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# STANDARDS FOR LIFEBOATS

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## **PART I**

## **OPERATIONAL REQUIREMENTS**

### 1. **SCOPE**

- 1.1 Lifeboats conforming to this standard are in accordance with the provisions of the Canada Shipping Act, the International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended 1983 and Resolution A.689 (17), Testing of Life-Saving Appliances.
- 1.2 Where a manufacturer of lifeboats intends to make a modification to an approved lifeboat, the manufacturer shall submit an application for approval as if such modified lifeboat was a new design, and shall submit such modified lifeboat to all tests as the Board considers necessary.

### 2. **DEFINITIONS**

- 2.1 Approval Authority means the Department of Transport, Board of Steamship Inspection (the Board).
- 2.2 CGSB means the Canadian General Standards Board;
- 2.3 Complement means the number of persons as determined by the Board that a lifeboat is certified to carry;
- 2.4 Inspection Authority means the Ship Safety Branch of the Canadian Coast Guard.
- 2.5 Inspector means a Steamship Inspector appointed pursuant to Section 301 of the Canada Shipping Act.
- 2.6 Lifeboat means in respect to the Life Saving Equipment Regulations a boat complying with the requirements of this Standard that has a carrying capacity of not more than 150 persons.
- 2.7 Person means a person having a mass of 75 kgs.

### 3. GENERAL REQUIREMENTS

#### 3.1 Materials

3.1.1 The materials from which the lifeboat hull, deck, and canopy are constructed shall be tested to determine their fire-retardant characteristics by placing a test specimen in a flame and upon removal from the flame, the burning time and burning distance shall be determined.

3.1.2 Construction materials shall be resistant to deterioration from

- a. air temperature in the range of -30 to +65°C.;
- b. rot, corrosion, seawater, oil and fungus; and,
- c. sunlight.

3.1.3 Lifeboats shall be constructed of steel, aluminum or fibrous glass reinforced plastics, except other materials may be accepted by the Board if such are equivalent or superior to the specified materials in physical properties and durability in a marine environment.

#### 3.2 Design and Construction

3.2.1 All lifeboats shall

- a. be properly constructed;
- b. have rigid hulls;
- c. 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; and,
- d. be capable of maintaining positive stability when in an upright position in calm water and loaded with their complement and equipment and holed in any one location below the waterline, assuming no loss of buoyancy material or other damage.

3.2.2 Every lifeboat shall be capable of being launched and its equipment capable of being operated by persons wearing immersion suits.

- 3.2.3 All lifeboats shall be of sufficient strength to
- a. enable them to be safely lowered into the water when loaded with their complement and equipment; and,
  - b. be capable of being launched and towed when the ship is making headway at a speed of 5 knots in calm water.
- 3.2.4 Hulls and rigid canopies shall be fire retardate or noncombustible.
- 3.2.5 Seating shall be provided on thwarts, benches or fixed chairs fitted as low as practicable in the lifeboat capable of supporting the number of persons each weighing 100 kg. for which spaces are provided.
- 3.2.6 Each lifeboat shall be of sufficient strength to withstand a load, without residual deflection on removal of that load:
- a. 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
  - b. in the case of other boats, twice the total mass of the lifeboat when loaded with its full complement of persons and equipment.
- 3.2.7 Each lifeboat 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 3m.
- 3.2.8 The vertical distance between the floor surface and the interior of the canopy or enclosure over at least 50 % of the floor area shall be
- a. not less than 1.3 m for a lifeboat permitted to accommodate 9 persons or less;
  - b. not less than 1.7 m for a lifeboat permitted to accommodate 24 persons or more; and
  - c. 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 10 and 23 persons.

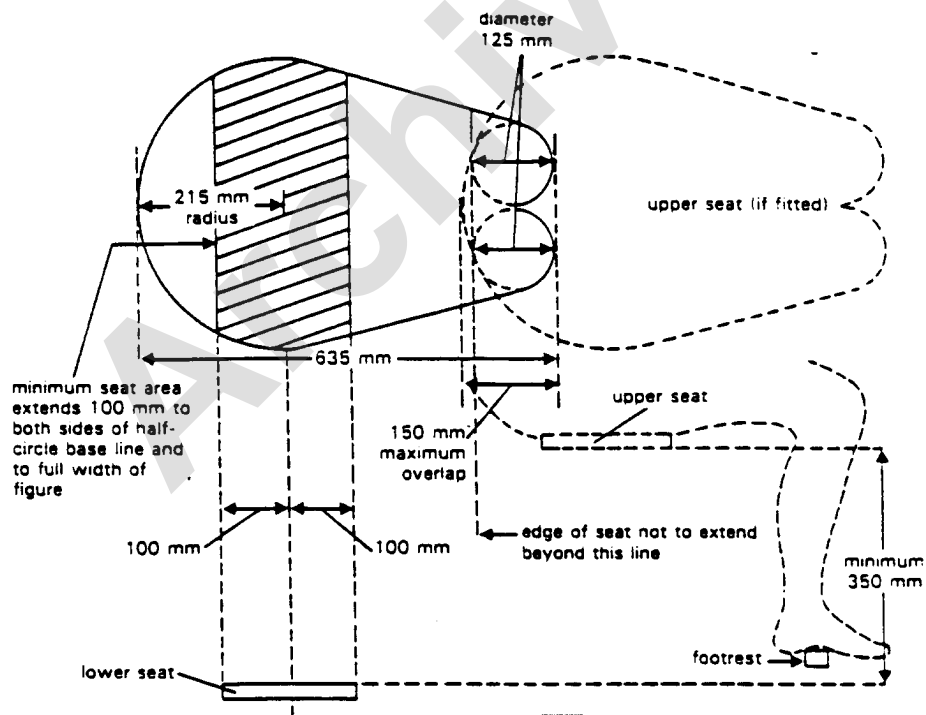
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### 3.3 Carrying capacity

3.3.1 The number of persons which a lifeboat shall be permitted to accommodate shall be equal to

- a. the number of persons, all wearing immersion suits, that can be seated in a normal position with out interfering with the means of propulsion or the operation of any of the lifeboat's equipment; or,
- b. 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 that footrests are fitted and there is sufficient room for legs and the vertical separation between the upper and lower seats is not less than 350 mm.

3.3.2 Each seating position within a lifeboat shall be clearly indicated.



NOTE: The shapes may be overlapped as shown, provide footrests are fitted and there is sufficient room legs and the vertical separation between the upper and lower seats is not less than 350 mm.

### 3.4 Access

3.4.1 Every passenger ship lifeboat shall be so arranged that

- a. it can be rapidly boarded by its full complement of persons; and,
- b. rapid disembarkation can be possible.

3.4.2 Every cargo ship lifeboat shall be so arranged that:

- a. it can be boarded by its full complement of persons in not more than 3 minutes from the time that the instruction to board is given; and,
- b. rapid disembarkation can be possible.

3.4.3 All surfaces on the lifeboat on which persons might walk shall have a non-slip finish.

3.4.4 Every lifeboat shall have a boarding ladder so arranged that

- a. it can be used on either side to enable persons in the water to board; and,
- b. the lowest step shall not be less than 0.4 m below the light waterline.

3.4.5 Every lifeboat shall be so arranged that helpless persons can be brought on board both from the water and on stretchers.

### 3.5 Buoyancy

3.5.1 All lifeboats shall have inherent buoyancy or shall be fitted with inherently buoyant material sufficient to float the lifeboat with all its equipment on board when flooded and open to the sea.

3.5.2 The buoyant material used in a lifeboat shall not be adversely affected by sea water, oil or oil products.

3.5.3 Notwithstanding the requirements of 3.5.1, all lifeboats shall have additional inherently buoyant material equal to 280 N of buoyant force per person for the number of persons the lifeboat is permitted to accommodate.

3.5.4 Buoyant material, unless in addition to that required under 3.5.1 and 3.5.3, shall not be installed external to the hull of the lifeboat.

### 3.6 Freeboard and Stability

3.6.1 All lifeboats, when loaded with 50% of the number of persons the lifeboat is permitted to accommodate seated in their normal positions to one side of the centreline, 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 greater.

### 3.7 Propulsion

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

3.7.2 Every lifeboat engine shall be provided with

- a. a manual starting system or a power starting system with two independent rechargeable energy sources; and,
- b. any additional starting aids that may be required.

3.7.3 The engine starting systems and aids shall be capable of starting the engine at an ambient temperature of -30°C within 2 minutes of commencing the starting procedure unless, in the opinion of the Board having due regard to the particular voyages in which the ship carrying the lifeboat is constantly engaged a different temperature is appropriate.

3.7.4 The engine starting systems shall not be impeded by the engine casing, thwarts or any other obstructions.

3.7.5 The engine shall be capable of operating

- a. for not less than 5 minutes after starting from cold with the lifeboat out of the water; and
- b. when the lifeboat is flooded up to the centreline of the crankshaft.

- 3.7.6 The propeller shafting shall be so arranged that the propeller can be disengaged from the engine and have provision made for ahead and astern propulsion of the lifeboat.
- 3.7.7 The exhaust shall be so arranged as to prevent water from entering the engine during normal operation.
- 3.7.8 Every lifeboat shall be designed with due regard to the safety of persons in the water and to the possibility of damage to the propulsion system by floating debris.
- 3.7.9 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 at least 6 knots and at least 2 knots when towing a 50 person life raft loaded with its full complement of persons and equipment or its equivalent.
- 3.7.10 All lifeboats shall be provided with sufficient fuel, suitable for use throughout the temperature range expected in the area of operation, to run the fully loaded lifeboat at 6 knots for not less than 24 hours.
- 3.7.11 The lifeboat engine, transmission and engine accessories shall be enclosed in a fire-retardant casing or other suitable arrangement providing similar protection. Such arrangements shall also protect persons from coming into accidental contact with hot or moving parts and protect the engine from exposure to weather and sea.
- 3.7.12 Adequate means shall be provided to reduce engine noise.
- 3.7.13 Engine starter batteries, where applicable, shall be provided with casings which form a watertight enclosure around the bottom and sides. The casings shall have a tight fitting top which provides for necessary gas venting.
- 3.7.14 The lifeboat engine and accessories shall be designed to limit electromagnetic emissions so that engine operation does not interfere with the operation of radio life saving appliances used in the lifeboat.
- 3.7.15 Means shall be provided for recharging all engine starting, radio and searchlight batteries while the engine is operating and from the ships power supply at a supply voltage not exceeding 55 volt which can be disconnected at the lifeboat embarkation station.

- 3.7.16 Radio batteries shall not be used to provide power for engine starting.
- 3.7.17 Water-resistant instructions shall be provided for starting and operating the lifeboat engine shall be mounted in a conspicuous place near the engine starting controls.
- 3.8 Fittings
- 3.8.1 Every lifeboat shall be provided with at least one drain valve fitted near the lowest point in the hull, which shall
- a. open automatically to drain water from the hull when not waterborne;
  - b. close automatically to prevent entry of water when waterborne;
- 3.8.2 Each drain shall be
- a. provided with cap or plug to close the valve which shall be securely attached to the lifeboat by a lanyard, chain, or other suitable means;
  - b. readily accessible from inside; and,
  - c. clearly indicated as to its position.
- 3.8.3 Every lifeboat shall be provided with a rudder and tiller.
- 3.8.4 When a wheel or other remote steering mechanism is also provided, the tiller shall be capable of controlling the rudder in case of failure of the steering mechanism.
- 3.8.5 The rudder shall be permanently attached to the lifeboat and the tiller shall be permanently installed on, or linked to, the rudder stock; however, if the lifeboat has a remote steering mechanism, the tiller may be removable and securely stowed near the rudder stock.
- 3.8.6 The rudder and tiller shall be arranged so as not to be damaged by the operation of the lifeboat release mechanism or the propeller.
- 3.8.7 A buoyant lifeline shall be becketed around the outside of the lifeboat, except in the vicinity of the rudder and propeller.

- 3.8.8 Lifeboats which are not self-righting when capsized, shall have suitable handholds on the underside of the hull to enable persons to cling to the lifeboat. The handholds shall be fastened to the lifeboat in such a way that, when subjected to an impact sufficient to cause them to break away, they break away without causing damage to the lifeboat.
- 3.8.9 Every lifeboat shall be fitted with sufficient watertight lockers or compartments to provide for the storage of the small items of equipment, water and provisions.
- 3.8.10 Means shall be provided for the collection and storage of rainwater.
- 3.8.11 Every lifeboat to be launched by a fall or falls shall be fitted with a release mechanism complying with the following requirements:
- a. the mechanism shall be so arranged that all hooks are released simultaneously;
  - b. the mechanism shall have two release capabilities as follows
    - (i) a manual release which will release the lifeboat when waterborne or when there is no load on the hooks;
    - (ii) an "on-load" release capability which will release the lifeboat with a load on the hooks and be so arranged as to release the lifeboat under any conditions of loading from no-load with the lifeboat waterborne to a load of 1.1 times the loaded mass of the lifeboat when loaded with its complement of persons and equipment. This release capability shall be adequately protected against accidental or premature use.
  - c. the release control shall be clearly marked in a colour that contrasts with its surroundings; and,
  - d. the release mechanism shall be designed with a safety factor of 6 based on the ultimate strength of the materials used, assuming the mass of the lifeboat is equally distributed between the falls.
- 3.8.12 Every lifeboat shall be fitted with a means to enable the forward painter to be released when under tension.

- 3.8.13 Every lifeboat shall be provided with a permanently installed earth connection and arrangements for adequately siting and securing in the operating position the antenna provided with the portable radio apparatus.
- 3.8.14 Lifeboats intended for launching down the side of a ship shall have skates or fenders as necessary to facilitate launching and prevent damage.
- 3.8.15 A manually controlled lamp visible on a dark night with a clear atmosphere at a distance of at least 2 miles for a period of not less than 12 hours shall be fitted to the top of the cover of closure. If the light is designed to flash it shall initially flash at a rate of not less than 50 flashes per minute over the first 2 hours of operation of the 12 hour operating period.
- 3.8.16 Every lifeboat shall have fitted on the inside a lamp or source of light to provide illumination for not less than 12 hours to enable reading of survival and equipment instructions; however, oil lamps shall not be permitted for this purpose.
- 3.8.17 Every lifeboat shall, unless expressly provided otherwise, be provided with effective means of bailing or be automatically self-bailing.
- 3.8.18 Every lifeboat shall be constructed and fitted so that an adequate view, forward, aft, and to both sides is provided from the control and steering position for safe launching and manoeuvring.
- 3.9 Equipment
- 3.9.1 All items of the lifeboat equipment, whether required by this section or elsewhere in this standard, with the exception of boat-hooks which shall be kept free for fending off purposes, shall be secured within the lifeboat by lashings, stored in lockers or compartments, stored in brackets or other similar mounting arrangements or other suitable means.
- 3.9.2 The equipment shall be secured in such a manner as not to interfere with any abandonment procedure.
- 3.9.3 All items of the lifeboat equipment shall be as small and of as little mass as possible and shall be packed in a suitable and compact form.
- 3.9.4 The normal equipment, unless otherwise stated, shall consist of;

- (i) sufficient oars to make headway in calm seas, thole pins, crutches or equivalent arrangements attached to the boat by lanyards or chains shall be provided for each oar,
- (ii) two boat hooks,
- (iii) a buoyant bailer and two buckets,
- (iv) a survival manual,
- (v) a binnacle containing an efficient compass which is luminous or provided with a suitable means of illumination. In a totally enclosed lifeboat, the binnacle shall be permanently fitted at the steering position; in any other lifeboat, it shall be provided with suitable mounting arrangements,
- (vi) a sea anchor of adequate size fitted with a shock resistant hawser and tripping line which provides a firm hand grip when wet. The strength of the sea anchor, hawser and tripping line shall be adequate for all sea conditions,
- (vii) two painters, manila or other suitable line, having a diameter of not less than 255 mm diameter and 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 greater. One painter shall be attached to the release device at the forward end of the boat, and the other painter shall be firmly secured at or near the bow of the boat ready for use,
- (viii) two hatchets, one at each end of the boat,
- (ix) rustproof, watertight container or individually sealed units containing a total of 3 litres of fresh water for each person the lifeboat is permitted to accommodate, of which 1 litre per person may be replaced by an approved desalting apparatus capable of producing an equal amount of fresh water in 2 days,
- (x) a rustproof dipper with lanyard, for the purpose of drawing water from the bunghole of a fresh water container, but this item may be waived in cases where the construction of the containers renders it unnecessary,

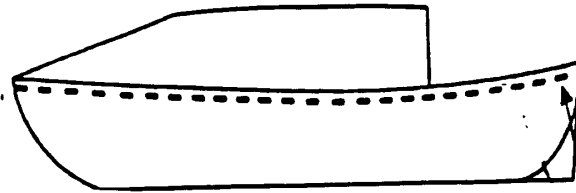
- (xi) a rustproof graduated drinking vessel, marked at 30, 45 and 60 ml levels,
- (xii) an approved food ration totalling not less than 10,000 kJ for each person the lifeboat is permitted to accommodate in airtight packaging and stowed in a watertight container,
- (xiii) 4 rocket parachute flares,
- (xiv) 6 hand flares,
- (xv) 2 buoyant smoke signals,
- (xvi) one waterproof electric torch suitable for Morse signalling together with one spare set of batteries and one spare bulb, in a waterproof container,
- (xvii) one daylight signalling mirror with instructions in both English and French for its use in signalling to ships and aircraft,
- (xviii) one copy of lifesaving signals in both English and French on a waterproof card or in a waterproof container,
- (xix) one whistle or equivalent sound signal,
- (xx) a first aid kit,
- (xxi) 6 doses of anti-seasickness medicine and one sea-sickness bag for each person,
- (xxii) a buoyant safety knife,
- (xxiii) 3 safety openers suitable for opening water and rations supplies,
- (xxiv) two buoyant rescue quoits attached to buoyant lines each not less than 30 m long,
- (xxv) a manual pump,
- (xxvi) one set of fishing tackle,

- (xxvii) sufficient tools to undertake minor adjustments to the engine and its accessories,
- (xxviii) portable fire extinguishing equipment suitable for extinguishing oil fires,
- (xxix) a searchlight capable of effectively illuminating a light coloured object at night having a width of 18m, at a distance of 180m for a total period of 6 hours and of working for not less than 3 hours continuously,
- (xxx) an efficient radar reflector or radar transponder, and
- (xxxi) thermal protective aids for 10% of the number of persons the boat is permitted to accommodate or 2, whichever is the greater.

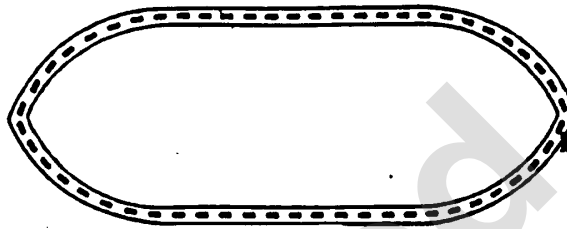
### 3.10 Markings

- 3.10.1 The lifeboat shall be marked in clear permanent letters showing the dimensions, persons which it is permitted to accommodate, approval number, and serial number.
- 3.10.2 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, of not less than 100 mm in height.
- 3.10.3 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.
- 3.10.4 Every lifeboat shall have affixed to it retro-reflective tape that complies with CGSB standards 62-GP-11 for the type prescribed therein with the highest level of reflectivity, and 62-GP-12 for all rigid and flexible surfaces, as amended from time to time,
- 3.10.5 Retro-reflective material shall be arranged as shown in the following diagrams

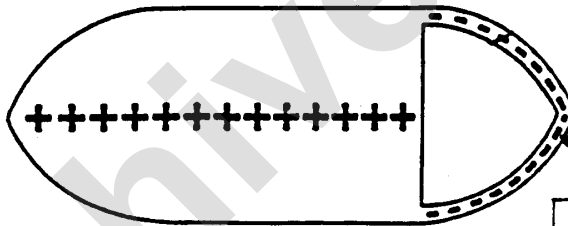
SIDE  
VUE LATERALE



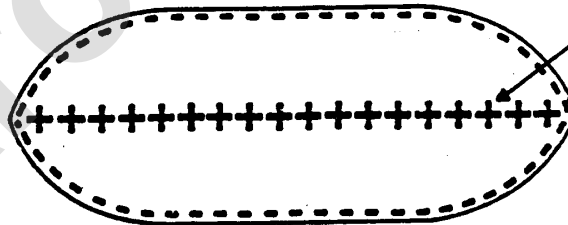
OPEN BOAT  
EMBARCATION NON PONTEE



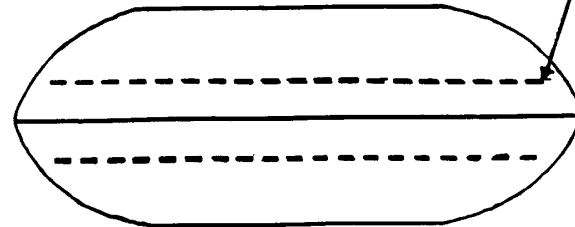
WITH CANOPY  
EMBARCATION AVEC TENDELET



ENCLOSED BOAT (RIGID TOP)  
EMBARCATION FERMEE (CAPOT RIGIDE)



NON-SELF RIGHTING BOAT (BOTTOM)  
BATEAU NON AUTO-REDRESSABLE (FOND)



Retro-Reflective tape  
Ruban rétro-réfléchissant

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#### 4. PARTIALLY ENCLOSED LIFEBOATS

4.1 Partially enclosed lifeboats shall comply with the requirements of section 3 and in addition shall comply with the requirements of this section.

4.2.1 Every partially enclosed lifeboat shall be

- a. provided with permanently attached rigid covers extending over not less than 20% of the length from the stem and not less than 20% of the length from the aftermost part of the lifeboat; and,
- b. fitted with a permanently attached foldable canopy which together with the rigid covers completely encloses the occupants of the lifeboat in a weatherproof shelter and provides protection from exposure.

4.2.2 The canopy required under 4.2.1(b) shall be so arranged

- a. that it is provided with adequate rigid sections or battens to permit erection;
- b. that it can be easily erected by not more than 2 persons;
- c. that it is insulated to protect the occupants against heat and cold by means of not less than 2 layers of material separated by an air gap or other equally efficient means, with provision to prevent accumulation of water in the air gap as applicable;
- d. that the exterior of the rigid cover and canopy, and the interior of that part of the lifeboat covered by the canopy, is of a highly visible colour;
- e. that it has entrances at both ends and on each side, provided with efficient adjustable closing arrangements which can be easily and quickly opened and closed from the inside or outside so as to permit ventilation, but exclude seawater, wind and cold;
- f. that means shall be provided for holding the entrances securely in the open and closed positions;
- g. that with the entrances closed, it admits sufficient air for the occupants at all times;
- h. that it has means for the collection of rainwater; and,

- (i) that the occupants can escape in the event of the lifeboat capsizing.

## 5. SELF-RIGHTING PARTIALLY ENCLOSED LIFEBOATS

### 5.1 General Requirements

- 5.1.1 Self-righting partially enclosed lifeboats shall comply with the requirements of section 3, and in addition shall comply with the requirements of this section.

### 5.2 Enclosure

- 5.2.1 Every self righting partially enclosed lifeboat shall be provided with permanently attached rigid covers extending over not less than 20% of the length from the stem and not less than 20% of the length from the aftermost part of the lifeboat.

- 5.2.2 The rigid covers required under 5.2.1 shall form two shelters which shall
  - a. if they have bulkheads, have openings of sufficient size to permit easy access by persons, each wearing an immersion suit; and,
  - b. be of sufficient interior height to permit persons easy access to their seats in the bow or stern of the lifeboat.

- 5.2.3 The rigid covers shall be so arranged that they include windows or translucent panels to admit sufficient daylight to the inside of the lifeboat with the openings and canopies closed so as to make artificial light unnecessary.

- 5.2.4 The rigid covers shall have railings attached to the outside of them to provide a secure handhold for persons moving about the exterior of the lifeboat.

- 5.2.5 Open parts of the lifeboat shall be fitted with a permanently attached folding canopy so arranged that it can be easily erected by not more than 2 persons in not more than 2 minutes and insulated to protect the occupants against heat and cold by means of not less than 2 layers of material separated by an air gap or other equally efficient means.

- 5.2.6 The enclosure formed by the rigid cover and canopy shall be so arranged
  - a. as to allow launching and recovery operations to be performed without any occupant having to leave the enclosure;

- b. that it has entrances at both ends and on each side, provided with efficient adjustable closing arrangements which can be easily and quickly opened and closed from the inside or outside so as to permit ventilation, but exclude seawater, wind and cold;
- c. means shall be provided for holding the entrances securely in the open and closed positions;
- d. that with the canopy erected and with the entrances closed, sufficient air is admitted for the occupants at all times;
- e. it has means for the collection of rainwater;
- f. that the exterior of the rigid covers and canopy and the interior of that part of the lifeboat covered by the canopy is of a highly visible colour. The interior of the shelters shall be of a colour which does not cause discomfort to the occupants; and
- g. that it is possible to row the lifeboat.

### 5.3 Capsizing and Re-righting

#### 5.3.1 A safety belt shall

- a. be fitted at each indicated seating position; and
- b. be so designed as to hold a person of a mass of 100 kg securely in place when the lifeboat is in a capsized position.

5.3.2 The stability of the lifeboat shall be such that it is inherently or automatically self-righting when loaded with its full or partial complement of persons and equipment and all entrances and openings are closed watertight, and the persons are secured with safety belts.

5.3.3 The lifeboat shall, in the event of capsizing, automatically attain a position that will provide an above water escape for its occupants.

5.3.4 The design of the engine exhaust pipes, air ducts, and other openings shall be such that water is excluded from the engine when the lifeboat capsizes and re-rights.

5.3.5 The lifeboat shall be automatically self-bailing.

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## 5.4 Propulsion

- 5.4.1 The lifeboat engine and transmission be controlled from the helmsman position.
- 5.4.2 The engine and engine installation shall be capable of running in any position during capsizing, and continue to run after the lifeboat returns to the upright, or, shall automatically stop on capsizing and be easily re-started after the lifeboat has returned to the upright and the water has been drained from the lifeboat.
- 5.4.3 The design of the lifeboat engine and lubricating systems shall prevent the loss of fuel and the loss of more than 250 ml of lubricating oil from the engine during capsizing.
- 5.4.4 Air-cooled lifeboat engines shall have a duct system to take in cooling air and exhaust it to the outside of the lifeboat, and manually operated dampers shall be provided to enable cooling air to be taken in from, and exhausted to the interior of the lifeboat.

## 5.5 Construction and Fendering

- 5.5.1 In addition to the requirements of section 3.2.7 a self-righting partially enclosed lifeboat shall be so constructed and fendered as to ensure that the lifeboat renders protection against harmful accelerations resulting from an impact of the lifeboat, when loaded with its full complement of persons and equipment, against the ship's side at an impact velocity of not less than 3.5 meters per second.

## 6 TOTALLY ENCLOSED LIFEBOATS

### 6.1 General Requirements

- 6.1.1 Totally enclosed lifeboats shall comply with the requirements of section 3 of this standard, and in addition shall comply with the requirements of this section.

### 6.2 Enclosure

- 6.2.1 Every totally enclosed lifeboat shall be provided with a rigid watertight enclosure which totally encloses the lifeboat.

6.2.2 The lifeboat enclosure shall be constructed and fitted so that

- a. it protects the occupants against heat and cold;
- b. access into the lifeboat is provided by hatches which can be closed to make the lifeboat watertight;
- c. hatches are positioned so as to allow launching and recovery operations to be performed without any occupants having to leave the enclosure;
- d. access hatches are capable of being opened and closed from both inside and outside and are equipped with a means to hold them securely in the open position;
- e. it is possible to row the lifeboat;
- f. it is capable, when the lifeboat is in the capsized position with the hatches closed and without significant leakage, of supporting the entire mass of the lifeboat, including all equipment, machinery and its full complement of persons;
- g. it includes windows or translucent panels on both sides, which admit sufficient daylight to the inside of the lifeboat with the hatches closed, to make artificial light unnecessary;
- h. its exterior is of a highly visible colour and its interior of a colour which does not cause discomfort to the occupants;
- i. handrails provide a secure handhold for persons moving about the exterior of the lifeboat, and aid embarkation and disembarkation;
- j. persons have access to their seats from an entrance without having to climb over thwarts or other obstructions; and,
- k. the occupants are protected from the effects of dangerous sub-atmospheric pressures which might be created by the lifeboat's engine.

6.3 Propulsion

- 6.3.1 The lifeboat engine and transmission be controlled from the helmsman position.

- 6.3.2 The engine and engine installation shall be capable of running in any position during capsize, and continue to run after the lifeboat returns to the upright, or, shall automatically stop on capsizing and be easily re-started after the lifeboat has returned to the upright and the water has been drained from the lifeboat.
- 6.3.3 The design of the lifeboat engine and lubricating systems shall prevent the loss of fuel and the loss of more than 250 ml of lubricating oil from the engine during capsize.
- 6.3.4 Air-cooled lifeboat engines shall have a duct system to take in cooling air and exhaust it to the outside of the lifeboat, and manually operated dampers shall be provided to enable cooling air to be taken in from, and exhausted to the interior of the lifeboat.
- 6.3.5 All exhaust systems shall, if applicable, be wrapped with non-absorbent lagging and be lead in such away as to reduce the risk of bilge water from coming into contact with the exhaust piping.
- 6.3.6 Any paint used on an engine, manifold and exhaust shall not give off any fumes when heated.
- 6.4 Construction and Fendering
- 6.4.1 In addition to the requirements of section 3.2.7 a totally enclosed lifeboat shall be so constructed and fendered as to ensure that the lifeboat renders protection against harmful accelerations resulting from an impact of the lifeboat, when loaded with its full complement of persons and equipment, against the ship's side at an impact velocity of not less than 3.5 m/s.
- 6.5 Free-fall lifeboats
- 6.5.1 A free-fall lifeboat shall be totally enclosed.
- 6.5.2 A lifeboat arranged for free-fall launching shall be so constructed that it is capable of rendering protection against harmful accelerations resulting from being launched when loaded with its complement and equipment, from at least the maximum height at which it is designed to be stowed above the waterline with the ship in the lightest seagoing condition, under unfavourable conditions of trim of up to 10° and with the ship listed not less than 20° either way.

- 6.5.3 Free-fall acceleration levels measured on the lifeboat structure at seat height for any person on board shall not exceed those limits as set out in part II, section 18 of this standard.

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## 7. SELF CONTAINED AIR SUPPORT SYSTEMS

- 7.1 In addition to complying with the requirements of section 3 and 6 all lifeboats fitted with air support systems shall comply with this section.
- 7.1.1 The self-contained air support system shall be so arranged that when proceeding with all entrances and openings closed, the air within the lifeboat remains safe and breathable and the engine runs normally for a period of not less than 10 minutes.
- 7.1.2 During the period described in 7.1.1 the atmospheric pressure inside the lifeboat shall never fall below the outside atmospheric pressure, nor shall it exceed it by more than 20 mb.
- 7.1.3 The self-contained air support system shall have provided visual indicators to indicate the pressure of the air supply within the system at all times.

## 8. FIRE PROTECTION

### 8.1 General Requirements

- 8.1.1 In addition to complying with sections 3, 6 and 7 fire protected lifeboats shall comply with this section.
- 8.1.2 The lifeboat, when waterborne shall be capable of protecting the number of persons it is permitted to accommodate, when subjected to a continuous oil fire that envelops the lifeboat for a period of not less than 8 minutes.

### 8.2 Water spray system

- 8.2.1 A lifeboat that has fitted a water spray system shall comply with the following
- (a) water for the system shall be drawn from the sea by a self-priming motor pump, and it shall be possible to turn "on" and turn "off" the flow of water over the exterior of the lifeboat;
  - (b) the sea water intake shall be so arranged as to prevent the intake of flammable liquids from the sea surface; and,
  - (c) the system shall be arranged to allow flushing with fresh water, and complete draining.

## PART II

## TESTING REQUIREMENTS

### 1. MATERIAL FIRE RETARDANCY TEST

1.1 GRP laminates shall be tested to determine the fire-retarding characteristics using the following method;

1.1.1 Three test specimens, each approximately 152 mm long by 13 mm wide shall be tested in a drought free atmosphere. Each specimen shall be marked by scribing a line 25 mm from one end. The other end shall be clamped in a support so that the longitudinal axis of the specimen is horizontal and the transverse axis inclined at 45° to the horizontal. Under the test specimen there shall be clamped a piece of clean wire gauze (18 meshes per 25 mm of linear inch) about 127 mm square in a horizontal position 61/2 mm below the edge of the specimen and with about 13 mm of the specimen extending beyond the edge of the gauze.

1.1.2 A bunsen burner (11 mm minimum outside diameter) with a luminous flame 13 mm to 19 mm in height shall be placed under the free end of the specimen. At the end of 30 seconds, the bunsen flame shall be removed and the specimen allowed to burn.

1.1.3 If the flame on the specimen is extinguished before reaching the 25 mm mark, the burner shall again be placed under the free end for a second period of 30 seconds immediately following the extinction of the first flame.

1.1.4 If the flame is again extinguished before reaching the 25 mm mark on each of the three test specimens, the laminate from which the specimens have been cut shall be regarded as self-extinguishing.

### 2. BUOYANCY TEST

2.1 Where inherently buoyant material is required, that material shall be subjected to the tests as prescribed in **Annex I and II**.

2.2 In addition to the tests required under 2.1., specimens of the buoyant material shall each be immersed for a period of 14 days under a 100 mm head of

a. two specimens in crude oil;

- b. two specimens in fuel oil;
- c. two specimens in diesel oil;
- d. two specimens in high octane petroleum spirit; and
- e. two specimens in kerosene.

2.3 All tests required under 2.2 shall be undertaken at normal room temperature (+18° to +22°C) and with sample specimens as supplied.

2.4 The dimensions of all specimens of buoyancy material tested shall be recorded prior to and upon completion of the tests.

2.5 The reduction of buoyancy shall not exceed 5 % and the specimens shall show no signs of damage such as shrinking, swelling, cracking, dissolution or change in mechanical qualities.

### 3. LAUNCHING TEST

3.1 It shall be demonstrated that the fully equipped lifeboat, loaded with a properly distributed mass equal to the mass of the number of persons for which it is to be approved, can be launched from a ship proceeding ahead at a speed of not less than 5 knots in calm water and on even keel.

3.2 There shall be no damage to the lifeboat or its equipment as a result of this test.

### 4. OVERLOAD TEST

#### 4.1 Davit launched lifeboat

4.1.1 The unloaded lifeboat shall be placed on blocks, or suspended from lifting hooks corresponding to davit falls, and sights erected for recording hull deflections. The measurements required in 4.1.7 shall then be made.

4.1.2 The lifeboat shall then be loaded with properly distributed weights to represent the fully equipped lifeboat loaded with the full complement of persons for which it is to be approved. The measurements required in 4.1.7 shall then be made.

- 4.1.3 Additional weights shall then be added so that the suspended load is 25%, 50%, 75% 100% greater than the weight of the full equipped and loaded lifeboat. However, in case of metal boats, the testing should stop at 25% overload. Measurements as require in 4.1.7 shall be taken at each increment of overload.
- 4.1.4 Weights shall be distributed within the lifeboat to represent the loading of the lifeboat in its service condition as far as is practicable. The weights representing persons need not be placed 300 mm above the seats to represent the centre of gravity of the seated person.
- 4.1.5 Parts of the machinery may be removed in order to prevent damage to them and weights should be added to the lifeboat to correspond and compensate for the removal of such machinery parts.
- 4.1.6 Testing by filling the lifeboat with water shall not be accepted.
- 4.1.7 The following are to be measured and recorded at each condition of load as specified in
- a. deflection of the keel, amidships;
  - b. change in the length as measured between the tops of the stem and stern posts;
  - c. change in the breadth over the gunwale at the quarter length forward, midships, and quarter length aft; and,
  - d. change in depth from gunwale to keel.
- 4.1.8 The keel deflections and change in breadth in 4.1.7 (a) and (c) shall not exceed 1/400th of the lifeboat's length when subjected to 25% overload; the results at 100% overload, if required, shall be approximately in proportion to those obtained at 25% overload.
- 4.1.9 Upon completion of the overload tests, all weights shall be removed from the lifeboat and the lifeboat dimensions measured. No significant residue deflection shall result and any permanent deflections as a result of the overload tests shall be recorded.

4.1.10 If the lifeboat is made of GRP, such measurement shall be taken after a lapse of time sufficient to permit the GRP to recover its original form (approximately 18 hrs).

#### 4.2 Free-fall lifeboats

4.2.1 It shall be demonstrated that the lifeboat has sufficient strength to withstand the forces acting upon it when a distributed mass equal to the mass of the number of persons for which it is to be approved and its equipment when free-fall launched from a height of 1.3 times the height for which it is to be approved.

4.2.2 If the lifeboat is normally ramp-launched, and a ramp is not available, this test may be conducted by dropping the lifeboat vertically with the keel at the same angle that normally occurs during water entry.

4.2.3 Upon completion, the lifeboat shall be unloaded, cleaned and carefully examined to detect the position and extent of damage that may have occurred.

4.2.4 An operational test shall then be conducted in accordance with section 11.1.

4.2.5 Upon completion, the lifeboat shall again be unloaded, cleaned and carefully examined for possible damage.

4.2.6 This test shall be considered successful if the lifeboat passes the operational test and there is no significant damage to it.

### 5. DAVIT LAUNCHED LIFEBOAT IMPACT AND DROP TEST

#### 5.1 Impact Test

5.1.1 A fully equipped lifeboat, including engine, shall be fully loaded with weights equal to the number of persons, each having a mass of 75 kg, it is permitted to accommodate and with skates or fenders, if required, in place.

5.1.2 The lifeboat shall be placed in a free hanging position, suspended by its davit lifting arrangements and shall be pulled laterally to a position so that, when released, it will strike a fixed rigid vertical surface at a velocity of 3.5 m/s.

5.1.3 The lifeboat shall be released to impact against the rigid vertical surface.

#### 5.1.4

In the case of self-righting partially enclosed and totally enclosed lifeboats, the acceleration forces shall be measured and evaluated in accordance with section 18 at different positions within the prototype lifeboat to determine the most severe occupant exposure to acceleration considering the effects of fenders, lifeboat elasticity, and seating arrangement.

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## 5.2 Drop Test

- 5.2.1 The drop test shall be conducted with the lifeboat that was used in the impact test.
- 5.2.2 The fully equipped lifeboat, with its engine, shall be loaded with weights equal to the mass of the maximum number of persons for which the lifeboat is to be approved.
- 5.2.3 The weights are to be distributed to represent the normal loading condition but need not be placed 300 mm above the seatpan.
- 5.2.4 The lifeboat shall be suspended above the water so that the distance from the lowest point of the lifeboat to the water is 3 m.
- 5.2.5 The lifeboat shall be released so that it falls freely into the water.

## 5.3 Operational test

- 5.3.1 After the impact and drop tests, the lifeboat shall be unloaded, cleaned and carefully examined to detect the position and extent of damage that may have occurred as a result of the tests.
- 5.3.2 An operational test shall then be conducted in accordance with section 11.1.

## 5.4 Acceptability criteria

- 5.4.1 The impact and drop tests shall be considered successful if:
  - a. no damage has been sustained that would affect the lifeboat's efficient function;
  - b. any damage that was caused by the impact and drop tests has not increased significantly as a result of the operational test;
  - c. machinery and other equipment has operated to full satisfaction;
  - d. no significant ingress of seawater has occurred; and

- e. accelerations measured during the impact and subsequent rebound, if applicable, are in compliance with the criteria of either section 18.3 or section 18.4 when using the emergency limits specified in table 2 or table 3, respectively.

## 6. FREE-FALL LIFEBOATS

### 6.1 Free-fall test

6.1.2 A free-fall lifeboat shall be launched from test heights at which it is intended to be stowed taking into account conditions of unfavourable list and trim, unfavourable locations of the centre of gravity, and extreme conditions of load.

6.1.3 During the free-fall launches, acceleration forces shall be measured and the data evaluated in accordance with section 18 at different locations in the lifeboat to determine the worst occupant exposure to acceleration taking into consideration the seating arrangement.

6.1.4 These tests may be conducted with scaled models that are at least 1 m in length. If models are used the following full-scale tests shall be conducted with the ship on an even keel using the same type of launching arrangement as the production lifeboat and from the height for which the lifeboat is to be approved;

- a. lifeboat fully loaded;
- b. lifeboat loaded with its required equipment and minimum launching crew only;
- c. lifeboat loaded with its required equipment and  $\frac{1}{2}$  of the full complement of persons seated in the forward half of the seating positions; and
- d. lifeboat loaded with its required equipment and  $\frac{1}{2}$  of the full complement of persons seated in the after half of the seating positions.

### 6.2 Acceptability criteria

6.2.1 The free fall tests shall be considered acceptable if;

- a. the acceleration forces are in compliance with the "Training" condition specified in tables 2 and 3 of section 18 during the launch, free-fall and subsequent water entry; and
- b. the lifeboat makes positive headway immediately after water entry.

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## 7. SEAT STRENGTH TEST

### 7.1 Davit launched lifeboats

7.1.1 The lifeboat seating shall be loaded with a mass of 100 kg, in each position allocated for a person to sit within the lifeboat.

7.1.2 It shall be demonstrated that each seating position can support this loading without any permanent damage or deformation.

### 7.2 Free-fall lifeboats

7.2.1 The seats experiencing the highest acceleration forces, and those seats which are supported in a manner different from the other seats in the lifeboat, shall be loaded with a mass of 100 kg. and arranged so that both the seatback and seatpan are affected.

7.2.2 The seating must be able to support the load during a free-fall launch from a height of 1.3 times the approved height without permanent deformation or damage.

## 8. CARRYING CAPACITY TEST

8.1 The lifeboat, fitted with its engine and require equipment, shall be capable of being boarded and properly with the total number of persons it is to be approved for having an average mass of 75 kg and wearing inherently buoyant immersion suits and any other essential equipment within 3 minutes in the case of lifeboats intended for cargo ships. In the case of lifeboats intended for passenger ships it shall be loaded as rapidly as possible with the complement wearing lifejackets.

8.2 It shall be demonstrated that the lifeboat can be manoeuvred and all equipment operated without difficulty and without interference with the occupants.

8.3 The surfaces on which persons might walk shall be visually examined to determine that they have non-skid finish.

## 9. FREEBOARD AND STABILITY TESTS

### 9.1 Flooded stability test

- 9.1.1 The lifeboat shall be loaded with its equipment. If provision lockers, water tanks and fuel tanks cannot be removed, they shall be flooded or filled to the final waterline resulting from this test. Lifeboats fitted with watertight storage compartments to accommodate individual drinking water containers shall have these containers on board and placed in the storage compartments which shall be sealed watertight during this test. The engine and any equipment which may be damaged by water may be substituted with ballast of equivalent weight and density.
- 9.1.2 Weights representing persons who would be in the water may be omitted. Weights representing person not in the water during this test shall be placed in the normal seating positions of such persons.
- 9.1.3 It shall be demonstrated that the lifeboat has positive stability in the water, when loaded as detailed above, filled with water to represent flooding which would occur when the lifeboat is holed in any one location below the waterline assuming no loss of buoyancy material and no other damage.
- 9.1.4 Several tests shall be conducted if it is shown that holes in different areas would create different flooding conditions.

### 9.2 Freeboard test

- 9.2.1 The life boat with its engine shall be loaded with a mass equal to that of all the equipment.
- 9.2.2 One half of the number of persons which the lifeboat is to accommodate, each having an average mass of 75 kg, shall be seated in a proper seating position on one side of the centreline.
- 9.2.3 The freeboard shall be measured on the low side of the lifeboat and it should not be less than 1.5 % of the lifeboats length or 100 mm, whichever is greater.

## 10. RELEASE MECHANISM TEST

### 10.1 Davit-launched lifeboats

- 10.1.1 A lifeboat, fitted with its engine, shall be suspended from its release mechanism just clear of the ground or water surface.
- 10.1.2 The lifeboat shall be loaded so that the total mass equals 1.1 times the mass of the lifeboat, all its equipment and the number of persons it is to accommodate, each having an average mass of 75 kg.
- 10.1.3 The lifeboat shall be released from each fall simultaneously without binding or damage to any part of the lifeboat or release mechanism.
- 10.1.4 It shall be confirmed that the lifeboat will release from the falls simultaneously when fully waterborne in both the light condition and in a 10% overload condition.
- 10.1.5 The release mechanism shall be mounted on a tensile strength testing device and an increasing load applied to at least 6 times the working load, without failure or release of the mechanism.
- 10.1.6 It shall be demonstrated that the release mechanism can release the fully equipped lifeboat when loaded with weights equal to the mass of the number of persons for which it is to be approved when the lifeboat is being towed at speeds up to 5 knots.
- 10.1.7 In lieu of a waterborne test, the follow is acceptable;
- a. A force equal to the force necessary to tow the lifeboat at a speed of 5 knots shall be applied to the hook in the lengthwise direction of the boat at an angle of 45° to the vertical. This force shall be applied in the forward and after direction, depending upon the design of the release hook;
  - b. A force equal to the safe working load of the hook shall be applied to the hook in the athwartships direction at an angle of 20° to the vertical. This force shall be conducted on both sides;
  - c. A force equal to the safe working load of the hook shall be applied to the hook in a direction half-way between the positions in a. and b. and within the ellipse segment formed by a. and b. This test shall be conducted in four positions.

## 10.2 Free-fall lifeboats

- 10.2.1 It shall be demonstrated that the free-fall release mechanism can operate when loaded with a force equal to at least 200% of the normal load caused by the fully equipped lifeboat including the total number of persons for which it is to be approved.
- 10.2.2 The release mechanism shall be mounted on a tensile strength testing device and an increasing load applied to at least 6 times the working load, without failure or release of the mechanism.

## 11. OPERATIONAL TEST

### 11.1 Operation of engine and fuel consumption test

- 11.1.1 The lifeboat, loaded with weights equal to the mass of its equipment and number of persons for which it is to be approved, shall be started and manoeuvred for a period of at least 4 hrs. to demonstrate satisfactory operation.
- 11.1.2 It shall be demonstrated that the lifeboat can tow two 25 person or one 50 person liferaft loaded with the number persons for which it is to be approved and its equipment at a speed of 2 knots.
- 11.1.3 The lifeboat shall be run at a speed of not less than 6 knots for a period which is sufficient to ascertain the fuel consumption, and to establish that the fuel tank has the required capacity.

### 11.2 Engine cold (-15°C) starting test.

- 11.2.1 The engine may be removed from the lifeboat for this test, however, it shall be equipped with all accessories, and the transmission that will be used in the lifeboat.
- 11.2.2 The engine, along with its fuel and coolant, shall be placed in a chamber and cooled to a temperature of -15°C, the engine shall remain in the cooled chamber until all parts of the engine have reached the temperature of the chamber.
- 11.2.3 The temperature of the fuel, engine oil, and cooling fluid, if any, shall be monitored prior to and during the tests. Samples of the fuel, engine oil, and cooling fluid, if any, shall be taken prior to the tests.
- 11.2.4 The engine shall be started and run three times as follows:

- a. the first two times, the engine shall be operated for a sufficient length of time to demonstrate that it runs at operating speed;
- b. the engine shall, after the first two starts, be allowed to stand until all parts have again reached the chamber temperature;
- c. the engine shall be restarted, and shall continue to run for a period of at least 10 minutes, during which period the transmission shall be operated through its gear positions.

### 11.3 Engine cold (-30°C) starting test.

11.3.1 The engine may be removed from the lifeboat for this test, however, it shall be equipped with all accessories, and the transmission that will be used in the rescue boat.

11.3.2 The engine, with its starting aids in operation (such as block heaters) along with its fuel and coolant, shall be placed in a chamber for not less than 24 hours and cooled to a temperature of -30°C.

11.3.3 The engine shall be started and run for a period of at least 10 minutes to demonstrate that it runs at operating speed during which period the transmission shall be operated through its gear positions.

### 11.4 Engine out of water test.

11.4.1 The engine shall be operated for a period of at least 5 minutes at idling speed under conditions simulating normal storage. The engine shall not be damaged as a result of this test.

### 11.5 Submerged engine test

11.5.1 The engine shall be operated for a period of at least 5 minutes, when submerged in water to the level of the crankshaft centreline with the engine in a horizontal position. The engine shall not be damaged as a result of this test.

### 11.6 Compass

11.6.1 It shall be demonstrated that the compass is not unduly affected by magnetic fittings and equipment in the lifeboat.

## 12. TOWING AND PAINTER RELEASE TEST

### 12.1 Towing test

12.1.1 It shall be demonstrated that the fully equipped lifeboat, loaded with weights equal to the mass of the number of persons for which it is to be approved, can be towed at a speed of not less than 5 knots in calm water and on even keel without resulting in damage to the lifeboat or its equipment.

### 12.2 Davit-launched lifeboat painter release test

12.2.1 It shall be demonstrated that the painter release mechanism can release the painter on a fully equipped and loaded lifeboat that is being towed at a speed of not less than 5 knots in calm water.

12.2.2 The painter release mechanism shall be tested with a fully equipped lifeboat loaded with full number of person for which it is to be approved in the directions specified in section 10.1.7 which are not obstructed by the canopy or other constructions in the lifeboat.

## 13. LIFEBOAT LIGHT TESTS

13.1 Twelve samples of the lifeboat exterior canopy light and twelve samples of the interior light shall be subjected to the temperature cycling test prescribed in **ANNEX I**, except if the same type of light is used for both the interior and exterior only twelve samples need be tested.

13.2 Upon completion of temperature cycling

- a. four lights shall be operated in seawater at a temperature of  $-1^{\circ}\text{C}$ ;
- b. four lights shall be operated in seawater at a temperature of  $+30^{\circ}\text{C}$ ;  
and,
- c. four lights operated in fresh water at a temperature of  $+18$  to  $20^{\circ}\text{C}$ .

13.3 The canopy exterior lights shall provide a luminous intensity sufficient to be visible at a distance of 2 miles on a dark night with a clear atmosphere for a period of not less than 12 hours.

- 13.4 The interior lights shall provide sufficient luminous intensity to read survival and equipment instructions for a period of not less than 12 hours.
- 13.5 In the case of a flashing light, the rate of flashing for the first 2 hours of the 12 hour operative period shall be not less than 50 flashes per minute.
- 13.6 This test may be dispensed with if a currently approved lighting system is being used.

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14. CANOPY ERECTION TEST

- 14.1 A lifeboat that is designed to be partially enclosed or self righting partially enclosed shall be loaded with the number of persons it is to accommodate.
- 14.2 If the lifeboat is partially enclosed, but not self righting, it shall be demonstrated that the lifeboat canopy can be easily erected by not more than two persons.
- 14.3 If the lifeboat is partially enclosed and self-righting, the canopy shall be erected by not more than two persons in not more than two minutes.

15. ADDITIONAL TESTS FOR SELF-RIGHTING PARTIALLY ENCLOSED AND TOTALLY ENCLOSED LIFEBOATS

15.1 Self-righting test

- 15.1.1 A suitable means capable of rotating the lifeboat about a fore and aft axis to any angle of the heel and then release it. The lifeboat in the enclosed mode, shall be incrementally rotated to angles of heel up to and including 180° and shall upon being released always return to the upright, without the assistance of the occupants. This test shall be conducted in the following conditions of load;
- a. when the lifeboat with its engine is loaded in the normal position with properly secured weights representing the fully equipped lifeboat with full complement of persons on board. A mass representing each person, having an average mass of 75 kg, shall be secured at each seating position, with its centre of gravity approximately 300 mm. above the seatpan so as to provide the same effect on stability as when the lifeboat is loaded with the number of persons which it will accommodate; and
  - b. when the life boat is in the light condition.
- 15.1.2 At the beginning of these tests, the engine shall be running in the neutral position and;
- a. unless arranged to stop automatically when inverted, the engine shall continue to run when inverted and for 30 min. after the lifeboat has returned to the upright position;

- b. if arranged to stop automatically when inverted, it shall be easily restarted (in the case of a self-righting partially enclosed lifeboat after the water has drained from the lifeboat) and run for 30 min. after the lifeboat has returned to the upright position.

## 15.2 Flooded capsizing test

- 15.2.1 The lifeboat shall be placed in water and fully flooded until it can not contain any addition water with all entrances shall be secured open.
- 15.2.2 Using a suitable means of rotating the lifeboat about a fore and aft axis to any angle of heel, the lifeboat shall be rotated to an angle of 180° and released.
- 15.2.3 When released the lifeboat shall attain a position that provides an above water escape for the occupants.
- 15.2.4 For this test, the lifeboat equipment or equivalent mass shall be secured in its normal operating position, the mass and distribution of the occupants may be disregarded.

## 15.3 Engine inversion test

- 15.3.1 The engine and its fuel tank shall be mounted on a rotatable frame, arranged to rotate about an axis equivalent to the fore and aft axis of the lifeboat. A pan shall be placed under the engine to collect any oil that may leak from the engine.
- 15.3.2 The following test procedure shall be followed:
  - a. start engine and run at full speed for 5 minutes;
  - b. stop engine and rotate through 360° in a clockwise direction;
  - c. restart engine and run at full speed for 10 minutes;
  - d. stop engine and rotate through 360° in an anticlockwise direction;
  - e. restart engine, run at full speed for 10 minutes and then shut down;
  - f. allow engine to cool;

- g. restart engine and run at full speed for 5 minutes;
- h. rotate running engine in a clockwise direction through 180°, hold at the 180° position for 10 seconds, and then rotate it a further 180° in a clockwise direction to complete one revolution;
- i. if the engine is arranged to stop automatically, restart engine;
- j. allow engine to continue to run at full speed for 10 minutes;
- k. stop engine and allow it to cool;
- l. repeat procedure in (g) through (k), except rotating the engine in an anticlockwise direction;
- m. restart the engine and run it at full speed for 5 minutes;
- n. rotate engine in a clockwise direction through 180° and stop the engine. Rotate it a further 180° to complete one revolution;
- o. restart engine and run at full speed for 10 minutes;
- p. repeat procedure under (n) rotating engine anticlockwise;
- q. restart engine and run at full speed for 10 minutes, then shut down the engine; and,
- r. dismantle the engine for examination.

15.3.3 During this test, the engine should not overheat, fail to operate, or, leak more than 250 ml of oil during any one inversion. When dismantled the engine should show no evidence of overheating or excessive wear.

#### 15.4 Engine Fumes

15.4.1 Engines fitted in totally enclosed lifeboats shall be run for at least 2 hours.

15.4.2 The atmosphere within the lifeboat shall be sampled to establish that noxious or nauseous fumes are not generated within the lifeboat.

#### 16. SELF-CONTAINED AIR SUPPORT SYSTEM TEST

- 16.1 All entrances and openings of the lifeboat shall be closed and the air supply to the inside of the lifeboat turned on.
- 16.2 The lifeboat engine shall be run at full speed for a period of 10 minutes, during which time the atmospheric pressure within the enclosed lifeboat shall be continuously monitored.
- 16.3 It shall be established that a small positive air pressure is maintained within the lifeboat, and that noxious gases cannot enter the lifeboat.
- 16.4 The internal air pressure shall never fall below the outside atmospheric pressure nor shall it exceed the outside atmospheric pressure by more than 20 mb during the test, even if the engine should stop.
- 16.5 It shall be demonstrated that when the air supply is depleted, automatic means are activated to prevent dangerously low pressure being developed within the lifeboat.
17. FIRE PROTECTED LIFEBOAT TEST
- 17.1 Fire test
- 17.1.1 The lifeboat to be tested shall be moored in the centre of an area which shall be not less than 5 times the maximum projected plan area of the lifeboat, with boundaries capable of completely retaining the fuel.
- 17.1.2 Kerosene shall be floated on the water, which when ignited, will sustain a fire which completely envelopes the lifeboat for a period of at least 8 minutes.
- 17.1.3 During this test, the lifeboat engine shall be run at full speed; however, the propeller need not be turning, and the gas and fire protective system shall be in operation throughout the test.
- 17.1.4 Temperatures within the lifeboat shall be recorded at not less than 10 locations on the inside surface and internally away from the inside surface at not less than 5 positions that would be taken by the occupants.
- 17.1.5 The maximum temperatures recorded are not to exceed;
- a. 60°C internally away from the inside surface; and

- b. 90°C at the inside surface.
- 17.1.6 The external temperature of the lifeboat and the temperature within the fire shall be recorded.
- 17.1.7 The atmosphere within the lifeboat shall be continuously sampled, and the representative samples analyzed for the presence and quantity of essential, toxic or injurious gases or substances.
- 17.1.8 The analyses must cover the range of anticipated gases or substances that may be produced and which can vary according to the materials and fabrication techniques used to manufacture the lifeboat.
- 17.1.9 The analysis must confirm that there is sufficient oxygen and no dangerous levels of toxic or injurious gases or substances.
- 17.1.10 The atmospheric pressure inside the lifeboat shall be continuously recorded to confirm that positive pressure is being maintained.
- 17.1.11 The condition of the lifeboat upon conclusion of this test shall be such that it can continue to be used in the fully loaded condition.
- 17.1.12 The Board may waive the fire test for any totally enclosed lifeboat which is
- a. identical in construction to another lifeboat which has successfully completed this test, provided the lifeboat differs only in size and retains essentially the same form;
  - b. the protective system shall be as effective as that of the tested lifeboat; and,
  - c. the water delivery rate and film thickness at the various locations around the hull and canopy shall be equal to or exceed the measurements made on the originally tested lifeboat.
- 17.2 Water spray test.
- 17.2.1 With the lifeboat engine running at its designed output, and with the spray pump operating, the R.P.M. of the engine and pump, and the pressure at the suction and delivery side of the pump, shall be measured to determine the rated valued of speed and water pressure.

- 17.2.2 With the lifeboat upright and on an even keel and with the spray pump running at its rated speed, the delivery of water and the thickness of the sprayed water film on the external surface of the lifeboat, shall be measured, and shall be to the satisfaction of the Board.
- 17.2.3 The lifeboat shall be successively trimmed 5° by the head and stern, and heeled 5° to port and starboard, during which conditions, with the spray pump running at its rated speed, measurements of the water pressure shall be taken at the suction and delivery side of the pump.
- 17.2.4 The water pressure under each condition of trim and heel shall be satisfactory, and the spraying condition observed shall be such that the spray film covers the whole surface of the lifeboat exterior.

## 18. MEASURING AND EVALUATING ACCELERATION FORCES

### 18.1 Selection, placement and mounting of accelerometers

- 18.1.1 The accelerometers shall comply with the following;
- a. the frequency response shall be 0 to 200 Hz;
  - b. have adequate capacity for the acceleration forces that will occur during the tests; and
  - c. have an accuracy of  $\pm 5\%$ .
- 18.1.2 The accelerometers shall be placed in the lifeboat, parallel to the principal axes of the lifeboat, at those locations necessary to determine the worst occupant exposure to acceleration.
- 18.1.3 Accelerometers shall be mounted on a rigid part of the interior of the lifeboat in a manner to minimize vibration and slipping.
- 18.1.4 There shall be sufficient number of accelerometers at each location to be measured so that all likely acceleration force can be measured.

### 18.2 Recording method and rate

- 18.2.1 Acceleration forces may be recorded on magnetic media as either an analog or a digital signal or on a paper plot.

18.2.2 Measurements shall have a sampling rate of at least 500 samples per second when recorded as a digital signal or when an analog signal is converted to a digital signal.

### 18.3 Evaluation with the dynamic response model

18.3.1 The dynamic response model is the preferred method in evaluating potential for the occupant in the lifeboat to be injured from the acceleration forces.

18.3.2 The parameters to be used in the analysis are shown in table 1 for each co-ordinate direction.

Table 1

PARAMETERS OF THE DYNAMIC RESPONSE MODEL

Co-ordinate axis	Natural frequency (rad/s)	Damping ratio
X	62.8	0.100
Y	58.0	0.090
Z	52.9	0.224

18.3.3 Before performing the dynamic response analysis, the measured accelerations must be orientated to the primary axes of the seat.

18.3.4 The desired outcome from the dynamic response analysis is the displacement time-history of the body mass relative to the seat support in each co-ordinate direction.

18.3.5 At all times the following expression shall be satisfied:

$$\sqrt{\left[\frac{dx}{S_x}\right]^2 + \left[\frac{dy}{S_y}\right]^2 + \left[\frac{dz}{S_z}\right]^2} \leq 1$$

where  $dx$ ,  $dy$  and  $dz$  are the concurrent relative displacements of body mass with respect to the seat support, in the  $x$ ,  $y$ , and  $z$  body axes, as computed from the dynamic response analysis and  $S_x$ ,  $S_y$ , and  $S_z$  are relative displacements which are presented in table 2 for the appropriate launch condition.

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Table 2

DISPLACEMENT LIMITS FOR LIFEBOAT

Acceleration direction	Displacement (Cm)	
	Training	Emergency
+ X --Eyeball in	6.96	8.71
- X --Eyeballs out	6.96	8.71
+ Y--Eyeballs right	4.09	4.95
- Y--Eyeballs left	4.09	4.95
+ Z--Eyeballs down	5.33	6.33
- Z--Eyeballs up	3.15	4.22

18.4 Evaluating using the SRSS method

18.4.1 In lieu of the proceeding procedure the follow may be used in determining the potential for an occupant in a lifeboat to become injured by an acceleration force.

18.4.2 Before performing the SRSS method, the measured accelerations must be orientated to the primary axes of the seat.

18.4.3 Full-scale acceleration data shall be filtered with no less than the equivalent of a 20 Hz low-pass filter.

18.4.4 Acceleration data measured on a model shall be filtered with a low-pass filter having a frequency not less than that obtained with the following expression:

$$f = \frac{20}{\sqrt{\frac{L}{LL}}}$$

where f is the frequency of the filter to be used, L is the length of the model lifeboat and LL is the length of the prototype lifeboat.

18.4.5 At all times the following expression shall be satisfied:

$$\sqrt{\left[\frac{gx}{Gx}\right]^2 + \left[\frac{gy}{Gy}\right]^2 + \left[\frac{gz}{Gz}\right]^2} \leq 1$$

where gx, gy and gz are the concurrent accelerations in the x, y. and z body axes and Gx, Gy, and Gz are allowable accelerations which are presented in table 3 for the appropriate launch condition.

Table 3

SRSS ACCELERATION LIMITS FOR LIFEBOAT

Acceleration direction	Displacement (G)	
	Training	Emergency
+ X --Eyeball in	15.0	18.0
- X --Eyeballs out	15.0	18.0
+ Y--Eyeballs right	7.0	7.0
- Y--Eyeballs left	7.0	7.0
+ Z--Eyeballs down	7.0	7.0
- Z--Eyeballs up	7.0	7.0

## **PART III**

## **PRODUCTION REQUIREMENTS**

### 1. PRODUCTION AND INSTALLATION TESTS

#### 1.1 General requirements

1.1.1 A surveyor may make random inspections of manufacturers premises to ensure that the quality of life saving appliances and the materials used comply with the specification of the approved prototype life saving appliance.

1.1.2 Manufacturers shall be required to institute a quality control procedure to ensure that life saving appliances are produced to the same standard as the prototype appliance approved by the Board, and to keep records of any production tests carried out in accordance with the Board's instructions. In the case of GRP constructions, this quality control procedure shall include;

- a. a complete ultrasonic tests to determine that the laminate is in accordance with specifications;
- b. a Barcol test;
- c. plug thickness test; and
- d. a burn test

1.1.3 Where proper operation of life saving appliances depend on their correct installation in ships, the Board shall require installation tests to ensure that the appliances have been correctly fitted in a ship.

#### 1.2 Load test

1.2.1 Each new lifeboat shall, when installed on a ship be loaded to 1.1 times its rated load, and suspended from its release mechanism, and released with the load on the release mechanism.

1.2.2 It shall be confirmed that the lifeboat will release when fully waterborne in the light condition and in a 10% overload condition.

#### 1.3 Seating test

1.3.1 A lifeboat, complete with its engine and equipment, shall be suspended or placed in an attitude to represent its embarkation position.

- 1.3.2 The complement, all wearing inherently buoyant immersion suits, and any other essential equipment required, shall
- a. if the lifeboat is intended for a cargo, board the lifeboat and be properly seated within a period of 3 minutes; and,
  - b. if the lifeboat is intended for a passenger ship, board the lifeboat and be properly seated as soon as possible.
- 1.3.3 When boarded, the lifeboat shall be placed in the water, manoeuvred, and all equipment on board tested to demonstrate that it can be operated without difficulty or interference with the occupants.
- 1.4 Engine Fumes
- 1.4.1 Engines fitted in totally enclosed lifeboats shall be run for at least 2 hours.
- 1.4.2 The atmosphere within the lifeboat shall be sampled to establish that noxious or nauseous fumes are not generated within the lifeboat.

## **PART IV**

## **APPROVAL REQUIREMENTS**

### **1. APPROVAL PROCEDURE**

- 1.1 The Approval Authority shall not consider approval of a lifeboat until the manufacturer has submitted
- a. all relevant plans, drawings and specifications for the lifeboat;
  - b. repair and production quality control manuals; and,
  - c. details of all components to be used in the construction and repaired of the lifeboat.
- 1.2 The Approval Authority shall not approve a lifeboat until the manufacturer has subjected a prototype lifeboat to all applicable tests as prescribed in this standard, and it is satisfied with the submissions required under 1.1, that all applicable tests have been successfully completed, and that provisions have been made for inspection and testing of production line lifeboats is to its satisfaction.
- 1.3 Following testing, two copies of the test reports shall be forwarded to the Approval Authority for its consideration.
- 1.4 The Approval Authority shall review the test reports, and, if the contents indicate compliance with the requirements of this standard, approval will be granted.
- 1.5 The Approval granted is valid only for the lifeboat identified thereon, and only when such lifeboat is manufactured in accordance with the relevant requirements of this standard and the approval certificate.
- 1.6 Any Modification to an existing approved lifeboat shall be submitted to the Approval Authority for its consideration, and shall be tested in accordance with the requirements of this standard, as applicable.
- 1.7 The Tests required by Part II of this Standard shall be conducted at
- a. an independent testing establishment recognized by the Board;
  - b. a manufacturers premises in the presence of an Inspector; or

- c. any combination of (a) or (b) as applicable.
- 1.8 Prior to subjecting a prototype lifeboat to the tests required in Part II, a manufacturer shall submit to the Approval Authority three sets of detailed plans or drawings and, details of all components to be used in the construction and repair of the lifeboat.
- 1.9 Upon inspection of the submitted plans, drawings and details, one set shall be notated and returned to the manufacturer.
- 1.10 Upon notification from the Approval Authority the manufacturer shall arrange to have a prototype lifeboat tested in accordance with the requirements of this Standard.
- 1.11 The manufacturer shall advise the Approval Authority, in advance, of the test dates in order that an Inspector can be present.
2. RECORDS
- 2.1 Manufacturers are required to maintain records relating to the quality control and production tests carried out in accordance with this standard.
- 2.2 Record shall include
- a. details of material purchases and usage;
  - b. date when production commenced and terminated, if production is not continuous;
  - c. test records of all components used in the production process;
  - d. test records of all prototype tests; and,
  - e. detailed descriptions of any failures.
- 2.3 Manufacturers shall retain the records for a period of at least 120 months, unless otherwise required by the Board.
- 2.4 The records shall be available for inspection by, or submission to, the approval authority upon request.

## ANNEX I

### TEMPERATURE CYCLING TEST

- I.1 Six specimens shall be alternately subjected for 8 hours to surrounding temperatures of  $-30^{\circ}\text{C}$  and  $+65^{\circ}\text{C}$ .
- I.2 These alternating cycles need not follow immediately after each other and the following procedure, repeated a total of 10 cycles.
- (a) an 8 hour cycle at  $+65^{\circ}\text{C}$  to be completed in one day;
  - (b) the specimens then removed from the warm chamber that same day and left exposed under ordinary room conditions until the next day;
  - (c) an 8 hour cycle at  $-30^{\circ}\text{C}$  to be completed the next day; and
  - (d) the specimens removed from the cold chamber that same day and left exposed under ordinary room conditions until the next day.
- I.3 Ordinary room temperatures is taken to be between  $+18$  to  $+22^{\circ}\text{C}$ .
- I.4 The dimensions of the specimens shall be recorded at the end of the 10 cycle period. The specimens are to be carefully examined and shall not show any sign of external change of structure or of mechanical qualities.
- I.5 Two of the specimens are to be cut open and there shall be no sign of change to the internal structure.
- I.6 Four of the specimens shall be used for the water absorption tests (Annex II), two of which shall be so tested after they have also been subjected to the high octane petroleum spirit in Part II, section 1.1.2 (d).

## ANNEX I I

### WATER ABSORPTION TEST

- II.1 The water absorption test shall be carried out in fresh water.
- II.2 Specimens shall be immersed for a period of 7 days under a 1.25 m head of water.
- II.3 The tests shall be carried out
- (a) on two specimens as received;
  - (b) on two specimens which have been subjected to the temperature cycling test (ANNEX I); and,
  - (c) on two specimens which have been subjected to the temperature cycling test (ANNEX I) followed by the high octane petroleum spirit.
- II.4 The specimens shall be at least 300mm square and be of the same thickness as used in the lifeboat. The dimensions shall be recorded at the beginning and end of these tests.
- II.5 The results must state the mass in kilograms which each specimen could support out of the water after one and seven days immersion. The reduction of buoyancy shall not exceed 16% for specimens which have been exposed to the high octane spirit and must not exceed 10% for all other specimens.
- II.6 The specimens shall show no signs of damage such as shrinking, swelling, cracking, dissolution or change in mechanical qualities.