STATUTORY INSTRUMENTS

1997 No. 1509

The Merchant Shipping (Cargo Ship Construction) Regulations 1997

PART VII

MACHINERY INSTALLATION

General

27.—(1) In every ship the machinery, boilers and other pressure vessels, and associated piping systems and fittings, shall be of a design and construction adequate for the service for which they are intended and shall be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards. The design shall have regard to the materials used in construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions on board.

Additional requirements for ships constructed on or after 1st September 1984

(2) Where the arrangements of the main propulsion machinery are unconventional the Secretary of State may require a separate source of propulsion power to be provided sufficient to give the ship a navigable speed.

(3) Means shall be provided whereby the normal operation of propulsion machinery can be sustained or restored when there is a breakdown of—

(a) a generating set which serves as a main source of electrical power;

(b) the source of steam supply;

(c) the boiler feed water system;

(d) the fuel oil supply systems for boilers or engines;

(e) the sources of lubricating oil pressure;

(f) the sources of water pressure;

(g) a condensate pump and the arrangements to maintain vacuum in condensers;

(h) the mechanical air supply for boilers;

(i) an air compressor and receiver for starting or control purposes; and

(j) the hydraulic, pneumatic or electrical means for control of main propulsion machinery including controllable pitch propellers;

or any other auxiliary system essential for propulsion.

The Certifying Authority may for the purposes of this paragraph, if it is safe so to do, permit a partial reduction in propulsion capability from normal operation.

(4) Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the ship shall be designed to operate when the ship is upright and when inclined at any angle of list up to and including 15 degrees either way under static conditions and 22.5 degrees

either way under dynamic conditions (rolling) and simultaneously inclined dynamically (pitching) 7.5 degrees by bow or stern. The Certifying Authority may permit a reduction in these angles taking into consideration the type, size and service conditions of the ship.

(5) Access shall be provided to facilitate the cleaning, inspection and maintenance of main propulsion and auxiliary machinery including boilers and pressure vessels.

Machinery

28.—(1) The main and auxiliary machinery essential for the propulsion and safety of the ship shall be provided with effective means of control and means shall be provided such as starting batteries, compressed air or the emergency generator, to ensure that the machinery can be brought into operation from the dead ship condition without external aid.

(2) Where risk from over-speeding of machinery would otherwise exist, two independent means of control shall be provided to ensure that the safe speed is not exceeded; provided that the Certifying Authority may permit a single means of limiting the speed of machinery where it considers it safe so to do.

(3) Where main or auxiliary machinery or any parts of such machinery are subject to internal pressure, those parts shall, before being put into service for the first time, be subjected to a hydraulic test to a pressure suitably in excess of the working pressure having regard to—

(a) the design and the material of which they are constructed;

(b) the purpose for which they are intended to be used; and

(c) the working conditions under which they are intended to be used;

and such parts shall be maintained in an efficient condition.

Additional requirements for ships constructed on or after 1st September 1984

(4) The propulsion machinery systems shall be designed, constructed and installed so that undue stress due to vibration is not induced during normal operation.

(5) All gearing and every shaft and coupling used for transmission of power essential for the propulsion and safety of the ship or for the safety of persons on board shall be so designed and constructed that they will withstand the maximum working stresses which they will be subjected to in all service conditions taking into account the type of engines by which they are driven or of which they form part.

(6) Every internal combustion engine having a cylinder diameter of 200 millimetres or greater or a crankcase volume of 0.6 cubic metres or greater shall be provided with crankcase explosion relief valves of a suitable type having sufficient area to relieve abnormal pressure in the crankcase. The explosion relief valves shall be arranged or provided with means to ensure that any discharge from them is so directed as to minimize the possibility of injury to personnel.

(7) Every main propulsion turbine and, where applicable, main internal combustion propulsion machinery and auxiliary machinery shall be provided with automatic shut-off arrangements that will operate in the case of failures, such as a lubricating oil supply failure, which could lead rapidly to complete breakdown, serious damage or explosion. The Certifying Authority may permit arrangements that over-ride the automatic shut-off devices.

Means of manoeuvring and going astern

29.—(1) Every ship shall have sufficient power for going astern to secure proper control of the ship in all normal circumstances. The ability of the machinery to reverse the direction of thrust of the propeller in sufficient time and so to bring the ship to rest from maximum ahead service speed shall be demonstrated and recorded.

Ships constructed on or after 1st September 1984

(2) The effectiveness of any supplementary means of stopping or manoeuvring the ship shall be demonstrated and recorded.

(3) Every ship with multiple propellers shall undergo trials to determine the ability of the ship to manoeuvre with one propeller inoperative.

(4) The trial records required by paragraphs (1), (2) and (3) shall be available on the ship.

Boilers and other pressure vessels

30.—(1) In every ship every boiler or other pressure vessel and its respective mountings shall, before being put into service for the first time, be subjected to a hydraulic test to a pressure suitably in excess of the working pressure which will ensure that the boiler or other pressure vessel and its mountings are adequate in strength and design for the service for which it is intended and having regard to—

(a) the design and the material of which it is constructed;

(b) the purpose for which it is intended to be used; and

(c) the working conditions under which it is intended to be used;

and every such boiler or other pressure vessel and its respective mountings shall be maintained in an efficient condition.

(2) In every such ship provision shall be made which will facilitate the cleaning and inspection of every pressure vessel.

(3) Means shall be provided which will prevent overpressure in any part of boilers and other pressure vessels, and in particular every boiler and every unfired steam generator shall be provided with not less than two safety valves. The Certifying Authority may, having regard to the output or any other feature 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.

Additional requirements for ships constructed on or after 1st September 1984

(4) Every unattended oil fired boiler shall be provided with arrangements to shut off the fuel supply and give an alarm at an attended location in the event of low boiler water level, combustion, air supply failure or flame failure.

(5) Every boiler designed to contain water at a specific level shall be provided with at least two means for indicating the water level, at least one of which shall be a direct reading gauge glass.

(6) Every water-tube boiler serving turbine machinery shall be fitted with a high water level alarm.

(7) Means shall be provided to test and control the quality of the water in boilers.

Boiler feed systems

31.—(1) Every boiler which provides services essential for the safety of the ship and which would be rendered dangerous by the failure of its feed water supply shall be provided with not less than two efficient and separate feed water systems so arranged that either of such systems may be opened for inspection or overhaul without affecting the efficiency of the other. Means shall be provided which will prevent overpressure in any part of the systems.

(2) Every feed check valve, fitting, or pipe through which feed water passes from a pump to such boilers shall be designed and constructed to withstand the maximum working stresses to which it may be subjected, with a factor of safety which is adequate having regard to the material of which it is constructed and the working conditions under which it will be used. Every such valve, fitting, or

pipe shall, before being put into service for the first time, be subjected to a hydraulic test suitably in excess of the maximum working pressure of the boiler to which it is connected or of the maximum working pressure to which the feed line may be subjected, whichever shall be the greater, and shall be maintained in an efficient condition. The feed pipes shall be adequately supported.

(3) If in any ship it is possible for oil to enter the feed water system of a boiler, the arrangements for supplying boiler feed water shall provide for the interception of oil in the feed water.

Additional requirements for ships constructed on or after 1st September 1984

(4) Means shall be provided to test and control the quality of the feed water to boilers.

Steam pipe systems

32.—(1) In every ship every steam pipe and every fitting connected thereto through which steam may pass shall be so designed and constructed as to withstand the maximum working stresses to which it may be subjected, with a factor of safety which is adequate having regard to—

(a) the material of which it is constructed; and

(b) the working conditions under which it will be used.

(2) Without prejudice to the generality of the foregoing, every steam pipe or fitting shall, before being put into service for the first time, be subjected to a test by hydraulic pressure to a pressure suitably in excess of the working pressure to be determined having regard to the requirements of subparagraphs (1)(a) and (b) and every such steam pipe or fitting shall be maintained in an efficient condition.

(3) Steam pipes shall be adequately supported.

(4) Provision shall be made which will avoid excessive stress likely to lead to the failure of any such steam pipe or fitting, whether by reason of variation in temperature, vibration or otherwise.

(5) Efficient means shall be provided for draining every such steam pipe so as to ensure that the interior of the pipe is kept free of water and that water hammer action will not occur under any condition likely to arise in the course of the intended service of the ship.

(6) If a steam pipe is connected to any source at a higher pressure than it can otherwise withstand with an adequate factor of safety, an efficient reducing valve, relief valve and pressure gauge shall be fitted to such pipe.

Air pressure systems

33.—(1) In every ship in which machinery essential for the propulsion and safety of the ship or of persons on board is required to be started, operated or controlled solely by compressed air, there shall be provided an efficient air system which shall include a sufficient number of air compressors and compressed air storage vessels to ensure that an adequate supply of compressed air is available under all conditions likely to be met in service.

(2) Every part of a compressed air system subjected to air pressure shall be designed and constructed to withstand, with an adequate factor of safety, the maximum working stresses to which they may be subjected. Every air pressure pipe or fitting in such a system, other than a pneumatic control system, shall, before being put into service for the first time, be subject to a hydraulic test suitably in excess of the maximum working pressure to which it may be subjected and be maintained in an efficient condition.

(3) Means shall be provided to prevent overpressure in any part of any such compressed air system and, where water jackets or casings of air compressors and coolers might otherwise be subjected to dangerous overpressure due to leakage into them from air pressure parts, suitable pressure relief arrangements shall be provided.

(4) Provision shall be made to reduce to a minimum entry of oil into any such compressed air system and to drain the system. Provision shall also be made to protect the system from the effects of internal explosion.

(5) All discharge pipes from starting air compressors shall lead directly to the starting air receivers, and all starting air pipes from the air receivers to main or auxiliary engines shall be entirely separate from the compressor discharge pipe system.

Cooling water systems

34. In every ship in which cooling water services are essential for the running of the propelling machinery there shall be at least two means of operating such water services.

Oil and gaseous fuel installations

35.—(1) In every ship oil fuel provided for use in boilers or machinery shall have a flash point of not less than 60°C (closed cup test): provided that the Marine Safety Agency may, subject to such conditions as it may impose—

(a) permit any ship to use oil fuel having a flash point of not less than 55°C in boilers, or oil fuel having a flash point of not less than 43°C in internal combustion type machinery provided that the ambient temperature of the machinery space in which such fuel oil is stored or used is at least 10°C below the flash point of the fuel oil;

(b) permit the use of fuel oil with a flash point of less than 43°C provided that it is not stored in any machinery space;

(c) permit the use of gaseous fuel in ships designed for the carriage of liquefied gas if such fuel results solely from evaporation of the cargo carried.

Nothing in this paragraph shall apply to fuel provided for use in a generator provided in accordance with paragraph 1(g) of Schedule 10 in Merchant Shipping Notice MSN 1671.

(2) In every ship in which oil or gaseous fuel is used, the arrangement for storage, distribution and utilisation of fuel shall comply at least with the provisions of Schedule 4 in Merchant Shipping Notice MSN 1671.

Lubricating and other oil systems

36.—(1) In every ship in which oil for lubrication, cooling or operation of the main propelling machinery and its ancillary services is circulated under pressure, provision shall be made so that in the event of the failure of a pump an alternative means of circulating such oil is available.

(2) In ships constructed on or after 1st September 1984, lubricating oil and other flammable oils shall not be carried in fore peak tanks.

Remote control of propulsion machinery from the navigation bridge

37. Every United Kingdom ship constructed on or after 1st May 1981 operating with unmanned machinery spaces, and every other ship constructed on or after 1st September 1984, shall be provided with—

(a) effective means for the operation and control of main auxiliary machinery essential for the propulsion and safety of the ship; and

(b) remote control of the propulsion machinery from the navigating bridge in accordance with the provisions of Schedule 5 in Merchant Shipping Notice MSN 1671.

Steering gear

38. Every ship shall be provided with the means for steering which shall be in accordance with the provisions of Schedule 6 in Merchant Shipping Notice MSN 1671.

Ventilating systems in machinery spaces Requirements for ships constructed on or after 1st September 1984

39. Machinery spaces of Category A in every such ship shall be ventilated so that an adequate supply of air is maintained for the safety and well-being of personnel and the operation of machinery, including boilers, at full power in all weather conditions. Any other machinery space shall be adequately ventilated having regard in particular to the prevention of an accumulation of oil vapour under all normal conditions.

Protection against noise Requirements for ships constructed on or after 1st September 1984

40.—(1) In every such ship, measures shall be taken to reduce noise levels in machinery spaces as far as is reasonable and practical. On completion of a ship noise levels in machinery spaces shall be measured and a record of the measurements taken shall be retained on the ship.

(2) Noise levels and their measurement shall be in accordance with the provisions of Schedule 8 in Merchant Shipping Notice MSN 1671.

Communication between navigating bridge and machinery space

41.—(1) Every ship shall be provided with two means for communicating orders from the navigating bridge to the position in the machinery space or machinery control room from which the main engines are normally controlled. One of the means shall be an engine room telegraph.

Additional requirements for ships constructed on or after 1st September 1984

(2) The means for communicating orders referred to in paragraph (1) shall be independent of each other. In addition, means of communication shall be provided to any other position from which the main engines may be controlled.

Additional requirements for ships constructed on or after 1st October 1994

(3) Appropriate means of communication shall be provided from the navigating bridge and the engine-room to any other position from which the speed or direction of thrust of the propellers may be controlled.

Engineers' alarm Requirements for ships constructed on or after 1st September 1984

42. Every ship shall be provided with an engineers' alarm which shall be clearly audible in the engineers' accommodation when operated from a position in the machinery space or machinery control room from which the engines are normally controlled.

Spare gear

43. Every ship shall be provided with sufficient spare gear having regard to the intended service of the ship.

Periodically unattended machinery spaces Requirements for ships constructed on or after 1st May 1981

44. Every ship with machinery spaces containing machinery used or essential for propulsion and intended to be periodically unattended under any sailing condition, including manoeuvring, shall comply with the provisions of Schedule 9 in Merchant Shipping Notice MSN 1671.

Closing of openings Requirements for tankers constructed on or after 25th May 1980 and to other ships constructed on or after 1st September 1984.

45.—(1) In every ship the number of skylights, doors, ventilators, openings in funnels for exhaust ventilation and other openings, to machinery spaces shall be the minimum compatible with the proper working and safety of the ship.

(2) The skylights to machinery spaces of Category A shall be constructed of steel and their flaps shall be capable of being closed and opened from a suitable position outside the space in the event of fire. Adequate arrangements shall be made to permit the release of smoke in the event of fire.

(3) Windows shall not be fitted in machinery space boundaries. This requirement shall not preclude the use of glass in control rooms located within the machinery space boundaries.

(4) Any machinery space of Category A which is accessible from an adjacent shaft tunnel shall be provided with a light-weight steel fire-screen door in addition to any water tight door. The fire-screen door shall be operable from each side and shall be located at the shaft tunnel side of the bulkhead.