast system hydraulic/pneumatic pressure-indicating system.

203. In addition to remote control of the ballast pumps and valves from the central ballast control station, all ballast pumps and valves shall be fitted with independent local control operable in the event of remote control failure. The independent local control of each ballast pump and of its associated ballast tank valves shall be in the same location.

204. The control and indicating systems listed in F3.201 shall function independently of one another, or have sufficient redundancy, such that a failure in one system does not jeopardize the operation of any of the other systems.

205. Each power-actuated ballast valve shall fail to the closed position upon loss of control power. Upon reactivation of control power, each such valve shall remain closed until the ballast control operator assumes control of the reactivated system. The RBNA may accept ballast valve arrangements that do not fail to the closed position upon loss of power provided the RBNA is satisfied that the safety of the unit is not impaired.

206. The tank level indicating system under F3.201.e shall provide means to:

a. indicate liquid levels in all ballast tanks. A secondary means of determining levels in ballast tanks, which may be a sounding pipe, shall be provided. Tank level sensors shall not be situated in the tank suction lines;

b. indicate liquid levels in other tanks, such as fuel oil, fresh water, drilling water or liquid storage tanks, the filling or emptying of which, in the view of the RBNA, could affect the stability of the unit. Tank level sensors shall not be situated in the tank suction lines.

207. The draught indicating system shall display the draught as measured at each corner of the unit or at representative positions as required by the RBNA.

208. Enclosures housing ballast system electrical components, the failure of which would cause unsafe operation of the ballast system upon liquid entry into the enclosure, shall comply with Part II, Title MODU, Section 7.

209. A means to indicate whether a valve is open or closed shall be provided at each location from which the valve can be controlled. The indicators shall rely on movement of the valve spindle, or be otherwise arranged with equivalent reliability.

210. Means shall be provided at the central ballast control station to isolate or disconnect the ballast pump control and ballast valve control systems from their sources of electrical, pneumatic or hydraulic power.

F4. AIR VENTING AND OVERFLOW PIPES, SOUNDING/ULLAGE PIPES AND TANK LEVEL INDICATORS

100. Tank vents and overflows

101. Tank vents and overflows are to be located giving due regard to damage stability and the location of the final calculated immersion line in the assumed damage condition.

102. Tank vents and overflows which could cause progressive flooding are to be avoided unless special consideration has been taken in the damage stability review.

103. In cases where tank vents and overflows terminate externally or in spaces assumed flooded, the vented tanks are to be also considered flooded. In cases where tanks are considered damaged, the spaces in which their vents or overflows terminate are also to be considered flooded.

104. Vents and overflows from tanks not considered flooded as a result of damage and located above the final calculated immersion line may require to be fitted with automatic means of closing.

105. **Vent size**: The size of the vents is to be in accordance with the Rules with due consideration being given to the design pressure of the tank.

200. Sounding arrangements

201. All tanks are to be provided with separate sounding pipes, or approved remote level indicating system. Where a sounding pipe exceeds 20 m (65.6 ft) in length, the minimum internal diameter 38 mm (1.5 in.) as required by the Rules is to be increased to at least 50 mm (2 in.).

202. **Additional Sounding**: Where a remote level indicating system is used, an additional sounding system is to be provided for tanks which are not always accessible.

203. **Void Compartments:** Void compartments adjacent to the sea or tanks containing liquids, and void compartments through which piping carrying liquids passes are to be fitted with separate sounding pipes, approved tank liquid level indicating apparatus or be fitted with means to determine if the void tanks contain liquids. Voids as defined above which do not comply with this requirement are to be accounted for in the unit's stability analysis.

F5. POTABLE WATER

Note: See Part II, Title 11, Section 6, Chapter F5 of the Ship Rules.

F6. VENTILATION OF COMPARTMENTS

100. Application

101. In general, the requirements of the Ship Rules of Part II, Title 11, Section 6, F.7 are to be folowed.

102. In addition, the requirements for ventilation in units, in particular regarding fire safety, are contained in the Rules, Part II, Title MODU, Section 3, E.4 are to be applied.

F7. HYDRAULIC POWER FOR THE HULL ESSENTIAL SERVICES

100. Maneuvering system drive

101. The system shall provide protection against overload, with safety valve including to prevent torque transmitted by grounding ,etc.

102. The pipes are to be kept away from the hull and are to not pass through cargo spaces.

200. Other hydraulic systems

201. The characteristics of these systems are to be submitted to the RBNA for approval.

F8. FIRE PUMPS AND FIREFIGHTING PIPING SYSTEMS

100. Scope

Note: See Part II, Title MODU, Section 3, Chapter E, Subchapter E7**.**

F9. FIXED FIRE EXTINGUISHING EQUIPMENT

100. General

101. The requirements for the installation in fire extinguishing systems in areas of the units is to be in compliance with Part II, Title MODU, Chapter E, E8.

CHAPTER G
MACHINERY PIPING

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Note: The requirements of this Chapter are additional to those of the Ship Rules, Part II Title 11, Section 6 Chapter G.

G1. ARRANGEMENTS FOR FUEL OIL, AND OTHER FLAMMABLE OILS

100. Arrangements fuel oil

101. Arrangements for the storage, distribution and utilization of fuel oill shall be such as to ensure the safety of the unit and persons on board.

102. Arrangements for the storage, distribution and utilization of other flammable oils employed under pressure in power transmission systems, control and activating systems and heat transfer systems shall be such as to ensure the safety of the unit and persons on board.

103. In machinery spaces pipes, fittings and valves carrying flammable oils shall be of a material approved by the RBNA, having regard to the risk of fire.

104. Location and arrangement of vent pipes for fuel oil service and settling tanks shall be such that, in the event of a broken vent pipe, the risk of ingress of rainwater or seawater is minimized.

105. Two fuel oil service tanks for each type of fuel used on board necessary for propulsion and vital systems or equivalent arrangements shall be provided, each with a capacity of at least eight hours at the maximum continuous

rating of the propulsion plant, if any, and normal operating load of the generator plant.

106. High pressure fuel delivery lines

a. All external high pressure fuel delivery lines between the high pressure fuel pumps and fuel injectors shall be protected with a jacketed piping system capable of containing fuel from a high pressure line failure. A jacketed pipe incorporates an outer pipe into which the high pressure fuel pipe is placed forming a permanent assembly. The jacketed piping system shall include a means for collection of leakages and arrangements shall be provided for an alarm to be given of a fuel line failure.

b. All surfaces with temperatures above 220°C, which may be impinged as a result of a fuel system failure, shall be properly insulated.

c. Fuel oill lines shall be screened or otherwise suitably protected to avoid, as far as practicable, oil spray or oil leakages onto hot surfaces, into machinery air intakes, or other sources of ignition. The number of joints in such piping systems shall be kept to a minimum.

G2. LUBRICATING OIL

100. Arrangements for lubricatin oil lines

101. Arrangements for the storage, distribution and utilization of oil used in pressure lubrication systems shall be such as to ensure the safety of the unit and persons on board.

102. Location and arrangement of vent pipes for lubrication oil tanks shall be such that, in the event of a broken vent pipe, the risk of ingress of rainwater or seawater is minimized.

G3. MACHINERY COOLING

100. Protection against flooding

101. Each seawater inlet and discharge in spaces below the assigned load line shall be provided with a valve operable from an accessible position outside the space on:

a. . all column-stabilized units;

b. all other units where the space containing the valve is normally unattended and is not provided with high bilge water level detection.

102. The control systems and indicators provided in Part II Title MODU Section 1, H2.200. shall be operable in both normal conditions and in the event of main power failure. Where stored energy is provided for this purpose, its capacity shall be to the satisfaction of the RBNA.

103. Non-metallic expansion joints in piping systems, if located in a system which penetrates the unit's side and both the penetration and the non-metallic expansion joint are located below the deepest load waterline, shall be inspected as part of the dry-dock survey and replaced as necessary, or at an interval recommended by the manufacturer.

G4. EXHAUST OUTLETS

100. Exhaust pipes

101. Exhaust outlets of internal combustion engines are to be fitted with efficient spark arresting devices and shall discharge outside the hazardous areas.

102. Exhaust outlets of fired boilers are to discharge outside hazardous areas.

103. Exhaust piping is to be installed in accordance with the the requirements of this Chapter.

200. Thermal insulation

201. Exhaust pipe insulation is to be protected against possible oil absorption.

202. Exhaust pipes are to be insulated and installed so that no flammable material could ignite by contact with the installation and the maximum ambient temperature of the machinery space is accordance with the Rules

203. The insulation materials are to be non-flammable. Where there is the possibility of oil leaks or moisture leak or spray over the insulation, the piping is to be adequately protected by metallic plates.

300. Silencers

301. Silencers are recommended at the engine exhaust piping arranged so as to permit easier drainage and accesses for cleaning and maintenance.

G5. COMPRESSED AIR

100. Air pressure systems

101. In every unit means shall be provided to prevent excess pressure in any part of compressed air systems and where water jackets or casings of air compressors and coolers might be subjected to dangerous excess pressure due to leakage into them from air pressure parts. Suitable pressure-relief arrangements shall be provided for all systems.

102. The starting air arrangements for internal combustion engines shall be adequately protected against the effects of backfiring and internal explosions in the starting air pipes.

103. Starting air pipes from the air receivers to internal combustion engines shall be entirely separate from the compressor discharge pipe system.

104. Provision shall be made to reduce to a minimum the entry of oil into the starting air pressure systems and to drain these systems.

G6. HEATING SYSTEMS, STEAM, FEED WATER AND CONDENSATE

100. Steam boilers and boiler feed systems

101. Every steam boiler and every unfired steam generator shall be provided with not less than two safety valves of adequate capacity. However, the RBNA may, having regard to the output or any other features of any boiler or unfired steam generator, permit only one safety valve to be fitted if it is satisfied that adequate protection against overpressure is provided.

102. Every oil-fired boiler which is intended to operate without manual supervision shall have safety arrangements which shut off the fuel supply and give an alarm at an attended location in the case of low water level, air supply failure or flame failure.

103. Every steam generating system which could be rendered dangerous by the failure of its feedwater supply shall be provided with not less than two separate feedwater systems from and including the feed pumps, noting that a single penetration of the steam drum is acceptable. For those services not essential for the safety of the unit, only one feedwater system is required if automatic shutdown of the steam generating system upon loss of the feedwater supply is provided. Means shall be provided which will prevent overpressure in any part of the feedwater system.

104. Boilers shall be provided with means to supervise and control the quality of the feedwater. As far as practicable, means shall be provided to preclude the entry of oil or other contaminants which may adversely affect the boiler.

105. Every boiler essential for the safety of the unit and which is designed to have a water level shall be provided with at least two means for indicating its water level, at least one of which shall be a direct-reading gauge glass.

200. Steam pipe systems

201. Every steam pipe and every fitting connected thereto through which steam may pass shall be so designed, constructed and installed as to withstand the maximum working stresses to which it may be subjected.

202. Efficient means shall be provided for draining every steam pipe where dangerous water hammer action might otherwise occur.

203. If a steam pipe or fitting may receive steam from any source at a higher pressure than that for which it is designed, a suitable reducing valve, relief valve and pressure gauge shall be fitted.

G7. THERMAL OIL

100. Pipes

101. The pipes are to be, preferably, welded, and with the least number of parts.

102. Gaskets shall be compatible with the nature and temperature of the thermal oil.

103. The arrangement of pipes is to provide freedom for thermal expansion. The pipes shall not pass through accommodation, service and passenger spaces. If they pass through cargo spaces, protection is to be be provided. Passage through bulkheads and decks shall have thermal insulation.

104. The overflow outlet of this system is to reach the location where no hazards are created.

200. Valves

201. The valves will be of ductile material for rated pressure of 16 bar.

202. At the pressure line check valves will be installed in the return line and the valves will have a device to keep the open position.

300. Pumps

301. There shall be two independent circulating pumps.

302 There shall be one pump for the expansion tank feeding.

G8. HYDRAULIC POWER TO MACHINERY ESSENTIAL SERVICES.

100. Application

101. The characteristics of these systems are to be submitted to the RBNA for approval.

G9. USE OF AMMONIA AS A REFRIGERANT [IACS M69]

100. Use of Ammonia as a refrigerant

101. Ammonia refrigerating machinery shall be installed in dedicated gastight compartments. Except for small compartments, at least two access doors are to be provided.

102. Compartments containing ammonia machinery (including process vessels) are to be fitted with :

a. a negative ventilation system independent of ventilation systems serving other ship spaces and having a capacity no less than 30 changes per hour based upon the total volume of the space; other suitable arrangements which ensure an equivalent effectiveness may be considered;

b. a fixed ammonia detector system with alarms inside and outside the compartment;

c. water screens above all access doors, operable manually from outside the compartment;

d. an independent bilge system.

103. At least two sets of breathing apparatus and protective clothings are to be available.

104. Ammonia piping is not to pass through accommodation spaces.

105. In case of ammonia plants of fishing vessels under 55 m in length or other ammonia plants with a quantity of ammonia no greater than 25 kg said plants are allowed to be located in the machinery space.

106. The area where the ammonia machinery is installed is to be served by a hood with a negative ventilation system, so as not to permit any leakage of ammonia from dissipating into other areas in the space.

107. A water spray system is to be provided for the said area.
In addition previous items G9.102 b), G9.103 and G9.104 apply.

G10. HIGH PRESSURE PIPING FOR DRILLING OPERATIONS

100. General

101. Permanently installed piping systems for drilling operations are to comply with an acceptable standard or code.

102. Piping and piping components are to be designed to withstand the maximum stress that could arise from the most severe combination of pressure, temperature, and other loads or service conditions and to be in accordance with codes and standards as per Chapter B above.

CHAPTER T
TESTS

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T1. APPROACH (Pressure tests of piping after assembly on board [IACS UR P2.9]

100. Application to all systems

101. The piping systems, equipments and accessories are to be hydrostatically tested periodically after assembly at a hydraulic pressure equal to 1.5 times the working pressure.

102. Before entering into operation, the piping systems are to be subjected to flushing by circulation through single filters until there is evidence of cleaning.

103. Pressure tests of piping after assembly on board **IACS UR P2.9**

104. After assembly on board, the following tightness tests are to be carried out in the presence of the Surveyor.

105. In general, all the piping systems covered by these requirements are to be checked for leakage under operational conditions and, if necessary, using special techniques other than hydrostatic testing. In particular, heating coils in tanks and liquid or gas fuel lines are to be tested to no less than 1,5P but in no case less than 4 bar.

T2. PIPING SYSTEMS

100. Piping systems with working pressure above 10 bar (10.2 Kgf/cm^2)

101. The pipes for such systems are to be tested in the workshop after manufacture.

102. After installed on board, they shall be tested with all the accessories, at a pressure no less than the given below:

a. 1.25 times the design pressure, if there is any welded joint on board; and

b. The opening pressure of the over-pressure protection devices, in the other cases or when the welded joints on board have been subjected to non-destructive testing.

200. Cargo or fuel oil piping system

201. After installation on board, the system shall be tested at a pressure of 1.5 times the working pressure, but no less than 4 bar (4.07 kgf/cm^2).

300. Steam coils

301. After their installation on board, the steam coils shall be tested with a pressure equal to twice the working pressure.

400. Low pressure piping systems

401. Bilge pipes, ballast, and other low pressure service are to be tested, after their installation on board, at least, with a hydraulic pressure at least equal to the maximum service.

500. Fire testing of flexible pipes [IACS URF 42 SFL]

501. 1. Flexible pipes with end attachments which are required to be of fire-resisting materials shall be subject to a fire for 30 minutes at a temperature of 800^{o}C, while water at the maximum service pressure is circulated inside the pipe. The temperature of the water at the outlet shall no be less than 80^{o}C. No leak shall be recorded during or after the test.

502. 2. An alternative is to fire test the flexible pipe with flowing water at a pressure of at least 5 bar and subsequent pressure test to twice the design pressure.

T3. EQUIPMENT

100. Pumps, compressors, heat exchangers etc.

101. Equipment are to be tested with a hydraulic pressure no less than 1.5 times their working pressure.

T4. ACCESSORIES

100. Hydrostatic tests of valves and fittings [UR P2.10]

101. Valves and fittings non-integral with the piping system, intended for Classes I and II, are to be tested in accordance with recognized standards, but to no less than 1,5 times the design pressure.

102. Valves and cocks intended to be fitted on the ship side below the load waterline are to be tested by hydraulic pressure no less than 5 bar.

200. Steel pressure vessels

201. All boilers and other pressure vessels including their associated fittings which are under internal pressure are to be subjected to appropriate tests including a pressure test before being put into service for the first time. (See Part III, Title 62, Section 6, Subchapter T.8).

202. Pumps, compressors, heat exchangers, etc. are to be tested at a hydraulic pressure not less than 1,5 times the operating pressure.

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