PART VI

BILGE PUMPING ARRANGEMENTS

6.1 General

6.1.1 The bilge pumping system is not intended to cope with a large ingress of water, but it should be capable of dealing with leakage's which might cause the slow flooding of compartments or spaces adjacent to a damaged compartment. The arrangements should be such that adjacent compartments should be capable of being drained with the vessel heeled over to the permitted angle of heel and trim in the damaged condition.

6.1.2 The Regulations require that provision be made for all watertight compartments to be capable of being pumped out and under emergency conditions. This requirement does not apply to spaces permanently appropriated for the carriage of fresh water, water ballast or oil fuel.

6.2 Plan Approval

6.2.1 Plans and particulars should be submitted at an early stage. Such plans and particulars should include:

(i) particulars of service for which vessel is intended;

(ii) length, breadth and depth of vessel where:

(a) "length" is the length of the vessel in metres measured between perpendiculars taken at the extremities of the deepest subdivision load waterline;

(b) "breadth" is the greatest moulded breadth in metres at or below the vessel's deepest subdivision load waterline; and

(c) "depth" is the moulded depth in metres of the vessel amidships at the bulkhead deck.

6.2.2 The number, position, type and capacity of the pumps available for bilge pumping duties and the sources of power for their operation.

6.2.3 Plans showing:

(i) the arrangement of watertight bulkheads and the allocation of space between the bulkheads;

(ii) the arrangement and sizes of the main and branch bilge suction pipe lines, the direct bilge suction, and the arrangement of the ballast pipe lines;

(iii) the arrangement and type of valves at the bilge pumps, the bilge suction distribution chests and the positions from which the main sea inlet and direct suction valves of the main engine circulating pumps can be operated;

(iv) arrangement of remote power operated valves, if fitted, including details of valves, actuators and control system, capacity of air or fluid receivers, control piping material and pipe couplings;

(v) the arrangements for draining all spaces below the bulkhead deck;

(vi) the means of provided for preventing water from a damaged compartment finding its way into another compartment through a bilge suction system; and

(vii) the sounding arrangements.

6.3 Bilge Pumps

6.3.1 Number and type of bilge pumps

Regulation 41 and paragraphs 1 and 2 of Schedule 6 to Merchant Shipping Notice MSN 1699(M) prescribe the number and type of bilge pumps which are to be provided. General service pumps may be accepted as independent bilge pumps provided that they are of suitable capacity and connected to the bilge pumping system.

6.3.2 Capacity of bilge pumps

6.3.2.1 Schedule 6 to Merchant Shipping Notice MSN 1699(M) provides the method to be used to obtain the diameter of the bilge main pipe in mm. The bilge pump capacity should be determined by:

$$C = .0057d^2$$

WHERE C = CAPACITY OF PUMP IN CUBIC M OF SEA WATER PER HOUR AND

d = INTERNAL DIAMETER OF MAIN BILGE PIPE IN MM.

Paragraph 3 (4) of Schedule 6 to Merchant Shipping Notice MSN 1699(M) requires a direct suction to be fitted on main circulating pumps. In twin screw ships a direct suction should be fitted on the port and starboard sides. Cross connection between pumps must have the appropriate isolating valves.

6.3.3 Suction lift of hand pumps

Where hand pumps are fitted they should be self priming and where appropriate be capable of working from above the bulkhead deck. Where the hand pump is connected to the bilge main the suction lift should not exceed 5m, or 7.3m where the pump has a single direct suction. The effects of bends, restrictions, changes in pipe sections etc. which could reduce pump performance should be considered in the design of the system.

6.3.4 Bilge pipes

6.3.4.1 Pipes fitted in compliance with paragraph 5 of Schedule 6 to Merchant Shipping Notice MSN 1699(M) should be of steel or other suitable material having a melting point of not less than 800° Celsius. Bilge suction pipes joints should normally be made with flanged joints. However, other suitable alternative joints will be considered. Bilge main pipes should not be situated nearer to the ships side than 1/5 breadth of the ship at the deepest subdivision load line. Where any bilge pipe or bilge pump is not so situated then means should be provided such that in the event of damage to the bilge system in this area the entire bilge system is not put out of action or other compartments flooded as a result.

6.3.4.2 Bilge pipes used in, or under, fuel storage tanks or in boiler or machinery spaces including spaces containing oil fuel settling tanks or oil fuel pumping units will normally be of steel.

6.3.4.3 Bilge suction pipes are not to be led through oil tanks unless the pipes are enclosed in an oil tight trunkway. For ships constructed on or after 1 September 1998, where suction pipes pass through deep water ballast tanks, such pipes should be of heavy gauge material. Pipe joints should be kept to a minimum. The pipes should be led above the line of the double bottom.

Note: Heavy gauge is interpreted as the normal wall thickness plus an adequate margin for corrosion over the estimated life of the pipe. Pipe joints in this context is meant to include all joints except full penetration welded joints.

6.3.5 Additional requirements for ships constructed on or after 1st September 1998

For ships constructed on or after 1st September 1998, paragraph 5(3) of Schedule 6 to Merchant Shipping Notice MSN 1699(M) requires consideration to be given to the bilge pumping arrangements for cargo spaces containing flammable or toxic liquids. The arrangement should be such that the inadvertent pumping of such liquids through the bilge main system or any other system connected to a pump located in the machinery space is not possible. Such spaces may however require a separate pump system.

6.3.6 Diameter of bilge suction pipes

Paragraph 6(1) of Schedule 6 to Merchant Shipping Notice MSN 1699(M) provides the method for deriving the diameters of the main and branch bilge suction pipes.

6.3.7 Remote operated bilge valves

6.3.7.1 All valves should be accessible, clearly marked, be provided with "open-closed" indication and be capable of being operated from a position above the bulkhead deck and locally. Where such valves are power operated the valves should be capable of being operated satisfactorily when the actuator and indicating mechanism is submerged by a head of water up to at least the bulkhead deck.

6.3.7.2 The arrangements should where appropriate provide for:-

(i) the complete installation to be within the B/5 line and where appropriate the Remote Control Station to be situated above the bulkhead deck;

(ii) the remote control of the bilge valves being able to override local manual control;

(iii) valve position indicators being provided locally and above the bulkhead deck;

(iv) indicators showing "valve open" and "valve closed" position for each bilge valve and in the event of damage to the control system the position of the valve at time of failure;

(v) means available to show that the power supply is available and confirm the integrity of the open/shut mechanism; and

(vi) the working pressure in the system should be not less than 25 per cent greater than the pressure required to open a valve to the full open position, particularly when pneumatic opening is employed and the valve is kept closed by a spring or similar device.

6.3.7.3 Where pneumatically operated valves are provided the air supply should be from an independent source situated above the bulkhead deck and within the B/5 line. Where the air supply replenishment is taken from the main air receiver in the machinery space, then provision should be made to ensure that loss of pressure in the main receivers or failure of the interconnecting air lines will not adversely affect the supply from the independent source. The reservoir should have sufficient capacity to enable all the remotely operated valves to be activated at least once. Any air

replenishment lines to the independent source should be places within the B/5 line.

6.3.7.4 In electrically operated systems, power supplies should be from the main and emergency sources of power.

6.3.8 Prototype tests

6.3.8.1 Valves should be capable of operating satisfactorily when the compartments in which they are situated are flooded up to bulkhead deck level. When a spring is used to keep the valve closed, it should be non-corrodible, and sufficient to keep the valve closed when the underside of the valve lid is subjected to the pump suction pressure. To simulate these conditions the following tests should be carried out:

(i) The valve, complete with actuator and position switch should be placed in a tank of water and subjected to an external pressure at least equivalent to a head of water from the tank top to the bulkhead deck. The valve should be operated not less than one hundred times to test the control and indicating arrangements;

(ii) When a spring is employed to keep the valve closed, the underside of the valve lid should be subjected to pressure test to determine the pressure at which the valve begins to lift.

6.3.8.2 After installation a selected valve should also be tested to determine the minimum operating air or fluid pressure required to lift the spindle to the fully open position, and also the minimum pressure required to just raise the valve off its seat.

6.3.9 Bilge mud boxes and strum boxes

Bilge suctions in the machinery space of every ship should be led from readily accessible mud boxes placed wherever practicable above the level of the working floor of such space. The boxes should have straight tailpipes to the bilge's and covers secured in such a manner as will permit them to be readily opened and closed. The suction ends in hold spaces and tunnel wells should be enclosed in strum boxes having perforations approximately 10mm in diameter, and the combined area of such perforations should be not less than twice that of the suction pipe. Strum boxes should be so constructed that they can be cleared without breaking any joint of the suction pipe.

6.3.10 Bilge valves, cocks etc.

6.3.10.1 Valves in bilge distribution boxes should be of a non-return type. An arrangement of lock-up valves or of blank flanges should be provided to prevent any deep tank being inadvertently run up from the sea when it contains cargo, or pumped through a bilge pipe when it contains water

ballast; instructions for the working of such an arrangement should be conspicuously displayed nearby.

6.3.10.2 In any ship of Class III carrying less than 250 passengers provided with a hand pump for each watertight compartment in accordance with the provisions of the Regulations, the valves and cocks on the bilge main for controlling the bilge suctions are not required to be capable of being operated from above the ship's bulkhead deck if they are in the same compartment as a power pump. The hand bilge pumps, however, should be workable from above the ship's bulkhead deck.

6.3.10.3 Any remote operating system for bilge suction valves or cocks should be led as directly as possible. Every such operating system passing through a cargo space should be protected against damage in such a space.

6.3.10.4 Valves required to be operable from above the bulkhead deck may be pneumatically, hydraulically, electrically or mechanically operated with the piping runs and controls sited within the B/5 line. Such valves should fail to the closed position.

6.3.10.5 An emergency store of energy should be provided to enable all valves to be operated in the event of power failure.

6.3.11 Sounding arrangements

6.3.11.1 Sounding arrangements should consist of sounding pipes, or an efficient indicating apparatus. Such an indicating apparatus used for sounding spaces served by the bilge pumping system should be capable of being used under all anticipated angles of heel and trim due to flooding. Where electrical power is required for its operation, this should be taken from the emergency source of power.

6.3.11.2 Sounding pipes should, when possible, be straight, but were this is not practicable, the curvature of the pipes must permit the ready passage of the sounding rod or chain. A thick steel doubling plate shall be securely fixed below each sounding pipe for the sounding rod to strike upon. All such sounding pipes shall extend to positions above the ship’s bulkhead deck which shall at times be readily accessible. Sounding pipes for bilges, cofferdams and double bottom tanks, being bilges, cofferdams and tanks situated in the machinery space, shall extend unless the upper ends of the pipes are accessible in ordinary circumstances and are furnished with cocks having parallel plugs with permanently secured handles so loaded that on being released they automatically close the cocks.

6.3.12 Bilge holding tanks

6.3.12.1 The design of modern bilge systems usually incorporate a bilge holding tank into which the bilge water is pumped prior to discharge

overboard via the oily water separator/oil filtering equipment. The purpose of the holding tank is to act as a settling tank by allowing sufficient time for the separation of any oil (or Oil emulsions resulting from the use of proprietary bilge cleaning agents) from the bilge water prior to its discharge overboard via the oily water separator/oil filtering equipment. Apart from the obvious advantage of reducing the work required by the separator, which will mean reduced maintenance where coalescing filters or equivalent are fitted, this arrangement also allows for the use of automatic bilge reduction without the fear of a malfunctioning separator/oil filtering equipment causing oil pollution.

6.3.12.2 Although not a mandatory requirement the provision of a bilge holding tank is considered to be an important factor in the continuing effective operational use of the oily water separator/oil filtering equipment and as such, should be recommended to all owners, designers and builders of new vessels. Where practicable, owners of existing vessel should be encouraged to designate a suitably size existing tank for use as a bilge holding tank and modify the bilge pump discharge and separator suction arrangements accordingly.