

3 Machinery Installations



4 Guidelines for Equipment on Fire Fighting Ships

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Alterations to the preceding Edition are marked by beams at the text margin.

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Section 1

Equipment on Fire Fighting Ships

A. General

1. Scope

1.1 These Guidelines apply to equipment on ships for fire fighting and rescue work on offshore installations, harbour facilities and ships.

1.2 The range of the equipment is determined by the type of duty for which the ship is intended and is denoted by a Notation affixed to the Character of Classification of the machinery in accordance with 2.

2. Notations affixed to the Character of Classification

Fire Fighting Ships will, depending on the size and purpose of the equipment provided, have one of the following Notations affixed to the Character of Classification for the machinery installation.

FF1 Equipment for fighting fires in the initial stage and performing rescue operations in the immediate vicinity of the installation on fire.

FF2 Equipment for sustained fighting of large fires and for cooling parts of the installation on fire.

FF3 Corresponding to **FF2**, but with greater fire extinguishing capacity and additional fire-extinguishing equipment.

FF1/2 or **FF1/3** Equipment corresponding to **FF2** or **FF3** and additionally suited for rescue operations as per **FF1**.

3. Documents for approval

3.1 Basic documentation

Each of the following documents is to be submitted in triplicate respectively as single document in the case of electronic transmission for approval:

- plan showing the arrangement of all fire extinguishing equipment required by these Guidelines and giving details of type and performance of pumps and monitors
- arrangement showing the location and design of the sea connections and sea chests for the fire fighting system
- drawing showing the seating of the water monitors and giving details of their fastening method
- arrangement of the remote operation equipment for the water and foam monitors

- remote control equipment for water & foam monitors, if of electrical type
- details of the location of fireman's outfits and of the compressor for refilling of breathing air cylinders
- details of the manufacturer, type, electrical power, protection degree and location of the searchlights
- proof that the ship's propulsion plant and thrusters are capable of holding it (in calm waters) and in the required direction against the resultant forces of the monitors
- documentation showing the stability in all fire fighting operating conditions based on the results of an approved inclining test (lightweight survey) and including the proof of the maximum heeling moment corresponding to the maximum output of all monitors in any direction
- load balance calculation including required consumers in the case of fire fighting for simultaneous operation of fire pumps, thrusters, active rudders, water spray system, lighting, etc.
- details on structural fire protection
- torsional vibration calculation for engine driven monitor pumps having a power > 200 kW

3.2 Additional documentation

According to the Notation affixed to the Character of Classification concerned, the following documents are also to be submitted in triplicate respectively as single document in the case of electronic transmission.

3.2.1 For FF1

- diagram of the water spray system and the disposition of the nozzles, pumps and valves together with the capacity calculation of the water spray system

3.2.2 For FF2

- details of the type and performance of the portable foam generator, foam concentrate calculation and location of the foam concentrate storage tanks

3.2.3 For FF3

- details of the type and performance of the portable foam generator, foam concentrate calculation and location of the foam concentrate storage tanks
- drawing of the fixed installed foam system including the storage tanks, mixing unit, monitors and pipelines as well as capacity calculation

4. Trials and surveys

4.1 After completion, an operational test is to be carried out including verification of the equipment performance.

The heeling angle of the ship with the monitors in operation is to be determined on the basis of the most unfavourable conditions.

4.2 All equipment required by above Class Notations is subject to an external inspection and an operational test annually.

4.3 On the occasion of a Class Renewal the pumps and their drive motors together with the sea chests and sea connections are to be inspected in accordance with the Rules for Classification applicable to the machinery plant.

5. Reference to further Rules

5.1 In addition to these Guidelines the GL Rules [1 – Ship Technology, Part 1 – Seagoing Ships, Chapter 2 – Machinery Installations, Chapter 3 – Electrical Installations](#) and [Chapter 4 – Automation](#) are also applicable.

5.2 For design, material and testing of these pumps, Part 5 – Pumps, Chapter 1 – Guidelines for the Design, Construction and Testing of Pumps shall be observed.

B. Basic Requirements

1. Manual for operating, testing and maintenance

1.1 A manual for operating, testing and maintenance shall be carried on board.

1.2 The first part of the manual should contain the description of the ship's fire fighting systems and equipment together with the relevant instructions for operation, testing and maintenance. The second part should contain instructions for the operation of the ship when in operation.

2. Manoeuvrability

2.1 In calm water the main propulsion plant, the thrusters and the steering gear shall enable the ship to maintain its position for all possible directions of the monitors. The relevant tests shall be carried out during sea trials.

2.2 In order to maintain full manoeuvrability, suitable control devices and interlocks are to be used to prevent overloading of the ship's mains.

2.3 When the consumption of electrical power exceeds 90 % of the available capacity, a visual and audible alarm shall be provided on the bridge.

2.4 A control system for thrust and thrust direction, e.g. joystick system, shall be installed.

3. Stability

The ship shall be able to withstand the maximum heeling moment resulting from the operation of all the monitors.

4. Lighting

4.1 For operation in the dark, at least 2 fixed installed searchlights are to be provided which are to be fitted with maintenance-free lamps and are capable of orientation in any direction.

4.2 The capacity of the searchlights shall be such as to produce a luminous intensity of 50 lux over an area of at least 11 m in diameter at a distance of 250 m in good visibility.

C. Fire Protection and Extinguishing Equipment

1. Range of appliances and equipment

1.1 The required items of equipment corresponding to the various Notations affixed to the Character of Classification are shown in [Table 1.1](#).

1.2 For pumps involved in 'FF-service' a performance test is to be carried out in manufacturer's workshop under GL supervision.

2. Water spray system

2.1 The water spray system is to be capable of protecting all the vertical external surfaces of the ship's hull exposed in the light-load condition, all vertical surfaces of superstructures and deckhouses, the mounting platforms of the monitors and deck areas above engine rooms and spaces in which combustible materials may be stored.

2.2 The capacity of the water spray system is to be calculated on the basis of 10 l/min per m² of area to be protected.

2.3 For areas protected by A-60 insulation (insulation inside), the water spray capacity may be reduced down to 5 l/min per m².

2.4 The water spray system is to be divided in such a way that sections which are not exposed to radiant heat or fire can be shut off.

Table 1.1 Required equipment for the different Notations

Equipment parameters	Notations affixed to the Character of Classification		
	FF1	FF2	FF3
Water monitors:	2	3	4
Output [m³/h] per monitor	1200	2400	1800
Length of throw [m] ¹	120	150	150
Height of throw [m] ²	45	70	70
Pumps:	2	2 - 4	2 - 4
Total pump capacity [m³/h]	2400	7200	9600
Foam monitors:	–	–	2
Duration of supply of foam concentrate for foam monitors [min]	–	–	30 ³
Foam capacity per monitor [litre/min]	–	–	5000
Portable foam generator:	–	1	1
Duration of supply of foam concentrate for portable foam generator [min]	–	30 ³	30 ³
High-expansion foam output of portable foam generator [m³/min]	–	100	100
Water spray system	1	– ⁴	– ⁴
Number of fire hydrants on each side of ship (hose connections)	4	8	8
Fireman's outfits (total numbers)	4	8	8
Fuel supply [h] ⁵	24	96	96
Remarks ¹ horizontal distance from monitor outlet to centre of impact area ² vertical distance from surface of water to centre of impact area at a distance of at least 70 m from the closest portion of the ship ³ duration (in minutes) of uninterrupted foam production with generator operating at rated output ⁴ a water spray system is to be installed in the case of the combined Notations affixed to the Character of Classification FF1/2 or FF1/3 ⁵ with all monitors in uninterrupted operation			

2.5 The nozzles are to be so arranged that uniform distribution over the whole protected area can be achieved. Provision is to be made to ensure adequate visibility from the bridge.

2.6 Monitor supply water pumps may be used to operate the water spray system, provided that the capacity of the relevant pump(s) is increased by the amount of the additional demand.

2.7 If, besides the ship's emergency fire pump, two further fire pumps are available for the ship's fire main, one of these pumps may be used for the water spray system provided that the total capacity of the

fire pumps is sufficient to supply water at the required pressure simultaneously to the water spray system and the required number of hose connections according to 6.1.

2.8 The pipes of the fixed installed water spray system are to be effectively protected against corrosion, e.g. by hot-dip galvanizing or other equivalent means.

3. Water monitor system

3.1 Design and location of water monitors

3.1.1 Monitors shall be of approved type.

3.1.2 Monitors shall deliver a concentrated jet of water when operated at the required output.

3.1.3 At least two of the monitors are to be equipped with a permanently fitted control enabling either a solid or a spray jet to be delivered as required.

3.1.4 For the fastening of the monitors, the loads due to recoil action and sea condition are to be taken into account.

3.1.5 Monitors are to be made of seawater resistant material.

3.1.6 Monitors shall be directed either forward or aft and shall be capable of being traversed horizontally through an angle of 45° with respect to each side of the ship. The angle of elevation is determined by the required height of throw. Within the required fields of traverse and elevation, the jet of water delivered by the monitors shall not be obstructed by superstructures, masts, funnels, etc.

3.2 Control of water monitors

3.2.1 Monitors and the associated valves shall be of remote operated type.

3.2.2 The handling of the remote operation shall be located in a safe area.

3.2.3 Local operation of the monitors and associated valves shall be provided as well.

3.2.4 Control systems shall be protected against external damages.

3.2.5 Hydraulic or pneumatic control systems are to be capable of being supplied from two mutually independent energy sources.

3.2.6 Electrical control circuits shall be independent from each other. In electrical control systems an independent circuit is to be provided for each individual control unit.

4. Foam monitor system

4.1 Capacity

4.1.1 Foam monitors shall be of approved type.

4.1.2 The capacity of permanently installed foam monitors is to be at least 5000 l/min of foam solution each.

4.1.3 With both monitors operating simultaneously the length of throw shall be at least 70 m.

4.1.4 The monitors shall be mounted at a level designed to achieve a maximum height of throw.

4.2 Foam concentrate

The low-expansion foam concentrate shall be of approved alcohol resistant type suitable for oil and chemical fires.

4.3 Foam generator

The foam generating plant including the associated pipework is to be permanently installed.

4.4 Control of foam monitors

For control of foam monitors 3.2 applies analogously.

5. Pumps, sea connections and pipelines

5.1 Pumps

The pumps supplying water to the fire fighting and water spray systems together with their motors are to be installed in such a way that their operation and accessibility are not impaired by fumes or radiant heat during fire fighting.

5.2 Sea connections and sea chests

5.2.1 Sea connections and sea chests are to be provided on both sides of the ship for supplying the fire fighting systems.

5.2.2 Sea chests openings are to be equipped with strum plates having a free section equal to at least twice the free section of the seawater intake pipe.

5.2.3 Sea connections and sea chests are to be designed and arranged so as to provide an adequate and uniform supply of water free from interference by movements of the ship or current set up by thrusters and propellers.

5.2.4 The supply of water to other major systems shall not be affected by fire fighting operations.

5.2.5 Each sea connection is to be fitted with a remote operated shut-off valve.

5.2.6 Each monitor supply pump is to be connected to at least one sea chest/sea connection dedicated for FF-purposes.

5.3 Pipelines

5.3.1 Pipelines for fire fighting purposes (monitor supply, foam, water spray, etc.) on open deck shall be effectively protected against corrosion.

5.3.2 The wall thickness shall be in accordance with [Tables 11.5 and 11.6](#) of GL Rules I – Ship Technology, Part 1 – Seagoing Ships, Chapter 2 – Machinery Installations, Section 11, C.

5.3.3 The velocity inside suction pipes shall normally not exceed 2 m/s and inside delivery pipes not exceed 4 m/s.

6. Portable fire fighting equipment

6.1 Hose connections and hose boxes

6.1.1 At least half the hose connections prescribed in these Guidelines are to be located on the open deck.

6.1.2 Hose boxes are to be provided for at least every second hose connection/hydrant.

6.1.3 Each hose box is to be equipped with two approved fire hoses, each 20 m long, one approved multi-purpose spray/jet nozzle and one hose wrench.

6.1.4 It is to be ensured that at least half the required hose connections can be operated simultaneously with a pressure of 5 bar at the nozzle outlet.

6.1.5 Where water is supplied to the hose connections by the pumps of the water monitors, a separate piping system is to be provided for this purpose. Where necessary, the pressure is to be reduced, e.g. by pressure-reducing valves, to the point where nozzles can be managed by one person each.

6.2 Portable foam generator

6.2.1 The portable foam generator required as per [Table 1.1](#) shall be designed to produce at least 100 m³ of high-expansion foam per minute.

6.2.2 The high-expansion foam concentrate shall be of approved type suitable for fires in machinery spaces and similar fire hazard areas.

6.2.3 The concentrate is to be stored in a readily accessible place in portable containers of approximately 20 l capacity each.

7. Fireman's outfit

7.1 Scope of fireman's outfit required

7.1.1 Fireman's outfit shall conform to SOLAS 74, as amended, Chapter II-2, Regulation 10, 10.

7.1.2 Self-contained compressed air breathing apparatuses are to be provided. 3600 l of breathing air (including spare cylinders) are to be provided for each breathing apparatus.

7.1.3 In addition to above, the number of fireman's outfits required by the flag state are to be supplied, one of which may be set against the equipment called for in [Table 1.1](#).

7.2 Storage of fireman's outfits

7.2.1 The fireman's outfits are to be stored in a special room.

7.2.2 The room is to be clearly marked and accessible from the open deck.

7.2.3 The room shall be so arranged that the items of equipment can be stored in an orderly manner ready for immediate use.

7.2.4 Adequate ventilation and heating shall be provided in the storage room.

7.3 Compressor for refilling of breathing air cylinders

7.3.1 A breathing air compressor with a capacity of at least 300 l/min and equipped with all accessories necessary for filling simultaneously at least 4 breathing air cylinders is to be installed at a suitable position on the ship.

7.3.2 Breathing air compressors are to be of approved type.

