

LIFE SAVING APPLIANCES (LSA) CODE:

01. Definitions and general requirements for life-saving appliances
02. Lifebuoys and Life-jackets
03. Immersion suits, Anti-exposure suits and Thermal protective aids
04. General requirements for lifeboats
05. General requirements for life-rafts
06. General requirements for rescue boats
07. Rocket parachute flares
08. Hand flares
09. Buoyant smoke signals
10. Launching and embarkation appliances
11. Marine evacuation systems
12. Line-throwing appliances
13. General emergency alarm system
14. Public address system
15. IMO Symbols and Safety signs

01. DEFINITIONS AND GENERAL REQUIREMENTS FOR LIFE-SAVING APPLIANCES

Convention means the SOLAS, 1974, as amended.

Regulation means a regulation contained in the Annex to the Convention.

Retro-reflective material is a material which reflects in the opposite direction a beam of light directed on it. [A.658(16)]

Organization means IMO with all its committees.

Administration means Maritime administration of Flag state.

The terms used in this Code have the same meaning as those defined in regulation III/3.

Life-saving appliances on all ships have to be fitted with retro-reflective material where it will assist in detection and in accordance with the recommendations of the Organization in A.658(16);

Unless expressly provided otherwise in the opinion of the Administration, all LSA prescribed in this part shall:

- ❖ be constructed with proper workmanship and materials;
- ❖ not be damaged in stowage throughout the air temperature range -30°C to +65°C;
- ❖ if they are likely to be immersed in seawater during their use, operate throughout the seawater temperature range -1°C to +30°C;
- ❖ where applicable, be rot-proof, corrosion-resistant, and not be unduly affected by seawater, oil or fungal attack;
- ❖ where exposed to sunlight, be resistant to deterioration;
- ❖ be of a highly visible color on all parts where this will assist detection;
- ❖ be fitted with retro-reflective material where it will assist in detection and in accordance with the recommendations of the Organization in A.658(16);
- ❖ if they are to be used in a seaway, be capable of satisfactory operation in that environment;
- ❖ be clearly marked with approval information including the Administration which approved it, and any operational restrictions;
- ❖ where applicable, be provided with electrical short circuit protection to prevent damage or injury.

The Administration shall determine the period of acceptability of life-saving appliances which are subject to deterioration with age. Such life-saving appliances shall be marked with a means for determining their age or the date by which they must be replaced. Permanent marking with a date of expiry is the preferred method of establishing the period of acceptability. Batteries not marked with an expiration date may be used if they are replaced annually, or in the case of a secondary battery (accumulator), if the condition of the electrolyte can be readily checked.

02. LIFEBOUYS AND LIFE-JACKETS

Every lifebuoy shall:



- ❖ have an outer diameter of not more than 800 mm and an inner diameter of not less than 400 mm;
 - ❖ be constructed of inherently buoyant material; it shall not depend upon rushes, cork shavings or granulated cork, any other loose granulated material or any air compartment which depends on inflation for buoyancy;
 - ❖ be capable of supporting not less than 14.5 kg of iron in fresh water for a period of 24 hours;
 - ❖ have a mass of not less than 2.5 kg;
 - ❖ not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 seconds;
- ❖ be constructed to withstand a drop into the water from the height at which it is stowed above the waterline in the lightest seagoing condition or 30 m, whichever is the greater, without impairing either its operating capability or that of its attached components;
 - ❖ if it is intended to operate the quick release arrangement provided for the self-activated smoke signals and self-igniting lights, have a mass sufficient to operate the quick release arrangement;
 - ❖ be fitted with a grabline not less than 9.5 mm in diameter and not less than 4 times the outside diameter of the body of the buoy in length. The grabline shall be secured at four equidistant points around the circumference of the buoy to form four equal loops.

Self-igniting lights shall:



- ❖ be such that they cannot be extinguished by water;
- ❖ be of white colour and capable of either burning continuously with a luminous intensity of not less than 2 cd in all directions of the upper hemisphere or flashing (discharge flashing) at a rate of not less than 50 flashes and not more than 70 flashes per min with at least the corresponding effective luminous intensity;
- ❖ be provided with a source of energy capable of meeting the requirement of previous paragraph for a period of at least 2 hours;
- ❖ be capable of withstanding the drop test into the water from the height at which it is stowed above the waterline in the lightest seagoing condition or 30 m, whichever is the greater, without impairing either its operating capability or that of its attached components.

Self-activating smoke signals shall:



- ❖ emit smoke of a highly visible color at a uniform rate for a period of at least 15 min when floating in calm water;
- ❖ not ignite explosively or emit any flame during the entire smoke emission time of the signal;
- ❖ not be swamped in a seaway;
- ❖ continue to emit smoke when fully submerged in water for a period of at least 10 s;
- ❖ be capable of withstanding the drop test into the water from the height at which it is stowed above the waterline in the lightest seagoing condition or 30 m, whichever is the greater, without impairing either its operating capability or that of its attached components.

Buoyant lifelines shall:

- ❖ be non-kinking;
- ❖ have a diameter of not less than 8 mm; and
- ❖ have a breaking strength of not less than 5 kN.

Life-jackets:

An adult life-jacket shall be so constructed that:



- ❖ shall not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 seconds.
- ❖ at least 75% of persons, who are completely unfamiliar with the lifejacket, can correctly don it within a period of one min without assistance, guidance or prior demonstration;
- ❖ after demonstration, all persons can correctly don it within a period of one minute without assistance;
- ❖ it is clearly capable of being worn in only one way or, as far as is practicable, cannot be donned incorrectly;
- ❖ it is comfortable to wear;
- ❖ it allows the wearer to jump from a height of at least 4.5 m into the water without injury and without dislodging or damaging the lifejacket.

- ❖ shall have buoyancy which is not reduced by more than 5% after 24h submersion in fresh water.
- ❖ shall be fitted with a whistle firmly secured by a cord

An adult lifejacket shall have sufficient buoyancy and stability in calm fresh water to:

- ❖ .1 lift the mouth of an exhausted or unconscious person not less than 120 mm clear of the water with the body inclined backwards at an angle of not less than 20° from the vertical position;
- ❖ .2 turn the body of an unconscious person in the water from any position to one where the mouth is clear of the water in not more than 5 s.
- ❖ shall allow the person wearing it to swim a short distance and to board a survival craft.

A child lifejacket shall be constructed and perform the same as an adult lifejacket except as follows:



- ❖ donning assistance is permitted for small children;
- ❖ it shall only be required to lift the mouth of an exhausted or unconscious wearer clear of the water a distance appropriate to the size of the intended wearer;
- ❖ assistance may be given to board a survival craft, but wearer mobility shall not be significantly reduced.

In addition to the markings with approval information including the Administration which approved it, and any operational restrictions, a child lifejacket shall be marked with:

- ❖ the height or weight range for which the lifejacket will meet the testing and evaluation criteria recommended by the Organization in A.689.(17)
- ❖ a "child" symbol as shown in the "child's lifejacket" symbol adopted by the Organization in A.760(18)

Inflatable lifejackets



A lifejacket which depends on inflation for buoyancy shall have not less than two separate compartments and comply with the all requirements for ordinary lifejacket, and shall:

- ❖ inflate automatically on immersion, be provided with a device to permit inflation by a single manual motion and be capable of being inflated by mouth;
- ❖ in the event of loss of buoyancy in any one compartment be capable of complying with the all requirements for ordinary lifejacket;
- ❖ shall have buoyancy which is not reduced by more than 5% after 24h submersion in fresh water after inflation by means of the automatic mechanism.

Life-jacket light shall:



- ❖ have a luminous intensity of not less than 0.75 cd in all directions of the upper hemisphere;
- ❖ have a source of energy capable of providing a luminous intensity of 0.75 cd for a period of at least 8 hours;
- ❖ be visible over as great a segment of the upper hemisphere as is practicable when attached to a lifejacket;
- ❖ be of white color.

If the light referred above is a flashing light it shall, in addition:

- ❖ be provided with a manually operated switch; and
- ❖ flash at a rate of not less than 50 flashes and not more than 70 flashes per min with an effective luminous intensity of at least 0.75 cd.

03. IMMERSION SUITS, ANTI-EXPOSURE SUITS AND THERMAL PROTECTIVE AIDS

The immersion suit

The immersion suit shall be constructed with waterproof materials such that:

- ❖ it can be unpacked and donned without assistance within 2 min, taking into account any associated clothing*, and a lifejacket if the immersion suit is to be worn in conjunction with a lifejacket;
- ❖ it will not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 seconds;
- ❖ it will cover the whole body with the exception of the face. Hands shall also be covered unless permanently attached gloves are provided;
- ❖ it is provided with arrangements to minimize or reduce free air in the legs of the suit;
- ❖ following a jump from a height of not less than 4.5 m into the water there is no undue ingress of water into the suit.

An immersion suit which also complies with the requirements of life-jackets may be classified as a life-jacket.



An immersion suit which has buoyancy and is designed to be worn without a lifejacket shall be fitted with a light and the whistle complying with the requirements for life-jackets. If the immersion suit is to be worn in conjunction with a lifejacket, the lifejacket shall be worn over the immersion suit. A person wearing such an immersion suit shall be able to don a lifejacket without assistance.

In that case immersion suit shall permit the person wearing it:

- ❖ to climb up and down a vertical ladder at least 5 m in length;
- ❖ to perform normal duties associated with abandonment;
- ❖ to jump from a height of not less than 4.5 m into the water without damaging or dislodging the immersion suit, or being injured;
- ❖ to swim a short distance through the water and board a survival craft.

An immersion suit made of material which has no inherent insulation shall be:

- ❖ .1 marked with instructions that it must be worn in conjunction with warm clothing;
- ❖ .2 so constructed that, when worn in conjunction with warm clothing, and with a lifejacket if the immersion suit is to be worn with a lifejacket, the immersion suit continues to provide sufficient thermal protection, following one jump by the wearer into the water from a height of 4.5 m, to ensure that when it is worn for a period of 1h in calm circulating water at a temperature of 5°C, the wearer's body core temperature does not fall more than 2°C.

An immersion suit made of material with inherent insulation, when worn either on its own or with a lifejacket, if the immersion suit is to be worn in conjunction with a lifejacket, shall provide the wearer with sufficient thermal insulation, following one jump into the water from a height of 4.5 m, to ensure that the wearer's body core temperature does not fall more than 2°C after a period of 6h immersion in calm circulating water at a temperature of between 0°C and 2°C.

A person in fresh water wearing either an immersion suit or an immersion suit with a lifejacket, shall be able to turn from a face-down to a face-up position in not more than 5 seconds.

Anti-exposure suits

The anti-exposure suit shall be constructed with waterproof materials such that it:

- ❖ provides inherent buoyancy of at least 70 N;
- ❖ is made of material which reduces the risk of heat stress during rescue and evacuation operations;
- ❖ covers the whole body with the exception of the head and hands and, where the Administration so permits, feet; gloves and a hood shall be provided in such a manner as to remain available for use with the anti-exposure suits;
- ❖ can be unpacked and donned without assistance within 2 min;
- ❖ does not sustain burning or continue melting after being totally enveloped in a fire for a period of 2 seconds;
- ❖ is equipped with a pocket for a portable VHF telephone;
- ❖ has a lateral field of vision of at least 120°.

An anti-exposure suit which also complies with the requirements of life-jackets may be classified as a life-jacket.

An anti-exposure suit shall permit the person wearing it:

- ❖ to climb up and down a vertical ladder of at least 5 m in length;
- ❖ to jump from a height of not less than 4.5 m into the water with feet first, without damaging or dislodging the suit, or being injured;
- ❖ to swim through the water at least 25 m and board a survival craft;
- ❖ to don a lifejacket without assistance; and
- ❖ to perform all duties associated with abandonment, assist others and operate a rescue boat.

An anti-exposure suit shall be fitted with a light complying with the requirements for life jackets.

An anti-exposure suit shall:

- ❖ if made of material which has no inherent insulation, be marked with instructions that it must be worn in conjunction with warm clothing;
- ❖ be so constructed, that when worn as marked, the suit continues to provide sufficient thermal protection following one jump into the water which totally submerges the wearer and shall ensure that when it is worn in calm circulating water at a temperature of 5°C, the wearer's body core temperature does not fall at a rate of more than 1.5°C per hour, after the first 0.5 hours.

A person in fresh water wearing an anti-exposure suit complying with the requirements of this section shall be able to turn from a face-down to a face-up position in not more than 5 seconds and shall be stable face-up. The suit shall have no tendency to turn the wearer face-down in moderate sea condition.



Thermal protective aids

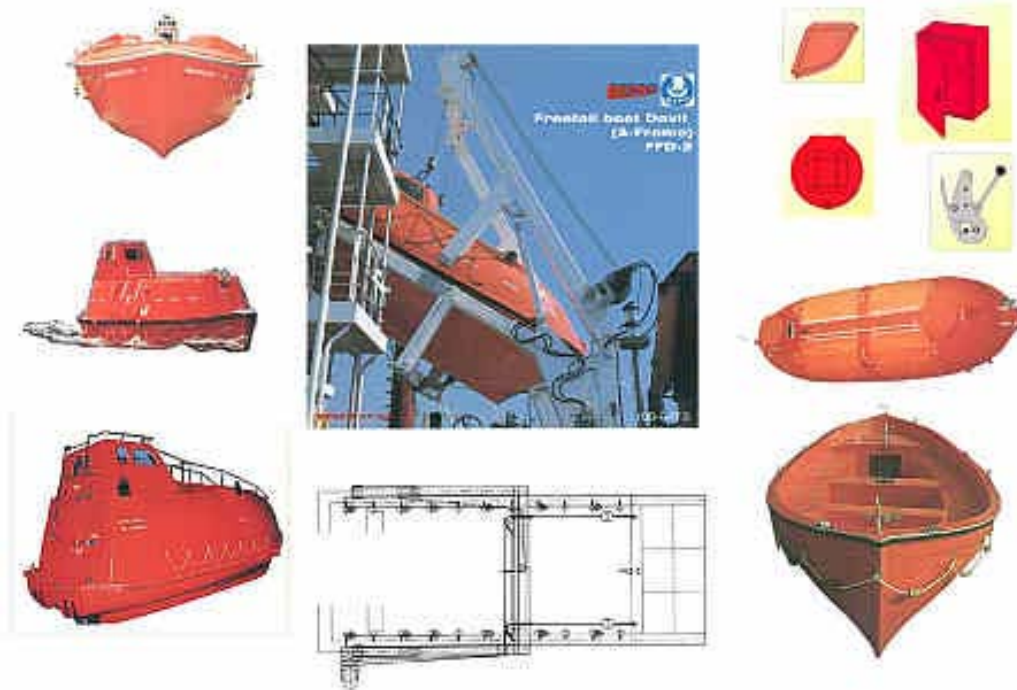


A thermal protective aid shall be made of waterproof material having a thermal conductance of not more than $7800 \text{ W/(m}^2\text{K)}$ and shall be so constructed that, when used to enclose a person, it shall reduce both the convective and evaporative heat loss from the wearer's body.

- ❖ The thermal protective aid shall:
- ❖ cover the whole body of persons of all sizes wearing a lifejacket with the exception of the face. Hands shall also be covered unless permanently attached gloves are provided;
- ❖ be capable of being unpacked and easily donned without assistance in a survival craft or rescue boat;
- ❖ permit the wearer to remove it in the water in not more than 2 min, if it impairs ability to swim.

The thermal protective aid shall function properly throughout an air temperature range -30°C to $+20^{\circ}\text{C}$.

04. GENERAL REQUIREMENTS FOR LIFEBOATS



All lifeboats shall be properly constructed and shall be of such form and proportions that they have ample stability in a seaway and sufficient freeboard when loaded with their full complement of persons and equipment. All lifeboats shall have rigid hulls and shall be capable of maintaining positive stability when in an upright position in calm water and loaded with their full complement of persons and equipment and holed in any one location below the waterline, assuming no loss of buoyancy material and no other damage.

Each lifeboat shall be fitted with a certificate of approval, endorsed by the Administration, containing at least the following items:

- ❖ manufacturer's name and address;
- ❖ lifeboat model and serial number;
- ❖ month and year of manufacture;
- ❖ number of persons the lifeboat is approved to carry; and
- ❖ with approval information including the Administration which approved it, and any operational restrictions.

The certifying organization shall provide the lifeboat with a certificate of approval which, in addition to the above items, specifies:

- ❖ number of the certificate of approval;
- ❖ material of hull construction, in such detail as to ensure that compatibility problems in repair should not occur;
- ❖ total mass fully equipped and fully manned;
- ❖ statement of approval.

All lifeboats shall be of sufficient strength to:

- ❖ enable them to be safely launched into the water when loaded with their full complement of persons and equipment;
- ❖ be capable of being launched and towed when the ship is making headway at a speed of 5 knots in calm water.

Hulls and rigid covers shall be fire-retardant or non-combustible.

Seating shall be provided on thwarts, benches or fixed chairs which are constructed so as to be capable of supporting:

- ❖ a static load equivalent to the number of persons each weighing 100 kg for which spaces are provided in compliance with the seating requirements shown on *Figure 1*
- ❖ a load of 100 kg in any single seat location when a lifeboat to be launched by falls is dropped into the water from a height of at least 3 m;
- ❖ a load of 100 kg in any single seat location when a free-fall lifeboat is launched from a height of at least 1.3 times its free-fall certification height.

Except for free-fall lifeboats, each lifeboat to be launched by falls shall be of sufficient strength to withstand a load, without residual deflection on removal of that load:

- ❖ in the case of boats with metal hulls, 1.25 times the total mass of the lifeboat when loaded with its full complement of persons and equipment; or
- ❖ in the case of other boats, twice the total mass of the lifeboat when loaded with its full complement of persons and equipment.

Except for free-fall lifeboats, each lifeboat to be launched by falls shall be of sufficient strength to withstand, when loaded with its full complement of persons and equipment and with, where applicable, skates or fenders in position, a lateral impact against the ship's side at an impact velocity of at least 3.5 m/s and also a drop into the water from a height of at least 3 m.

The vertical distance between the floor surface and the interior of the enclosure or canopy over 50% of the floor area shall be:

- ❖ not less than 1.3 m for a lifeboat permitted to accommodate nine persons or less;
- ❖ not less than 1.7 m for a lifeboat permitted to accommodate 24 persons or more; and
- ❖ not less than the distance as determined by linear interpolation between 1.3 m and 1.7 m for a lifeboat permitted to accommodate between nine and 24 persons.

No lifeboat shall be approved to accommodate more than 150 persons.

The number of persons which a lifeboat to be launched by falls shall be permitted to accommodate shall be equal to the lesser of:

- ❖ the number of persons having an average mass of 75 kg, all wearing lifejackets, that can be seated in a normal position without interfering with the means of propulsion or the operation of any of the lifeboat's equipment; or
- ❖ the number of spaces that can be provided on the seating arrangements in accordance with figure 1. The shapes may be overlapped as shown, provided footrests are fitted and there is sufficient room for legs and the vertical separation between the upper and lower seat is not less than 350 mm.

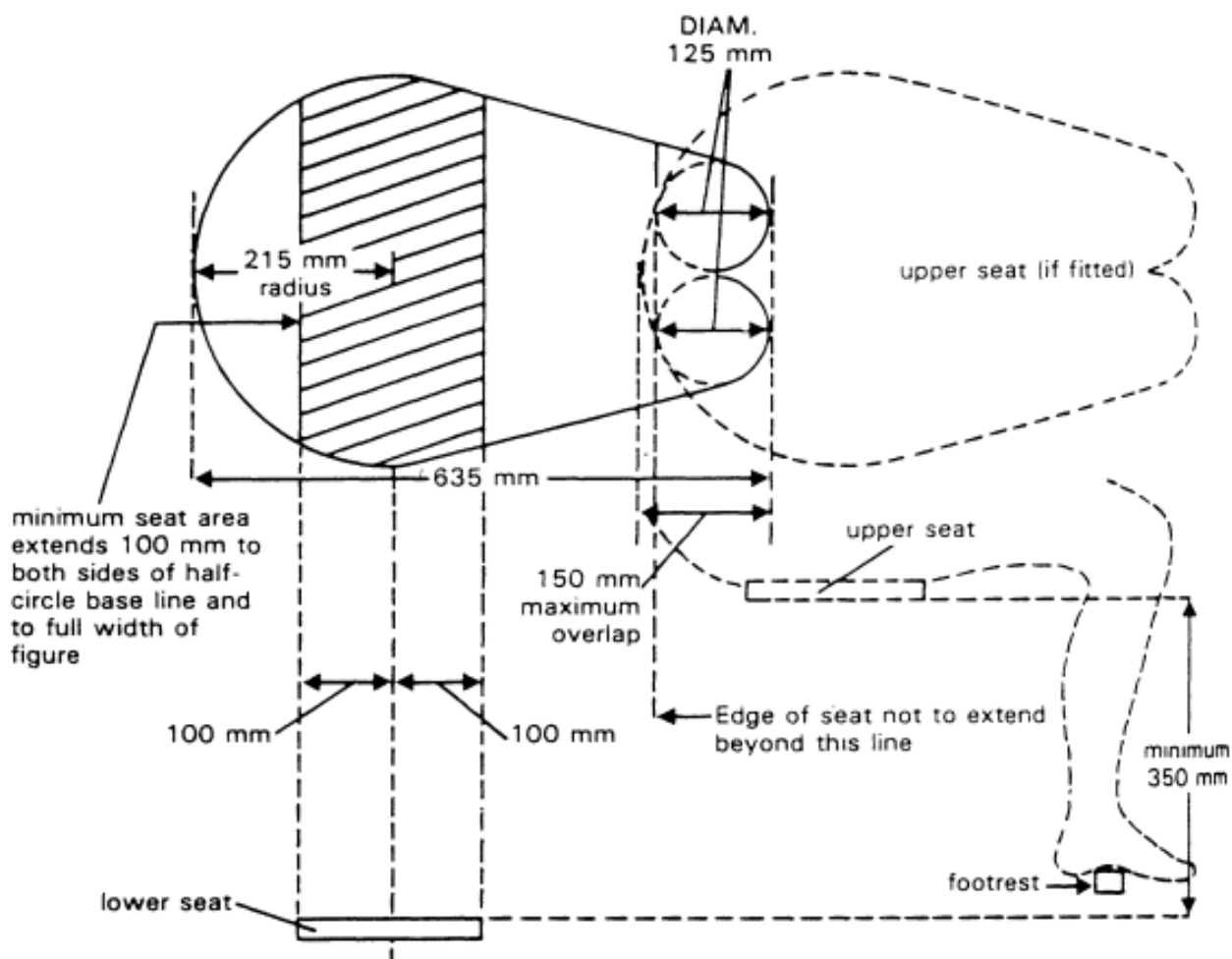


Figure 1

Each seating position shall be clearly indicated in the lifeboat.

Access into lifeboats

- ❖ Every passenger ship lifeboat shall be so arranged that it can be rapidly boarded by its full complement of persons. Rapid disembarkation shall also be possible.
- ❖ Every cargo ship lifeboat shall be so arranged that it can be boarded by its full complement of persons in not more than 3 min from the time the instruction to board is given. Rapid disembarkation shall also be possible.
- ❖ Lifeboats shall have a boarding ladder that can be used at any boarding entrance of the lifeboat to enable persons in the water to board the lifeboat. The lowest step of the ladder shall be not less than 0.4 m below the lifeboat's light waterline.
- ❖ The lifeboat shall be so arranged that helpless people can be brought on board either from the sea or on stretchers.
- ❖ All surfaces on which persons might walk shall have a non-skid finish.

Lifeboat buoyancy

All lifeboats shall have inherent buoyancy or shall be fitted with inherently buoyant material which shall not be adversely affected by seawater, oil or oil products, sufficient to float the lifeboat with all its equipment on board when flooded and open to the sea. Additional inherently buoyant material, equal to 280 N of buoyant force per person shall be provided for the number of persons the lifeboat is permitted to accommodate. Buoyant material, unless in addition to that required above, shall not be installed external to the hull of the lifeboat.

Lifeboat freeboard and stability

All lifeboats shall be stable and have a positive GM value when loaded with 50% of the number of persons the lifeboat is permitted to accommodate in their normal positions to one side of the centreline.

Under the condition of loading described above:

- ❖ each lifeboat with side openings near the gunwale shall have a freeboard, measured from the waterline to the lowest opening through which the lifeboat may become flooded, of at least 1.5% of the lifeboat's length or 100 mm, whichever is the greater;
- ❖ each lifeboat without side openings near the gunwale shall not exceed an angle of heel of 20° and shall have a freeboard, measured from the waterline to the lowest opening through which the lifeboat may become flooded, of at least 1.5% of the lifeboat's length or 100 mm, whichever is the greater.

Lifeboat propulsion

Every lifeboat shall be powered by a compression ignition engine. No engine shall be used for any lifeboat if its fuel has a flashpoint of 43°C or less (closed cup test).

The engine shall be provided with either a manual starting system, or a power starting system with two independent rechargeable energy sources. Any necessary starting aids shall also be provided. The engine starting systems and starting aids shall start the engine at an ambient temperature of -15°C within 2 min of commencing the start procedure unless, in the opinion of the Administration having regard to the particular voyages in which the ship carrying the lifeboat is constantly engaged, a different temperature is appropriate. The starting systems shall not be impeded by the engine casing, seating or other obstructions.

The speed of a lifeboat when proceeding ahead in calm water, when loaded with its full complement of persons and equipment and with all engine powered auxiliary equipment in operation, shall be at least 6 knots and at least 2 knots when towing a 25-person life-raft loaded with its full complement of persons and equipment or its equivalent. Sufficient fuel, suitable for use throughout the temperature range expected in the area in which the ship operates, shall be provided to run the fully loaded lifeboat at 6 knots for a period of not less than 24 h.

Water-resistant instructions for starting and operating the engine shall be provided and mounted in a conspicuous place near the engine starting controls.

Lifeboat fittings

All lifeboats except free-fall lifeboats shall be provided with at least one drain valve fitted near the lowest point in the hull, which shall automatically open to drain water from the hull when the lifeboat is not waterborne and shall automatically close to prevent entry of water when the lifeboat is waterborne. Each drain valve shall be provided with a cap or plug to close the valve, which shall be attached to the lifeboat by a lanyard, a chain, or other suitable means. Drain valves shall be readily accessible from inside the lifeboat and their position shall be clearly indicated.

All lifeboats shall be provided with a rudder and tiller. The rudder shall be permanently attached to the lifeboat.

All lifeboats shall be fitted with sufficient watertight lockers or compartments to provide for the storage of the small items of equipment, water and provisions.

Every lifeboat to be launched by a fall or falls, except a free-fall lifeboat, shall be fitted with a release mechanism, which shall be so arranged that all hooks are released simultaneously and release control shall be clearly marked in a color that contrasts with its surroundings.

Every lifeboat shall be fitted with a device to secure a painter near its bow. The device shall be such that the lifeboat does not exhibit unsafe or unstable characteristics when being towed by the ship making headway at speeds up to 5 knots in calm water.

Except for free-fall lifeboats, the painter securing device shall include a release device to enable the painter to be released from inside the lifeboat, with the ship making headway at speeds up to 5 knots in calm water.

Every lifeboat shall be so arranged that an adequate view forward, aft and to both sides is provided from the control and steering position for safe launching and maneuvering.

Lifeboat equipment

- 1) except for free-fall lifeboats, sufficient buoyant oars to make headway in calm seas.
- 2) two boat-hooks;
- 3) a buoyant bailer and two buckets;
- 4) a survival manual
- 5) an operational compass which is luminous or provided with suitable means of illumination. In a totally enclosed lifeboat, the compass shall be permanently fitted at the steering position; in any other lifeboat, it shall be provided with a binnacle if necessary to protect it from the weather, and suitable mounting arrangements;
- 6) a sea-anchor of adequate size fitted with a shock-resistant hawser which provides a firm hand grip when wet. The strength of the sea-anchor, hawser and tripping line if fitted shall be adequate for all sea conditions;
- 7) two efficient painters of a length equal to not less than twice the distance from the stowage position of the lifeboat to the waterline in the lightest seagoing condition or 15 m, whichever is the greater. On lifeboats to be launched by free-fall launching, both painters shall be stowed near the bow ready for use. On other lifeboats, one painter attached to the release device required to come together with release mechanism shall be placed at the forward end of the lifeboat and the other shall be firmly secured at or near the bow of the lifeboat ready for use;
- 8) two hatchets, one at each end of the lifeboat;
- 9) watertight receptacles containing a total of 3 liters of fresh water for each person the lifeboat is permitted to accommodate, of which either 1 liter per person may be replaced by a desalting apparatus capable of producing an equal amount of fresh water in 2 days, or 2 liters per person may be replaced by a manually powered reverse osmosis desalinators capable of producing an equal amount of fresh water in 2 days;
- 10) a rustproof dipper with lanyard;
- 11) a rustproof graduated drinking vessel;
- 12) a food ration totalling not less than 10,000 kJ for each person the lifeboat is permitted to accommodate; these rations shall be kept in airtight packaging and be stowed in a watertight container;
- 13) four rocket parachute flares;
- 14) six hand flares;
- 15) two buoyant smoke signals;
- 16) one waterproof electric torch suitable for Morse signalling together with one spare set of batteries and one spare bulb in a waterproof container;
- 17) one daylight signalling mirror with instructions for its use for signalling to ships and aircraft;
- 18) one copy of the life-saving signals prescribed by regulation V/16 on a waterproof card or in a waterproof container;
- 19) one whistle or equivalent sound signal;
- 20) a first-aid outfit in a waterproof case capable of being closed tightly after use;
- 21) anti-seasickness medicine sufficient for at least 48 h and one seasickness bag for each person;
- 22) a jack-knife to be kept attached to the boat by a lanyard;
- 23) three tin openers;
- 24) two buoyant rescue quoits, attached to not less than 30 m of buoyant line;
- 25) if the lifeboat is not automatically self-bailing, a manual pump suitable for effective bailing;
- 26) one set of fishing tackle;
- 27) sufficient tools for minor adjustments to the engine and its accessories;
- 28) portable fire-extinguishing equipment of an approved type suitable for extinguishing oil fires [A.602(15)].
- 29) a searchlight with a horizontal and vertical sector of at least 6° and a measured luminous intensity of 2500 cd which can work continuously for not less than 3 h;
- 30) an efficient radar reflector, unless a survival craft radar transponder is stowed in the lifeboat;
- 31) thermal protective aids complying with the requirements of section 2.5 sufficient for 10% of the number of persons the lifeboat is permitted to accommodate or two, whichever is the greater;
- 32) in the case of ships engaged on voyages of such a nature and duration that, in the opinion of the Administration a food ration and fishing tackle are unnecessary, the Administration may allow these items to be dispensed with.

Lifeboat markings

- ❖ The number of persons for which the lifeboat is approved shall be clearly marked on it in clear permanent characters.
- ❖ The name and port of registry of the ship to which the lifeboat belongs shall be marked on each side of the lifeboat's bow in block capitals of the Roman alphabet.
- ❖ Means of identifying the ship to which the lifeboat belongs and the number of the lifeboat shall be marked in such a way that they are visible from above

Free-fall lifeboats



Free-fall lifeboats shall comply with the requirements of totally enclosed lifeboats described above.

The carrying capacity of a free-fall lifeboat is the number of persons that can be provided with a seat without interfering with the means of propulsion or the operation of any of the lifeboat's equipment. The width of the seat shall be at least 430 mm. Free clearance in front of the backrest shall be at least 635 mm. The backrest shall extend at least 1,000 mm above the seat pan.

Each free-fall lifeboat shall make positive headway immediately after water entry and shall not come into contact with the ship after a free-fall launching against a trim of up to 10° and a list of up to 20° either way from the certification height when fully equipped and loaded with:

- ❖ its full complement of persons;
- ❖ occupants so as to cause the centre of gravity to be in the most forward position;
- ❖ occupants so as to cause the centre of gravity to be in the most aft position;
- ❖ its operating crew only.

Each free-fall lifeboat shall be of sufficient strength to withstand, when loaded with its full complement of persons and equipment, a free-fall launch from a height of at least 1.3 times the free-fall certification height.

Each free-fall lifeboat shall be fitted with a release system which shall:

- ❖ have two independent activation systems for the release mechanisms which may only be operated from inside the lifeboat and be marked in a color that contrasts with its surroundings;
- ❖ be so arranged as to release the boat under any condition of loading from no load up to at least 200% of the normal load caused by the fully equipped lifeboat when loaded with the number of persons for which it is to be approved;
- ❖ be adequately protected against accidental or premature use;
- ❖ be designed to test the release system without launching the lifeboat;
- ❖ be designed with a factor of safety of 6 based on the ultimate strength of the materials used.

In addition to the requirements for fully enclosed lifeboat certificate of approval for a free-fall lifeboat shall also state:

- ❖ free-fall certification height;
- ❖ required launching ramp length; and
- ❖ launching ramp angle for the free-fall certification height.

05. LIFE RAFTS

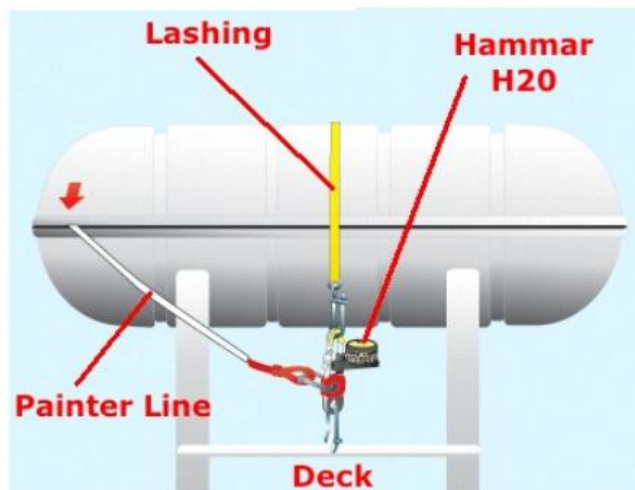


Every liferaft shall be so constructed as to be capable of withstanding exposure for 30 days afloat in all sea conditions.

The liferaft shall be so constructed that when it is dropped into the water from a height of 18 m, the liferaft and its equipment will operate satisfactorily. If the liferaft is to be stowed at a height of more than 18 m above the waterline in the lightest seagoing condition, it shall be of a type which has been satisfactorily drop-tested from at least that height.

The floating liferaft shall be capable of withstanding repeated jumps on to it from a height of at least 4.5 m above its floor both with and without the canopy erected.

The liferaft and its fittings shall be so constructed as to enable it to be towed at a speed of 3 knots in calm water when loaded with its full complement of persons and equipment and with one of its sea-anchors streamed.



The liferaft shall have a canopy to protect the occupants from exposure which is automatically set in place when the liferaft is launched and waterborne.

No liferaft shall be approved which has a carrying capacity of less than six persons

Unless the liferaft is to be launched by an approved launching appliance or is not required to be stowed in a position providing for easy side-to-side transfer, the total mass of the liferaft, its container and its equipment shall not be more than 185 kg.



The liferaft shall be fitted with an efficient painter of length equal to not less than 10 m plus the distance from the stowed position to the waterline in the lightest seagoing condition or 15 m whichever is the greater.

Davit-launched liferafts



In addition to the above requirements, a liferaft for use with an approved launching appliance shall:

- ❖ when the liferaft is loaded with its full complement of persons and equipment, be capable of withstanding a lateral impact against the ship's side at an impact velocity of not less than 3.5 m/s and also a drop into the water from a height of not less than 3 m without damage that will affect its function;
- ❖ be provided with means for bringing the liferaft alongside the embarkation deck and holding it securely during embarkation.

Every passenger ship davit-launched liferaft shall be so arranged that it can be rapidly boarded by its full complement of persons.

Every cargo ship davit-launched liferaft shall be so arranged that it can be boarded by its full complement of persons in not more than 3 min from the time the instruction to board is given.

The marking required on liferafts equipped in accordance with LSA code regulation 4.1.5.1 shall be "SOLAS A PACK" in block capitals of the Roman alphabet.

In the case of passenger ships engaged on short international voyages of such a nature and duration that, in the opinion of the Administration, not all the items specified in paragraph 4.1.5.1 are necessary, and "SOLAS B PACK" should be marked in block capitals of the Roman alphabet on liferaft.

The liferaft painter system shall provide a connection between the ship and the liferaft and shall be so arranged as to ensure that the liferaft when released and, in the case of an inflatable liferaft, inflated is not dragged under by the sinking ship.

If a weak link is used in the float-free arrangement, it shall:

- ❖ not be broken by the force required to pull the painter from the liferaft container;
- ❖ if applicable, be of sufficient strength to permit the inflation of the liferaft; and
- ❖ break under a strain of 2.2 ± 0.4 kN.

The liferaft shall be packed in a container that is:

- ❖ so constructed as to withstand hard wear under conditions encountered at sea;
- ❖ of sufficient inherent buoyancy, when packed with the liferaft and its equipment, to pull the painter from within and to operate the inflation mechanism should the ship sink;
- ❖ as far as practicable watertight, except for drain holes in the container bottom.

The container shall be marked with:

- ❖ maker's name or trade mark;
- ❖ serial number;
- ❖ name of approving authority and the number of persons it is permitted to carry;
- ❖ SOLAS;
- ❖ type of emergency pack enclosed;
- ❖ date when last serviced;
- ❖ length of painter;
- ❖ maximum permitted height of stowage above waterline (depending on drop-test height and length of painter);
- ❖ launching instructions.

06. RESCUE BOATS



Rescue boats may be either of rigid or inflated construction or a combination of both and shall:

- ❖ be not less than 3.8 m and not more than 8.5 m in length; and
- ❖ be capable of carrying at least five seated persons and a person lying on a stretcher.

Rescue boats shall be capable of manoeuvring at a speed of at least 6 knots and maintaining that speed for a period of at least 4 hours.

Rescue boats shall have sufficient mobility and manoeuvrability in a seaway to enable persons to be retrieved from the water, marshal liferafts and tow the largest liferaft carried on the ship when loaded with its full complement of persons and equipment or its equivalent at a speed of at least 2 knots.

A rescue boat shall be fitted with an inboard engine or outboard motor. If it is fitted with an outboard motor, the rudder and tiller may form part of the engine.

Arrangements for towing shall be permanently fitted in rescue boats and shall be sufficiently strong to marshal or tow liferafts.

Inflated rescue boats shall be so constructed as to be capable of withstanding exposure:

- ❖ when stowed on an open deck on a ship at sea;
- ❖ for 30 days afloat in all sea conditions.

The buoyancy of an inflated rescue boat shall be provided by either a single tube subdivided into at least five separate compartments of approximately equal volume or two separate tubes neither exceeding 60% of the total volume.

In addition to complying with the requirements lifeboats, inflated rescue boats shall be marked with a serial number, the maker's name or trade mark and the date of manufacture.

The inflated rescue boat shall be maintained at all times in a fully inflated condition.

07. ROCKET PARACHUTE FLARES



The rocket parachute flare shall:

- ❖ be contained in a water-resistant casing;
- ❖ have brief instructions or diagrams clearly illustrating the use of the rocket parachute flare printed on its casing;
- ❖ have integral means of ignition;
- ❖ be so designed as not to cause discomfort to the person holding the casing when used in accordance with the manufacturer's operating instructions.

The rocket shall, when fired vertically, reach an altitude of not less than 300 m.

At or near the top of its trajectory, the rocket shall eject a parachute flare, which shall:

- ❖ burn with a bright red color;
- ❖ burn uniformly with an average luminous intensity of not less than 30,000 cd;
- ❖ have a burning period of not less than 40 s;
- ❖ have a rate of descent of not more than 5 m/s; and
- ❖ not damage its parachute or attachments while burning.



08. HAND FLARES



The hand flare shall:

- ❖ be contained in a water-resistant casing;
- ❖ have brief instructions or diagrams clearly illustrating the use of the hand flare printed on its casing;
- ❖ have a self-contained means of ignition; and
- ❖ be so designed as not to cause discomfort to the person holding the casing and not endanger the survival craft by burning or glowing residues when used in accordance with the manufacturer's operating instructions.

The hand flare shall:

- ❖ burn with a bright red colour;
- ❖ burn uniformly with an average luminous intensity of not less than 15,000 cd;
- ❖ have a burning period of not less than 1 min; and
- ❖ continue to burn after having been immersed for a period of 10s under 100 mm of water.



09. BUOYANT SMOKE SIGNALS



The buoyant smoke signal shall:

- ❖ be contained in a water-resistant casing;
- ❖ not ignite explosively when used in accordance with the manufacturer's operating instructions
- ❖ have brief instructions or diagrams clearly illustrating the use of the buoyant smoke signal printed on its casing.

The buoyant smoke signal shall:

- ❖ emit smoke of a highly visible color at a uniform rate for a period of not less than 3 min when floating in calm water;
- ❖ not emit any flame during the entire smoke emission time;
- ❖ not be swamped in a seaway;
- ❖ continue to emit smoke when submerged in water for a period of 10 s under 100 mm of water.



10. LAUNCHING AND EMBARKATION APPLIANCES



With the exception of the secondary means of launching for free-fall lifeboats, each launching appliance shall be so arranged that the fully equipped survival craft or rescue boat it serves can be safely launched against unfavorable conditions of trim of up to 10° and list of up to 20° when boarded by its full complement of persons.

Each launching appliance shall be so constructed that only a minimum amount of routine maintenance is necessary. All parts requiring regular maintenance by the ship's crew shall be readily accessible and easily maintained.

Each launching appliance shall, as far as practicable, remain effective under conditions of icing.

Each rescue boat launching appliance shall be fitted with a powered winch motor capable of raising the rescue boat from the water with its full rescue boat complement of persons and equipment at a rate of not less than 0.3 m/s.

The launching mechanism shall be so arranged that it may be actuated by one person from a position on the ship's deck and, except for secondary launching appliances for free-fall lifeboats, from a position within the survival craft or rescue boat. When launched by a person on the deck, the survival craft or rescue boat shall be visible to that person.

The winch brakes of a launching appliance shall be of sufficient strength to withstand:

- ❖ a static test with a proof load of not less than 1.5 times the maximum working load;
- ❖ a dynamic test with a proof load of not less than 1.1 times the maximum working load at maximum lowering speed.

An efficient hand gear shall be provided for recovery of each survival craft and rescue boat.

Where davit arms are recovered by power, safety devices shall be fitted which will automatically cut off the power before the davit arms reach the stops in order to prevent overstressing the falls or davits, unless the motor is designed to prevent such overstressing.

The speed at which the fully loaded survival craft or rescue boat is lowered to the water shall not be less than that obtained from the formula:

$$S = 0.4 + 0.02H$$

where **S** is the lowering speed in meters per second and **H** is the height in meters from the davit head to the waterline with the ship at the lightest sea-going condition.

The maximum lowering speed shall be established by the Administration having regard to the design of the survival craft or rescue boat.

The lowering speed of a fully equipped liferaft without persons onboard shall be to the satisfaction of the Administration. The lowering speed of other survival craft, fully equipped but without persons on board, shall be at least 70% of that required for survival craft or rescue boat.

Every **free-fall launching appliance** shall comply with the applicable requirements for survival craft or rescue boat, in addition, shall comply with:

- ❖ to be constructed so as to prevent sparking and incendiary friction during the launching of the lifeboat.
- ❖ be designed and arranged so that in its ready to launch position, the distance from the lowest point on the lifeboat it serves to the water surface with the ship in its lightest seagoing condition does not exceed the lifeboat's free-fall certification height
- ❖ be arranged so as to preclude accidental release of the lifeboat in its unattended stowed position.
- ❖ The release mechanism shall be arranged so that at least two independent actions from inside the lifeboat are required in order to launch the lifeboat.
- ❖ Each launching appliance shall be provided with a secondary means to launch the lifeboat by falls.
- ❖ The secondary means of launching shall be equipped with at least a single off-load capability to release the lifeboat.

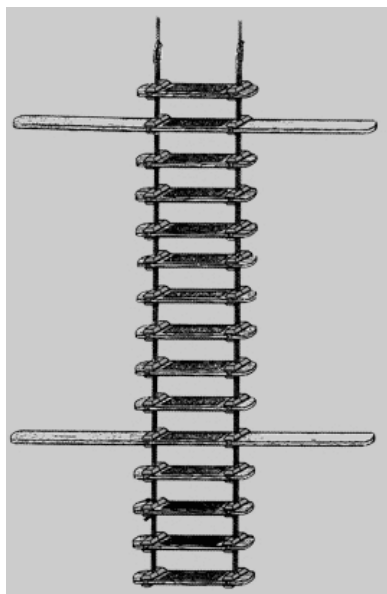
Every **liferaft launching appliance** shall comply with the requirements for survival craft or rescue boat, except with regard to embarkation in the stowed position, recovery of the loaded liferaft and that manual operation is permitted for turning out the appliance.

The launching appliance shall include an automatic release hook arranged so as to prevent premature release during lowering and shall release the liferaft when waterborne. The release hook shall include a capability to release the hook under load.

The on-load release control shall:

- ❖ be clearly differentiated from the control which activates the automatic release function;
- ❖ require at least two separate actions to operate;
- ❖ with a load of 150 kg on the hook, require a force of at least 600 and not more than 700 N to release the load, or provide equivalent adequate protection against inadvertent release of the hook;
- ❖ be designed such that the crew members on deck can clearly observe when the release mechanism is properly and completely set.

Embarkation ladders



Handholds shall be provided to ensure a safe passage from the deck to the head of the ladder and vice versa.

The steps of the ladder shall be:

- ❖ made of hardwood, free from knots or other irregularities, smoothly machined and free from sharp edges and splinters, or of suitable material of equivalent properties;
- ❖ provided with an efficient nonslip surface either by longitudinal grooving or by the application of an approved nonslip coating;
- ❖ not less than 480 mm long, 115 mm wide and 25 mm in depth, excluding any nonslip surface or coating;
- ❖ equally spaced not less than 300 mm or more than 380 mm apart and secured in such a manner that they will remain horizontal.

The side ropes of the ladder shall consist of two uncovered manila ropes not less than 65 mm in circumference on each side. Each rope shall be continuous with no joints below the top step. Other materials may be used provided the dimensions, breaking strain, weathering, stretching and gripping properties are at least equivalent to those of manila rope. All rope ends shall be secured to prevent unraveling.

11. MARINE EVACUATION SYSTEMS



The Marine Evacuation Chute (MEC) System is the most efficient, easy-to-use, flexible, and cost-effective Marine Evacuation System available in the world today. As a gravity-launch system, the Marine Evacuation System evacuates passengers and crew with the utmost safety in the shortest possible time.



Marine Evacuation System, dual-track slide platform, 50 person liferaft.

The passage of the marine evacuation system shall provide for safe descent of persons of various ages, sizes and physical capabilities wearing approved lifejackets from the embarkation station to the floating platform or survival craft.

Strength and construction of the passage and platform shall be to the satisfaction of the Administration.

If the passage gives direct access to the survival craft, it should be provided with a quick release arrangement.

A marine evacuation system shall be:

- ❖ capable of deployment by one person;
- ❖ such as to enable the total number of persons for which it is designed, to be transferred from the ship into the inflated liferafts within a period of 30 min in the case of a passenger ship and of 10 min in the case of a cargo ship from the time abandon ship signal is given;
- ❖ arranged such that liferafts may be securely attached to the platform and released from the platform by a person either in the liferaft or on the platform;
- ❖ capable of being deployed from the ship under unfavorable conditions of trim of up to 10° and list of up to 20° either way;
- ❖ in the case of being fitted with an inclined slide, such that the angle of the slide to the horizontal is:
 - ❖ within a range of 30° to 35° when the ship is upright and in the lightest sea-going condition; and
 - ❖ in the case of a passenger ship, a maximum of 55° in the final stage of
- ❖ flooding set by the requirements in regulation II-1/8;
- ❖ evaluated for capacity by means of timed evacuation deployments conducted in harbour;
- ❖ capable of providing a satisfactory means of evacuation in a sea state associated with a wind of force 6 on the Beaufort scale;
- ❖ designed to, as far as practicable, remain effective under conditions of icing; and
- ❖ so constructed that only a minimum amount of routine maintenance is necessary.

Any part requiring maintenance by the ship's crews shall be readily accessible and easily maintained

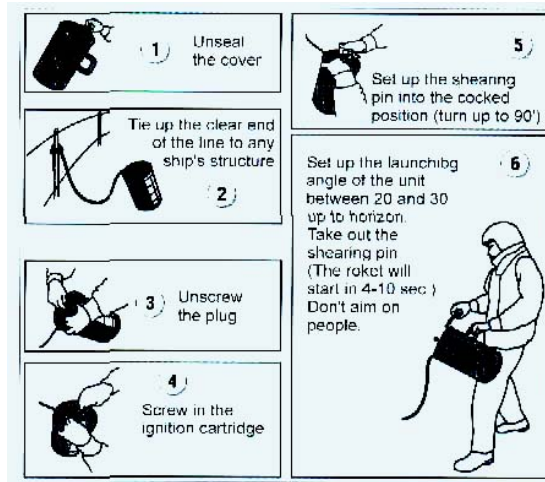
The marine evacuation system shall be marked with:

- ❖ maker's name or trade mark;
- ❖ serial number;
- ❖ date of manufacture (month and year);
- ❖ name of approving authority;
- ❖ name and place of servicing station where it was last serviced, along with the date of servicing; and
- ❖ the capacity of the system

Any inflatable liferaft used in conjunction with the marine evacuation system shall:

- ❖ conform with the requirements of section 4.2 ;
- ❖ be sited close to the system container but be capable of dropping clear of the deployed system and boarding platform;
- ❖ be capable of release one at a time from its stowage rack with arrangements which will enable it to be moored alongside the platform;
- ❖ be stowed in accordance with regulation III/13.4; and
- ❖ be provided with pre-connected or easily connected retrieving lines to the platform.

12. LINE-THROWING APPLIANCES



Every line-throwing appliance shall:

- ❖ be capable of throwing a line with reasonable accuracy;
- ❖ include not less than four projectiles each capable of carrying the line at least 230 m in calm weather;
- ❖ include not less than four lines each having a breaking strength of not less than 2 kN;
- ❖ have brief instructions or diagrams clearly illustrating the use of the line-throwing appliance.

The rocket, in the case of a pistol-fired rocket, or the assembly, in the case of an integral rocket and line, shall be contained in a water-resistant casing. In addition, in the case of a pistol-fired rocket, the line and rockets together with the means of ignition shall be stowed in a container which provides protection from the weather.

13. GENERAL EMERGENCY ALARM SYSTEM



The general emergency alarm system shall be capable of sounding the general emergency alarm signal consisting of seven or more short blasts followed by one long blast on the ship's whistle or siren and additionally on an electrically operated bell or klaxon or other equivalent warning system, which shall be powered from the ship's main supply and the emergency source of electrical power required by regulation II-1/42 or II-1/43, as appropriate.

- ❖ The system shall be capable of operation from the navigation bridge and, except for the ship's whistle, also from other strategic points.
- ❖ The system shall be audible throughout all the accommodation and normal crew working spaces.
- ❖ The alarm shall continue to function after it has been triggered until it is manually turned off or is temporarily interrupted by a message on the public address system.
- ❖ The minimum sound pressure levels for the emergency alarm tone in interior and exterior spaces shall be 80 dB (A) and at least 10 dB (A) above ambient noise levels existing during normal equipment operation with the ship underway in moderate weather. In cabins without a loudspeaker installation, an electronic alarm transducer shall be installed, e.g. a buzzer or similar.
- ❖ The sound pressure levels at the sleeping position in cabins and in cabin bathrooms shall be at least 75 dB (A) and at least 10 dB (A) above ambient noise levels as regulated in A.830(19).

14. PUBLIC ADDRESS SYSTEM



The public address system shall be a loudspeaker installation enabling the broadcast of messages into all spaces where crew members or passengers, or both, are normally present, and to muster stations. It shall allow for the broadcast of messages from the navigation bridge and such other places on board the ship as the Administration deems necessary. It shall be installed with regard to acoustically marginal conditions and not require any action from the addressee. It shall be protected against unauthorized use.

With the ship underway in normal conditions, the minimum sound pressure levels for broadcasting emergency announcements shall be:

- ❖ in interior spaces 75 dB (A) and at least 20 dB (A) above the speech interference level;
- ❖ in exterior spaces 80 dB (A) and at least 15 dB (A) above the speech interference level.

15. IMO SYMBOLS AND SAFETY SIGNS

IMO SYMBOLS & SAFETY SIGNS						
ON SELF-ADHESIVE PHOTOLUMINESCENT STICKERS (150mm X 150mm)						
						
502.01 Fasten seat belts	502.02 Secure hatches	502.03 Start engine	502.04 Lower lifeboat	502.05 Lower liferaft	502.06 Lower rescue boat	502.07 Release falls
						
502.08 Start water spray	502.09 Start air supply	502.10 Release gripes	502.11 Lifeboat	502.12 Rescue boat	502.13 Liferaft	502.14 Davit-launched liferaft
						
502.15 Embarkation ladder	502.16 Evacuation slide	502.17 Lifebuoy	502.18 Lifebuoy with line	502.19 Lifebuoy with light	502.20 Lifebuoy with light and smoke	502.21 Lifejacket
						
502.22 Child's lifejacket	502.23 Immersion suit	502.24 Survival craft portable radio	502.25 EPIRB	502.26 Radar transponder	502.27 Survival craft distress signals	502.28 Rocket parachute flares
						
502.29 Line-throwing appliance	502.30 Muster station (Assembly station)	502.33	502.34	502.35 T.P.A. THERMAL PROTECTIVE AID	MOOO1 EVACUATION CHUTE	MOOO2 ANTI-EXPOSURE SUIT