

TÜRK LOYDU



Chapter 11 – Fire Fighting Ships July 2019

This latest edition incorporates all rule changes. The latest revisions are shown with a vertical line. The section title is framed if the section is revised completely. Changes after the publication of the rule are written in red colour.

Unless otherwise specified, these Rules apply to ships for which the date of contract for construction as defined in TL- PR 29 is on or after 1st of July 2019. New rules or amendments entering into force after the date of contract for construction are to be applied if required by those rules. See Rule Change Notices on TL website for details.

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Fire Fighting Ships

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AMENDMENTS

Revision	RCS No.	EIF Date*
Section 01	02/2022	01.04.2022
Section 01	03/2021	01.07.2021

* Entry into Force (EIF) Date is provided for general guidance only, EIF dates given in Rule Change Summary (RCS) are considered valid. In addition to the above stated changes, editorial corrections may have been made.

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A. General

1. Scope

1.1 These Rules 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.

1.3 In addition to these Rules, related sections of the current **TL** Rules for Classification of Steel Ships, Chapter 1- Hull, Chapter 4- Machinery, Chapter 5 – Electrical Installation are also applicable.

1.4 For design, material and testing of these pumps, **TL** Rules for the Design, Construction and Testing of Pumps shall be observed.

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.

The following special items related to fire fighting operations are covered under classification:

- Vessel's fire fighting capabilities
- Vessel's stability and its ability to maintain station while fire fighting monitors are in full operation
- The degree of vessel's self-protection against external fires

FF0 This notation is assigned when the characteristics of the fire-fighting system are not those required for the assignment of the additional service features **FF1**, **FF2** or **FF3**, and when the system is specially considered by **TL**.

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.

Where **FF2** or **FF3** vessels also meet **FF1** requirements, combined Class notation **FF1/2** or **FF1/3** may be given.

Vessels not fully in compliance with these Rules or not specifically built for the service intended to be covered by these Rules, but which have special fire fighting capabilities in addition to their regular service, may be specially considered and reviewed under the intent of these Rules as they relate to fire fighting. Such vessels complying with item B.3 may be given the notation (**Fire Fighting Capability**). The standard applied with data on the extent of this special fire fighting capability will be entered into **class additional information of the class certificate**, and such special fire fighting systems will be subject to annual surveys.

3. Documents for Approval

Each of the following documents is to be submitted in triplicate for approval. See Table 1.1.

4. Certification

Certificates shall be required for the components shown in Table 1.2.

5. Tests, Trials and Surveys

5.1 Workshop Tests

5.1.1 Materials used for the housing of fire-fighting pumps are to be subjected to a tensile test at ambient temperature according to the relevant provisions of **TL** Rules for the Design, Construction and Testing of Pumps.

Table 1.1 Required documentation for the different Notations

Documentation Requirements			
Function	Documentation Type	Additional Description	Relevant Notation
Sea chest	System diagram, arrangement	The location and design of the sea connections and sea chests for fire fighting monitors	FFO, FF1, FF2, FF3
Fire Fighting Arrangements	Operation and maintenance manuals	Fi-fi operation, according to B-1 of this section.	FFO, FF1, FF2, FF3
Fire Water Supply and Distribution Arrangement	Piping diagram, capacity analysis, arrangement plan	Details of all fire fighting equipment required by these rules such as pumps and monitors, including their capacity, range and trajectory of delivery	FFO, FF1, FF2, FF3
FF Vessel Fire Extinguishing System	Structural drawing	Supporting structure for pumps, pump drivers and monitors	FFO, FF1, FF2, FF3
FF Vessel Monitor Water-Spray Fire Extinguishing System	Fixed fire extinguishing system documentation	Including specification of height and length of throw, location of pumps, pump drivers, monitors, hose connections and hose stations, seating of monitors and their fastening methods, torsional vibration calculation for engine driven monitor pumps having a power > 200 kw	FFO, FF1, FF2, FF3
Fire Fighter's Outfit	Arrangement plan		FFO, FF1, FF2, FF3
Breathing Air Compressor Unit	Arrangement plan		FFO, FF1, FF2, FF3
Lighting	Arrangement plan, specification	Details of the manufacturer, type, electrical power, protection degree and location of the searchlights	FFO, FF1, FF2, FF3
Stability	Preliminary and final stability booklet	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.	FFO, FF1, FF2, FF3
Manoeuvrability	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	According to B-2 of this section.	FF1, FF2, FF3
Power control system		An operating control system of the power supplied by the engines is to be provided, including an alarm device operating at 80% of the maximum propulsive power available in free navigation, and an automatic reduction of power on reaching 100% of the above propulsive power, to prevent engine overload. Such operating control system may not be required where the installed power is redundant.	FF1, FF2, FF3

Table 1.1 Required documentation for the different Notations (continued)

Remote Control and Remote Operation	Piping/wiring diagram, arrangement plan	Arrangement and diagram of the local and remote operation equipment for the water and foam monitors, remote control equipment	FFO, FF1, FF2, FF3
Electrical Systems	Calculation report	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.	FFO, FF1, FF2, FF3
Fuel Systems	Capacity analysis	Calculation of required fuel capacity (24 hours for FF1, 96 hours for FF2 and FF3)	FF1, FF2, FF3
Structural Fire Protection Arrangements	Structural fire protection drawing	Outer boundaries including doors, windows and other closing devices of openings in A Class and B Class divisions, fire test reports for insulation materials	FFO, FF1
External Surface Protection Water-Spray Fire Extinguishing System	Fixed fire extinguishing system documentation	Diagram of the water-spray system and the arrangement of the nozzles, pumps and valves together with the capacity calculation of the water-spray system	FFO, FF1
Fixed Foam System	Piping diagram, capacity analysis, arrangement plan	Diagram and arrangement of the fixed installed foam system including the storage tanks, mixing unit, monitors and pipelines as well as capacity calculation	FF3
Portable Foam Generator	Specification	Details of the type and performance of the portable foam generator, foam concentrate calculation and location of the foam concentrate storage tanks	FF2, FF3

5.1.2 Materials used for pipes, valves and other accessories are to be tested in accordance with the provisions of TL Rules, Chapter 4- Machinery, Section 16.

5.1.3 After completion of manufacture and before installation on board, pipes, valves, accessories and pump housings are to be submitted to a hydrostatic test in accordance with the provisions of TL Rules, Chapter 4- Machinery, Section 16.

5.2 Onboard Tests

5.2.1 After assembly on board, the water fire-fighting system and the fixed foam fire-extinguishing system are to be checked for leakage at normal operating pressure.

For FF1 vessels, fire main capacities shall be tested as follows:

The static pressure measured at the fire hydrant manifold shall be not less than 2.5 bars with four (4) jets

of water from hoses simultaneously engaged to one of the fire hydrant manifolds as required in this section.

Table 1.2 Required certificates for different components

Components	TL product certificate	Works certificate	Test report
Fire fighting pumps and their prime movers	X		
Compressor for filling the cylinders of air-breathing apparatus	X		
Pipes and valves		X	
Foam liquid suitable for its intended use			X

In a separate test, both water monitors shall be tested in operations simultaneously with the active heat radiation protection system in operation for not less than one (1) hour or until the temperature of the dedicated fire fighter pumps' prim-movers are stabilised.

For FF2 vessels, the number of hoses simultaneously engaged shall be not less than six (6) and for FF3 vessels, not less than eight (8) for the test specified above.

The pressure in the fire hydrant manifold shall be not less than 2.5 bar and maximum 5 bar when tested as described above with one length of hose fitted with a standard 16 mm nozzle fully open on each hose connection on one fire hydrant manifold

5.2.2 The water fire-fighting system and fixed foam fire-extinguishing system are to undergo an operational test on board the ship, to check their characteristics and performances. Operation of completed fire fighting systems is to be demonstrated to the satisfaction of the Surveyor, including height and throw of the water monitors.

5.2.3 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, measured at operation tests and recorded.

5.2.4 The capability of the side thrusters and of the main propulsion system to maintain the ship in position with all water monitors in service without requiring more than 80% of the propulsive power is to be demonstrated.

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

5.2.6 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.

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.

1.3 Information regarding line of responsibility and delegation of tasks, description of each fire fighting system and the equipment covered by the classification, safety precautions and start-up procedures, instructions for use, testing and maintenance of the fire fighting installations and the equipment (or may be only referred to), instructions for operation of the vessel during fire fighting, plan and records for periodically testing and drills shall be included in the operation manual.

2. Manoeuvrability

2.1 The main propulsion plant, the side thrusters and the steering gear system are to be capable of maintaining the ship in position in still water and of withstanding the reaction forces of the water monitors even in the most unfavourable combination of operating conditions of such monitors, without requiring more than 80% of the above propulsive power, to prevent engine overload. 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.

The operation of the side thruster(s) and the main propeller(s) shall be simple and limited to the adjustment of resultant thrust vector for the vessel, possible adjustment of the turning moment, possible adjustment of heading (gyro stabilised).

Operation shall be arranged at the workstation where the monitors are controlled.

3. Intact Stability

3.1 General

The stability of the ship for the loading conditions defined in Chapter 1 - Hull, Section 26, and B.2.11 is to be in compliance with the requirements in Chapter 1 - Hull, Section 26, B.10 and B.11.

3.2 Additional criteria

The loading conditions reported in the trim and stability booklet, with the exception of lightship, are also to be checked in order to investigate the ship's capability to support the effect of the reaction force of the water jet in the beam direction due to the monitors fitted on board. A fire-fighting ship may be considered as having sufficient stability, according to the effect of the reaction force of the water jet in the beam direction due to the monitors fitted on board, if the heeling angle of static equilibrium θ_0 , corresponding to the first intersection between heeling and righting arms (see Fig 1), is less than 5°. The heeling arm may be calculated as follows:

$$b_h = \frac{\sum \cdot R_i \cdot h_i + S \cdot (T/2 - e)}{9,81 \cdot \Delta} \cdot \cos\theta$$

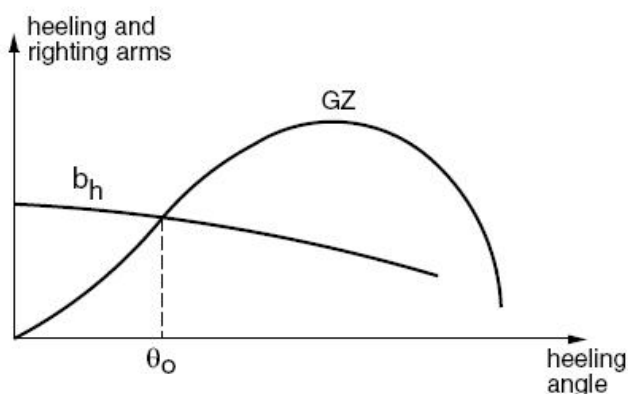


Figure 1.1 Heeling and righting arm curves

b_h = Heeling arm, in m, relevant to the reaction force of the water jet of the monitors fitted on board, and to the effect of transversal manoeuvring thrusters. The monitors are assumed to be oriented in beam direction parallel to the sea surface, so as to consider the most severe situation

R_i = Reaction force, in kN, of the water jet of each monitor fitted on board (see Fig 1.2)

h_i = Vertical distance, in m, between the location of each monitor and half draught (see Fig1.2)

S = Thrust, in kN, relevant to manoeuvring thruster(s), if applicable (see Fig 1.2)

e = Vertical distance, in m, between the manoeuvring thruster axis and keel (see Fig 1.2)

Δ = Displacement, in t, relevant to the loading condition under consideration

T = Draught, in m, corresponding to Δ (see Fig 1.2)

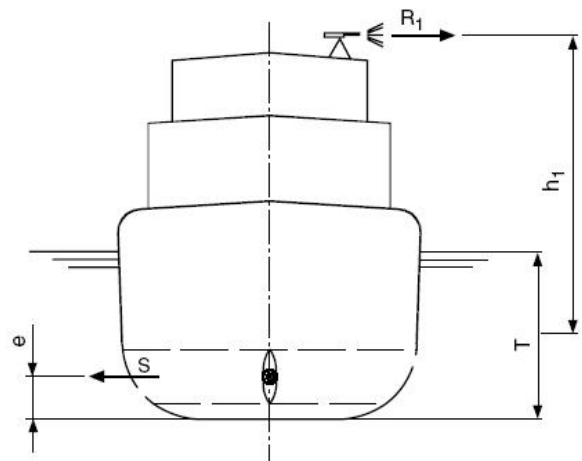


Figure 1.2 Reaction force of water jet in the beam direction due to monitors

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

Hull and superstructure shall be constructed of steel. External doors and hatches shall be of steel. External platforms and exposed piping systems shall be of steel.

Windows/portlights in the structural exterior boundaries are to be constructed to "A-0" class standard or be protected by external, steel deadlights or shutters, except in the navigation bridge.

For all vessels receiving FF1, FF2 or FF3 notations that are equipped with a water-spray system meeting the requirements of C.2 of this section, standard-type(non-fire rated) windows and portlights in the structural exterior boundaries are acceptable without external steel deadlights or shutters.

As a minimum, the frames are to be metallic and effectively secured to the adjacent structure. The glazing is to be set into the frames in a suitable, approved packing or compound, using metallic clips.

Special consideration will be given to boundaries to be constructed of materials other than steel. Details of the materials and of the protection which may be required to be provided are to be submitted to TL.

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 1.5.

1.2 For pumps involved in fire fighting service, a performance test is to be carried out in manufacturer's workshop under TL 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, deck areas above engine rooms and spaces in which combustible materials may be stored, wood sheathed steel decks, essential external equipment for fire fighting operations and external life rafts and lifeboats and rescue boats.

2.2 The capacity of the water spray system is to be calculated on the basis of Table 1.4.

2.3 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.

2.4 The nozzles are to be so arranged that uniform distribution over the whole protected area can be achieved. Water spray system is to be fitted in such a way as not to impair the necessary visibility from the wheelhouse and from the station for remote control of water monitors, also during operation of spray nozzles.

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

2.6 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 those connections according to 4.2 and 6.1.

2.7 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.

2.8 Where the water monitor pumps or fire main pumps are used for the water spray system, it is to be possible to segregate the water spray system by means of a valve.

Table 1.4 Minimum water capacity requirement for water-spray systems

Location to be Protected	Minimum Water Capacity litres/minute/m ²
Un-insulated steel (vertical areas)	10
Un-insulated steel (horizontal areas)	5
Wood sheathed steel decks	10
Steel boundaries internally insulated to Class A-60 (1)	5
1) <i>Applicable for outside vertical areas only. No requirements for exposed deck insulated by A-60.</i>	

2.9 Suitable drainage cocks are to be arranged and precautions are to be taken in order to prevent clogging of spray nozzles by impurities contained in pipes, nozzles, valves and pumps

2.10 When the ship is protected by a water-spraying system, suitable scuppers or freeing ports are to be provided to ensure efficient drainage of water accumulating on deck surfaces when such system is in operation.

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.

3.1.7 For ships having the notation FF0, the characteristics of the water fire-fighting system will be given special consideration by the TL.

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, which has adequate overall operational visibility, communications and protection. Water monitors and foam monitors are to be operated and controlled with a remote control system located in a common control station. Sea water suction valves, water delivery valves and pump prime movers are to be operable from the same position.

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. The control system is to be designed with a redundancy level such that lost function can be restored within 10 minutes and failure of control system shall initiate an alarm.

3.2.5 As a minimum, there shall be arranged two independent control systems such that a single failure will not disable more than 50% of the monitors installed. Failure in any remote control system shall initiate an alarm at the workstation from where the monitors are controlled.

3.2.6 Hydraulic or pneumatic control systems are to be capable of being supplied from two mutually independent energy sources. A stand-by pump for hydraulic systems and a stand-by compressor for pneumatic systems may be assumed as mutually independent energy source.

Table 1.5 Required equipment for the different Notations

Equipment parameters	Notations affixed to the Character of Classification					
	FF1	FF2			FF3	
Water monitors:	2	2	3	4	3	4
Output [m ³ /h] per monitor	1200	3600	2400	1800	3200	2400
Length of throw [m] (1)	120	150			150	
Height of throw [m] (2)	45	70			70	
Pumps: (7)	1-2	2 - 4			2 - 4	
Total pump capacity [m ³ /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 [m ³ /min]	–	100			100	
Water spray system (6)	1	– (4)			– (4)	
Number of fire hydrants on each side of ship (hose connections)	4	6			8	
Firemen'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 FF1/2or FF1/3.						
5) With all monitors in uninterrupted operation.						
6) Where the water monitor pumps are also used for the self-protection water-spraying system, their capacity is to be sufficient to ensure the simultaneous operation of both systems at the required performances.						
7) For ships assigned with FF0, the number of pumps shall be one as minimum where capacity and other characteristics of those pumps shall be agreed with TL.						
Note: For ships assigned with FF0, the number of fire hydrants on each side of ship (hose connections) and number of firemen's outfits shall comply with Table 1.6 and Table 1.7 respectively.						

3.2.7 Electrical control circuits shall be independent from each other. In electrical control systems, if more than one control unit is fitted, an independent circuit is to be provided for each individual control unit.

3.2.8 Open and closed indication of remotely controlled valves, if fitted, shall be indicated at the remote control station. Suitable measures such as appropriate settings of the opening and closing times of remotely controlled valves are to be used to prevent unacceptable high pressure surges in the system.

3.2.9 The switch-over to manual operation is to be effected locally at the monitors and valves. Switch-over to remote control must be effected from the monitor control room.

4. Foam Monitor System

For ships having the notation FF0 some relaxation in the provisions of this Section may be accepted by **TL**.

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 and height of throw at least 50 m above sea level.

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

4.1.5 The foam concentrate tank shall have capacity for at least 30 minutes of maximum foam generation from both foam monitors. When determining the necessary quantity of foam concentrate, the admixture is assumed to be 5%.

4.2 Foam concentrate

The low-expansion foam concentrate shall be of approved alcohol resistant type suitable for oil and chemical fires. The foam expansion ratio is not to exceed 12.

4.3 Foam generator

The foam generating plant, consisting of a fixed type with separate foam concentrate tank and foam-mixing units including the associated pipe work is to be permanently installed.

4.4 Control of foam monitors

For control of foam monitors C-3.2 of this Section applies analogously.

Additionally, the remote control of the foam monitors is to be located at the remote-control station for the water monitors and is to include remote control of water and foam concentrate.

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.

Means are to be provided to avoid overheating of the fire-fighting pumps when they operate at low delivery rates.

The starting of fire-fighting pumps when sea water inlet valves are closed is either to be prevented by an interlock system or to trigger an audible and visual alarm.

The pumps of the water monitor system may be used for supplying water to the foam monitor system. In such case, it may be necessary to reduce the pump water delivery pressure to ensure correct water pressure for maximum foam generation.

Internal combustion engines of 100 kW and over that are associated with the fire fighting pumps are to comply with **TL** Rules, Chapter 4 - Machinery, as applicable to engines intended for propulsion and for auxiliary services essential for propulsion, manoeuvring and safety of the vessel.

Electric motors of 50 kW and over that are associated with the fire fighting pumps are to comply with **TL** Rules, Chapter 5 – Electrical Installation, Section 20, A.

For pumps with more than 200 kW of power, an expansion joint is to be provided on pressure side of each pump. It is also recommended to provide expansion joint at suction side of each pump.

In any case shall the available net positive suction head (NPSH available) for the pump system is to be 1 m water column higher than the required net positive suction head (NPSH required)

For pumps located above water line an approved self-priming system shall be provided.

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. Sea suction for fire-fighting pumps are not to be used for other purposes.

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. Number of monitors is to be equally divided to the sea chests.

5.2.7 Sea suction is to be as short and straight as possible and located as low as practicable to avoid clogging due to debris or ice and any possibility of oil

intake from the surface of the sea.

5.2.8 A drain line or any equivalent suitable means for filling the water monitors' supply piping downstream of the pressure valves and up through the monitors whilst the pressure valves are in the closed position, shall be arranged.

5.3 Pipelines

5.3.1 Pipelines for fire fighting purposes (monitor supply, foam, water spray, etc.) shall be effectively protected against corrosion internally for all piping from sea water inlets to water monitors and externally for the lengths of piping exposed to the weather.

5.3.2 The wall thickness shall be in accordance with Tables 16.5 and 16.6 of **TL** Rules, Chapter 4 - Machinery, Section 16.

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

5.3.4 The piping system serving the water and foam monitors are not to be used for other services (i.e. hose connections required for mobile fire fighting equipment) except for the water-spraying system and manifold hydrants referred to in this section.

5.3.5 The valve control is to be designed so as to prevent pressure hammering.

5.3.6 Piping systems are to be protected from overpressure. All piping is to be suitably protected from freezing by drain cocks or other equivalent fittings.

6. Portable Fire Fighting Equipment

6.1 Hose connections/Hydrants and hose boxes

6.1.1 In addition to the fire hydrants required for onboard use, fire hydrant manifolds shall be provided on the port and starboard sides of the weather deck. The hose connections shall therefore point outwards.

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

6.1.3 Hose boxes are to be provided for at least every two hose connection/hydrant.

6.1.4 Each hose box is to be equipped with two approved fire hoses with 38 – 65mm diameter, each 20 m. long; one approved multi-purpose spray/jet nozzle and one hose wrench. A water jet flow of at least 12 m is to be provided.

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

6.1.6 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. Furthermore, valves to be arranged for independent supply to the fire hydrant manifolds without having the monitor and or the water spray in use. 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 1.5 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. Firemen's Outfit

7.1 Scope of firemen's outfit required

7.1.1 Firemen's outfit shall conform to Fire Safety Systems Code. For number of firemen's outfit, Table 1.7 is to be referred.

Table 1.6 Required Additional Fire Hydrant Manifolds, Hose Connections and Nozzles for the different Notations

Arrangement of Additional Fire Hydrant Manifolds, Hose Connections and Nozzles				
Notation	Number of Fire Hydrant Manifolds		Number of Hose Connections at Each Manifold	Number of Hose Box at Each Side (P/S)
	Port	Starboard		
FF0	1	1	4	2
FF1	1	1	4	2
FF2	1	1	6	3
	2	2	3	3
FF3	1	1	8	4
	2	2	4	4

Note:
Hose boxes to be arranged in accordance with C-6.1.3 of this section

Table 1.7 Number of firemen's outfits

Number of firemen's outfits			
FF0	FF1	FF2	FF3
4	4	8	8

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 the number of firemen's outfit required in this section, the number of firemen's outfits required by the flag state are to be supplied, one of which may be set against the equipment called for in Table 1.4.

7.2 Storage of firemen's outfits

Information on the firemen's outfit is to be displayed at a storage area for the user. Data is also to be included in the operating manual, which is to be accessible for the crew's information. The information to be displayed and operating manual data are to include particulars on capability of lifelines (holding capacity and length), lanterns (operating time) and breathing apparatus (time).

The fire fighter's outfits shall be placed in at least two separate fire stations of which one shall have access from the open deck. The entrance to the fire station shall be clearly marked. The room shall be arranged for ventilation and heating.

7.2.1 The firemen'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 equipped with a suitable filter on the air suction side; oil separators and suitable filters capable of preventing passage of oil droplets or vapours to the air bottles and all other accessories necessary for filling simultaneously at least 4 breathing air cylinders is to be installed at a suitable position on the ship. The capacity of the compressor is to be sufficient to allow the refilling of the bottles of air breathing apparatuses in no more than 30 minutes. This capacity is not to be less than 160 litres per minute.

7.3.2 Breathing air compressors are to be of approved type and certified by the manufacturer as being capable of maintaining air purity suitable for this type of service.