D9
(1979)
(Rev. 1 1987)
(Rev. 2 1990)
(Rev. 3 1996)

Machinery

D9.1 General

D9.1.1 The following Requirements apply to the machinery essential to the safe operation of the unit. They do not apply to equipment and systems used solely for the drilling operation, except in so far as safety is concerned.

Systems and equipment that are used solely for drilling and that may affect the safety of the unit on which they are installed may be designed to the alternative requirements of recognized standards acceptable to the Society.

D9.1.2 Self-propelled and non-self-propelled units

All propulsion and auxiliary machinery, steering arrangements, pressure vessels, pumps and piping systems necessary for the safe operation of the unit are to be constructed and installed in accordance with the relevant requirements of the Rules and as specified herein.

D9.1.3 Machinery Installations – Inclinations

D9.1.3.1 – All units All machinery, components and systems essential to the safe operation of a unit are to be designed to operate under the following static conditions of inclination:

1. when column stabilized units are upright and inclined to an angle up to 15° in any direction:
2. when self-elevating units are upright and inclined to an angle up to 10° in any direction:
3. when surface units are upright and level trim and when inclined to an angle of list up to 15° either way and simultaneously trimmed to an angle up to 5° by the bow or stern.

The Society may permit or require deviations from these angles, taking into consideration the type, size and service conditions of the unit.

D9.1.3.2 – Self Propelled Units – Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the unit should, as fitted in the unit, be capable of operating under the static conditions required by D9.1.3.1 and the following dynamic conditions:

1. column stabilized units 22.5° in any direction:
2. self-elevating units 15° in any direction:
3. surface units 22.5° rolling and simultaneously pitching 7.5° by bow or stern.

The Society may permit deviation from these angles, taking into consideration the type, size and service conditions of the unit.

D9.1.3.3 Emergency Source of Power On all units, the emergency generator and its prime mover and any emergency accumulator battery are to be capable of supplying the power required by D10.4.2 when upright and when inclined to the greater of the first intercept angles at which compliance with the intact and damage stability criteria of D3.8 are satisfied. However, in no case need the equipment be designed to operate when inclined more than:

1. 25° in any direction on a column stabilized unit:
2. 15° in any direction on a self-elevating unit: and
3. 22.5° about the longitudinal axis and/or when inclined 10° about the transverse axis on surface unit.

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D9.2 Jacking systems

D9.2.1 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.

D9.3 Piping systems

D9.3.1 General
Pipes are to be arranged inboard of the zone of assumed damage penetration unless special consideration has been taken in the damage stability review. (See D3 to D6).

D9.3.2 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.

D9.3.3 Where air or steam is used to atomize well bore fluids prior to flaring, a non-return valve is to be fitted in the air or steam line. This valve should be part of the permanently installed piping, readily accessible and as close as possible to the burner boom. Alternative arrangements shown to provide an equivalent level of safety may be accepted by the Society.

D9.4 Valve arrangements

D9.4.1 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.

D9.4.2 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:

(i) closing of open valves
(ii) opening of closed valves.

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

D9.5 Ballast systems for column stabilized units

D9.5.1 General

Each ballast tank is to be capable of being pumped out by at least two power-driven pumps, arranged so that tanks can be drained at all normal operating and transit conditions. The ballast pumps are to be of the self-priming type or be provided with a separate priming system.

D9.5.2 Capacity

The system is to be capable of raising the unit, starting from a level trim condition at deepest normal operating draft, to the severe storm draft, or a greater distance as may be specified by the Society, within three hours.

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D9.5.3 System arrangement

The ballast system is to be arranged to prevent the inadvertent transfer of ballast water from one quadrant to any other quadrant of the unit. The system is also to be arranged so that the transfer of ballast water from one tank to any other tank through a single valve is not possible except where such a transfer could not adversely affect the stability of the unit.

D9.5.4 Operation in Damaged Condition

The ballast system is to be arranged so that even with any one pump inoperable, it is capable of restoring the unit to a level trim condition and draft acceptable to the Society with respect to stability, when subject to the damage conditions specified in D3.7.3.

D9.5.5 Control Features

Ballast pumps, ballast tank valves and sea chest valves are to be provided with a means of remote control from a central ballast control station. Pumps are also to be provided with a means of local control in the pump room. A manually operated independent means of control of the valves is also to be provided. This ballast control station and any back-up stations are to be readily accessible and protected from the weather when the unit is subject to the assumed conditions of severe storm and damage. Additionally, these stations are not to be located within the assumed damaged penetration zone. The central ballast control station is to include the following:

(i) A valve position indicating system.
(ii) A tank level indicating system.
(iii) A draft indicating system.
(iv) 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.

The control and indicating systems are to function independently of each other so that a failure in any one system will not affect the operation of the other systems. The ballast pump and ballast valve control systems are to be arranged so that the loss of any one of their components will not cause the loss of operation to the other pumps or valves.

To ensure that uncontrolled transfer of ballast water will not continue upon loss of power, ballast tank valves are to close automatically upon loss of power or be provided with an arrangement considered equivalent to the satisfaction of the Society.

D9.6 Bilge systems

D9.6.1 General

In general, the bilge system is to be in accordance with the Rules. 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.

All distribution boxes and manually operated valves in connection with the bilge pumping arrangements are to be in positions which are accessible under normal circumstances. Where such valves are located in normally unmanned spaces below the assigned load line and not provided with high bilge water level alarms, they are to be operable from outside the space.

D9.6.2 Size of bilge main

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

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D9.6.3 Size of bilge branch suctions

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 m^2 (ft^2) 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.).

D9.6.4 Size of Bilge Pumps

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.

D9.6.5 Chainlockers

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.

D9.6.6 Void Compartments

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. 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.

D9.6.7 Bilge alarm

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.

D9.6.8 Bilge suctions from hazardous areas

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

D9.6.9 The following additional requirements are applicable to column stabilized units:

1. 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.
2. At least one of the pumps referred to in D9.6.1 and all pump-room bilge suction valves are to be capable of both remote and local operation.

D9.7 Tank vents and overflows

D9.7.1 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. (See D.7.4.2(c)) Tank vents and overflows which could cause progressive flooding are to be avoided unless special consideration has been taken in the damage stability review.

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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.
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.

D9.7.2 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.

D9.8 Sounding arrangements

D9.8 .1 General

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.).

D9.8.2 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.

D9.8.3 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.

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D9.9 Low flash point fuels

D9.9.1 General

Where it is intended to burn fuels of a flash point below 60°C (140°F) but not less than 43° C (110°F), closed cup test, this fact is to be indicated clearly on the arrangement submitted. Vent heads of an approved type with flame arrestors are to be fitted to vent pipes. Consideration may be given to other arrangements. The use of fuels of a flash point lower then 43°C (110°F) closed cup test will require special consideration of storage and handling facilities and controls as well as the electrical installation and ventilation provisions.

D9.9.2 Fuel storage for helicopter facilities

Areas where such fuel tanks are situated and fuelling operations conducted are to be suitable isolated from enclosed spaces or other areas which contain a source of vapour ignition. Vent heads of an approved type with flame arrestors are to be fitted to vent pipes. Fuel storage tanks are to be of approved metallic construction and are to be adequate for the installation. Special attention is to be given to the design, mounting and securing arrangements and electrical bonding of the tank and fuel transfer system. The storage and handling area is to be permanently marked. Coamings or other arrangements are to be provided to contain fuel-oil spills.

D9.10 Machinery installations in hazardous areas

D9.10.1 Combustion engines in hazardous areas

Generally, combustion engines are not to be installed in hazardous areas. When this cannot be avoided, special consideration may be given to the arrangement.

D9.10.2 Boilers in hazardous areas

Fired boilers are not to be installed in hazardous areas.

D9.11 Installation of internal combustion engines and boilers

D9.11.1 Exhaust outlets

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

D9.11.2 Exhaust pipes

Exhaust piping is to be installed in accordance with the Rules. Exhaust pipe insulation is to be protected against possible oil absorption.

D9.11.3 Air intakes

Air intakes for internal combustion engines shall be not less than 3 m (10 ft) from the hazardous areas as delineated in D8.2.

D9.12 High pressure piping for drilling operations

D9.12.1 General

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

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D9.13 Initial start arrangement

D9.13.1 General

Provision is to be made for initial starting on board with the unit in a "dead ship" mode without the use of external aid.

D9.14 Control and monitoring

D9.14.1 General

Where propulsion machinery spaces are normally unattended during transit, the control and monitoring systems are to be constructed and installed in accordance with the applicable requirements of the Rules.

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