

piping and components, taking into account pulsating pressures due to dynamic loads.

(4) Relief valves shall be fitted to any part of the hydraulic system which can be isolated and in which pressure can be generated from the power source or from external forces. The setting of the relief valves shall not exceed the design pressure. The valves shall be of adequate size and so arranged as to avoid an undue rise in pressure above the design pressure.

(5) The main steering gear and rudder stock shall be:

(a) of adequate strength and capable of steering the ship at maximum ahead service speed which shall be demonstrated;

(b) capable of putting the rudder over from 35° on one side to 35° on the other side with the ship at its deepest seagoing draught and running ahead at maximum ahead service speed and, under the same conditions, from 35° on either side to 30° on the other side in not more than 28 seconds;

(c) operated by power where necessary to meet the requirements of paragraph (b) above and in any case when the rudder stock is over 120mm diameter in way of the tiller, excluding strengthening for navigation in ice; and

(d) so designed that they will not be damaged at maximum astern speed; however, this design requirement need not be proved by trials at maximum astern speed and maximum rudder angle.

(6) The auxiliary steering gear shall be:

(a) of adequate strength and capable of steering the ship at navigable speed and of being brought speedily into action in an emergency;

(b) capable of putting the rudder over from 15° on one side to 15° on the other side in not more than 60 seconds with the ship at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater; and

(c) operated by power where necessary to meet the requirements of paragraph (b) above—and in any case when the rudder stock is over 230mm diameter in way of the tiller, excluding strengthening for navigation in ice.

(7) Main and auxiliary steering gear power units shall be:

(a) arranged to restart automatically when power is restored after a power failure; and

(b) capable of being brought into operation from a position on the navigating bridge. In the event of a power failure to any one of the steering gear power units, an audible and visual alarm shall be given on the navigating bridge.

(8)(a) Where the main steering gear comprises two or more identical power units, an auxiliary steering gear need not be fitted, provided that:

(i) in a passenger ship, the main steering gear is capable of operating the rudder as required by sub-clause (5)(b) of this clause while any one of the power units is out of operation;

(ii) in a cargo ship, the main steering gear is capable of operating the rudder as required by sub-clause (5)(b) of this clause while operating with all power units;

(iii) the main steering gear is so arranged that after a single failure in its piping system or in one of the power units the defect can be isolated so that steering capability can be maintained or speedily regained.

(b) Steering gears, other than of the hydraulic type, shall achieve standards equivalent to the requirements of this paragraph to the satisfaction of the Chief Surveyor.

(9) Steering gear control shall be provided:

(a) for the main steering gear, both on the navigating bridge and in the steering gear compartment;

(b) where the main steering gear is arranged in accordance with sub-clause (8) of this clause, by two independent control

systems, both operable from the navigating bridge. This does not require duplication of the steering wheel or steering lever. Where the control system consists of an hydraulic telemotor, a second independent system need not be fitted, except in a tanker, chemical tanker or gas carrier of 10,000 gross tonnage and upwards;

(c) for the auxiliary steering gear, in the steering gear compartment and, if power-operated, it shall also be operable from the navigating bridge and shall be independent of the control system for the main steering gear.

(10) Any main and auxiliary steering gear control system operable from the navigating bridge shall comply with the following:

(a) if electric, it shall be served by its own separate circuit supplied from a steering gear power circuit from a point within the steering gear compartment, or directly from switchboard busbars supplying that steering gear power circuit at a point on the switchboard adjacent to the supply to the steering gear power circuit;

(b) means shall be provided in the steering gear compartment for disconnecting any control system operable from the navigating bridge from the steering gear it serves;

(c) the system shall be capable of being brought into operation from a position on the navigating bridge;

(d) in the event of a failure of electrical power supply to the control system, an audible and visual alarm shall be given on the navigating bridge; and

(e) short circuit protection only shall be provided for steering gear control supply circuits.

(11) The electric power circuits and the steering gear control systems with their associated components, cables and pipes required by this clause and by clause 46 of this Code shall be separated as far as is practicable throughout their length.

(12) A means of communication shall be provided between the navigating bridge and the steering gear compartment.

(13) The angular position of the rudder shall:

(a) if the main steering gear is power-operated, be indicated on the navigating bridge. The rudder angle indication shall be independent of the steering gear control system;

(b) be recognisable in the steering gear compartment.

(14) Hydraulic power-operated steering gear shall be provided with the following:

(a) arrangements to maintain the cleanliness of the hydraulic fluid taking into consideration the type and design of the hydraulic system;

(b) a low-level alarm for each hydraulic fluid reservoir to give the earliest practicable indication of hydraulic fluid leakage. Audible and visual alarms shall be given on the navigating bridge and in the machinery space where they can be readily observed; and

(c) a fixed storage tank having sufficient capacity to recharge at least one power actuating system including the reservoir, where the main steering gear is required to be power-operated. The storage tank shall be permanently connected by piping in such a manner that the hydraulic systems can be readily recharged from a position within the steering gear compartment and shall be provided with a contents gauge.

(15) The steering gear compartment shall be:

(a) readily accessible and, as far as practicable, separated from machinery spaces; and

(b) provided with suitable arrangements to ensure working access to steering gear machinery and controls. These arrangements shall include handrails and gratings or other nonslip surfaces to ensure suitable working conditions in the event of hydraulic fluid leakage.

(16) Where the rudder stock is required to be over 230mm