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TP 7322 E

# **STANDARDS FOR RESCUE BOATS**

**MARINE SAFETY DIRECTORATE  
TRANSPORT CANADA  
OTTAWA**

**Canada**



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## PART A

## OPERATIONAL REQUIREMENTS

### 1. SCOPE

- 1.1 Rescue boats 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 rescue boats intends to make a modification to an approved rescue boat, the manufacturer shall submit an application for approval as if such modified rescue boat was a new design, and shall submit such modified rescue boat to all tests as the Board considers necessary.
- 1.3 Every prototype rescue boat shall comply with the requirements of this standard.
- 1.4 Every production line rescue boat shall be manufactured in accordance with the approved plans and materials.
- 1.5 Notwithstanding any requirements of these Standards, the Board may allow alternative constructional features or fittings, providing the Board is satisfied that such constructional feature or fittings are equivalent to the requirements of these Standards.

### 2. DEFINITIONS

- 2.1 Anti-exposure work suit means a suit complying with the requirements of CGSB-65.21.
- 2.2 Approval Authority means the Department of Transport, Board of Steamship Inspection (the Board).
- 2.3 CGSB means the Canadian General Standards Board.
- 2.4 Complement means the number of persons as determined by the Board that a rescue boat is certified to carry.
- 2.5 Immersion suit means an inherently buoyant suit complying with the requirements of CGSB-65.16.
- 2.6 Inspection Authority means the Ship Safety Branch of the Canadian Coast Guard.

- 2.7 Inflated Rescue Boat means a rescue boat the buoyancy and shape of which result solely from its being inflated;
- 2.8 Inspector means a Steamship Inspector appointed pursuant to Section 301 of the Canada Shipping Act.
- 2.9 Person means a person having a mass of 75 kgs.
- 2.10 Rescue boat is a boat designed to rescue persons in distress and to marshal survival craft.
- 2.11 Rigid Rescue Boat means a rescue boat the structure of which is not normally deformable, but which may include an inflatable or solid flotation collar.
- 2.12 Thermal protective aid is a bag or suit made of waterproof material with low thermal conductivity.

3. GENERAL REQUIREMENTS - ALL RESCUE BOATS

- 3.1 Rescue boats shall be either rigid or inflated
- (a) not less than 3.8 m and not more than 8.5 m in length;
  - (b) capable of carrying not less than five seated persons and one person lying down; and,
  - (c) constructed of steel, aluminum, fibrous glass reinforced plastics (FRP), or any other materials provided that they are equivalent or superior to the specified materials in physical properties and durability in a marine environment.
- 3.2 The rescue boat shall be provided with a bow cover for not less than 15% of its length.
- 3.3 In cases where an enclosure or canopy is fitted the vertical distance between such covers over 50% of the floor area shall be
- (a) not less than 1.3 m for a rescue boat permitted to accommodate nine persons or less;

- (b) not less than 1.7 m for a rescue boat permitted to accommodate twenty-four 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 rescue boat permitted to accommodate between nine and twenty-four.

#### 4 MANOEUVRABILITY AND TOWING

- 4.1 Every rescue boat shall be of sufficient strength to enable it to be safely lowered into the water when loaded with its full complement of persons and equipment and to be capable of being launched and towed when the ship is making headway at a speed of 5 knots in calm water.
- 4.2 Arrangements for towing shall be permanently fitted in the rescue boat and shall be sufficiently strong to marshall or tow life rafts.
- 4.3 The towing arrangements referred to in 4.2 and means of connection shall have a safety factor of 6:1.
- 4.4 Every rescue boat shall be fitted with a release device to enable the forward painter to be released when under tension.
- 4.5 Every rescue boat shall be capable of towing a fully loaded 50 person life raft or two 25 person life rafts at a speed of at least two knots.

#### 5. STABILITY

- 5.1 Every rescue boat shall be of such form and proportions that it shall have ample stability in a seaway and sufficient freeboard when loaded with its full complement of persons and equipment.
- 5.2 Every rescue boat in a flooded condition shall be capable of maintaining positive stability when in an upright position in calm water and loaded with its full complement of persons and equipment.

#### 6. CARRYING CAPACITY

- 6.1 Seating in rescue boats shall be provided by any of the following means thwarts, benches, fixed chairs or on the deck spaces as to maintain positive stability.

- 6.2 Each seating position in a rescue boat shall be clearly indicated and be capable of supporting a weight of 100 kg.
- 6.3. The complement of a rescue boat shall be equal to the number of persons, all wearing immersion or anti-exposure work suits that can be seated in a normal position without interfering with the means of propulsion or the operation of any of the rescue boat's equipment.

## 7. ACCESS

- 7.1 On passenger ships every rescue boat shall be so arranged that it can be rapidly boarded by its complement.
- 7.2 On cargo ships every rescue boat shall be so arranged that it can be boarded by its complement in not more than three minutes from the time the instruction to board is given.
- 7.3 Rapid disembarkation from rescue boats shall also be possible.
- 7.4 Every rescue boat shall have a portable boarding ladder or other means of boarding that can be used on either side of the rescue boat to enable persons in the water to board.
- 7.5 The lowest part of the ladder or other means of boarding referred to in 7.4 shall be not less than 0.4 m below the rescue boat's light waterline.
- 7.6 The rescue boat shall be constructed and fitted so that helpless people can be brought on board either from the sea or on stretchers.
- 7.7 All surfaces on which persons might normally walk shall have a non-skid finish.

## 8. FITTINGS

- 8.1 All rescue boats shall be provided with means to drain water from the inside of the rescue boat when it is not waterborne and such means shall prevent the entry of water when the boat is waterborne.
- 8.2 Each drain valve shall be provided with a cap or plug to close the valve, which shall be attached to the rescue boat.
- 8.3 Drain valves shall be readily accessible from inside the boat and their position shall be clearly indicated.

- 8.4 Every rescue boat shall be provided with effective means of bailing or be automatically self-bailing.
- 8.5 All rescue boats shall be provided with suitable means of steering to the satisfaction of the Board.
- 8.6 When a wheel or other remote steering mechanism is provided, a tiller or other suitable means capable of controlling the rudder in case of failure of the steering mechanism shall be provided.
- 8.7 Where a rudder is provided it shall be permanently attached to the rescue boat.
- 8.8 Except in the vicinity of the rudder and propeller, a buoyant lifeline shall be becketed around the outside of the rescue boat.
- 8.9 Every rescue boat shall be fitted with a launching release mechanism complying with the following requirements:
- (a) the mechanism shall be controlled from a single point and be capable of releasing all hooks simultaneously;
  - (b) except as provided in paragraph (c), the mechanism shall be of a type which will only release the rescue boat when it is waterborne or when the rescue boat is attached to the release mechanism and is being towed through the water;
  - (c) in the event of winch failure or damage of the launching arrangements which prevents lowering of the rescue boat to the water, the mechanism shall be capable of releasing the rescue boat; this release capability shall be adequately protected against accidental or premature use;
  - (d) the release control shall be clearly marked in a colour that contrasts with the surroundings;
  - (e) the mechanism shall be capable of releasing the rescue boat under any conditions of loading from no-load with the rescue boat waterborne to a load of 1.1 times the total mass of the rescue boat loaded with its full complement of persons and equipment; and

- (f) the mechanism shall be designed with a factor of safety of six on the ultimate strength of the materials used, assuming the mass of the rescue boat is equally distributed between the bridles, lifting hooks or other suitable launching means.

8.10 A rescue boat shall have skates or fenders to facilitate launching and prevent damage to the rescue boat.

## 9. PROPULSION

9.1 A rescue boat shall be fitted with an inboard engine or outboard motor to the satisfaction of the Board.

9.2 No engine shall be used for any rescue boat if its fuel has a flash point of 43°C or less (closed cup test) except as prescribed in 9.9.

9.3 An inboard engine shall comply with the following requirements;

- (a) it shall be a compression ignition type;
- (b) the engine shall be provided with either
  - (i) a manual starting system; or,
  - (ii) a starting system with two independent power sources;
- (c) the engine starting arrangements shall start the engine at an ambient air temperature of -30°C, utilizing starting aids if necessary, and at an ambient air temperature of -15°C without starting aids within two minutes of commencing the engine start procedure;
- (d) the power start arrangement shall be equipped with a rechargeable energy source;
- (e) the starting arrangement shall not be impeded by the engine casing, thwarts or other obstructions;
- (f) the engine shall be capable of operating for not less than 5 minutes after starting from cold with the boat out of the water;
- (g) the engine shall be capable of operating when the boat is flooded up to centreline of the crank shaft;

- (h) the propeller shafting shall be so arranged that the propeller can be disengaged from the engine;
- (i) the exhaust pipe shall be so arranged as to prevent water from entering the engine in normal operation;
- (j) provisions shall be made for ahead and astern propulsion of the rescue boat;
- (k) the engine shall operate under conditions of at least 20° list and 10° trim;
- (l) the engine circulating pumps shall be self priming;
- (m) the engine shall be efficiently ventilated;
- (n) the engine, transmission and engine accessories shall be
  - (i) enclosed in a fire-retarding casing or other suitable arrangements providing similar protection
  - (ii) arranged to protect persons from coming into contact with hot or moving parts; and
  - (iii) protected from exposure to the elements.

9.4 Starter batteries shall be provided with casings which form a watertight enclosure around the bottom and sides of the fitting top which provides for necessary gas venting.

9.5 Means shall be provided for recharging all engine starting and searchlight batteries.

9.6 Means shall be provided for recharging rescue boat batteries by

- (a) ship's power supply at a voltage not exceeding 55v; or,
- (b) a Ground Fault Interruption system.

9.7 All rescue boats 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.

- 9.8 A rescue boat shall be capable of:
- (a) when proceeding ahead and loaded with its full complement and equipment and with all engine powered auxiliary equipment in operation at a speed of at least 6 knots;
  - (b) manoeuvring at any speed up to 6 knots; and
  - (c) of operating at its maximum speed for a period of at least 4 hours.
- 9.9 Notwithstanding 9.2, gasoline driven outboard motors with an approved fuel system may be fitted in rescue boats provided the fuel tanks are specially protected against fire and explosion to the satisfaction of the Board.
- 9.10 An outboard motor shall be capable of starting at an ambient temperature of -15°C.
- 9.11 Where an outboard motor is provided, spare fuel may be carried in suitable containers.
- 9.12 Water resistant instructions printed in both English and French for starting and operating the propulsion system shall be provided and mounted in a conspicuous place near the engine starting controls.
10. MARKINGS
- 10.1 The dimensions of a rescue boat shall be marked on it in clear permanent characters.
- 10.2 The name and port of registry of the ship to which the rescue boat belongs shall be marked in permanent characters not less than 100 mm in height on each side of the rescue boat's bow.
- 10.3 Means of identifying the ship to which the rescue boat belongs and the number of the rescue boat shall be marked in such a way that they are visible from above.
- 10.4 A rescue boat shall be marked with a manufacturing serial number, the maker's name or trademark and the date of manufacture.
- 10.5 All instructions shall be in both English and French.

- 10.6 Where indelible markings are made on an inflated boat, the marking material shall not contain ingredients harmful to the boat's fabric.
- 10.7 Complete details of all markings shall be included in the submission of the specifications.
- 10.8 Every rescue boat 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.
- 10.9 Retro-reflective material shall be arranged as shown in the following diagrams



## 11. RIGID RESCUE BOATS - ADDITIONAL REQUIREMENTS

- 11.1 The hulls of rigid rescue boats shall be constructed with fire retarding or non-combustible material to the satisfaction of the Board.
- 11.2 Every rigid rescue boat shall have inherent buoyancy or shall be fitted with inherently buoyant material sufficient to float the rigid rescue boat, loaded with all its equipment when flooded and open to the sea.
- 11.3 Notwithstanding the requirements of section 11.2 every rigid rescue boat shall be provided with inherently buoyant material equal to 280 N of buoyant force per person for the number of persons the rescue boat is permitted to carry.
- 11.4 Inherent buoyant material, unless in addition to that required in sections 11.2 and 11.3 shall not be installed externally to the hull of the rescue boat.
- 11.5 The inherently buoyant material referred to in sections 11.2 and 11.3 shall meet the test requirements for such material as prescribed in Part B, section 2.
- 11.6 Every rigid rescue boat shall of sufficient strength to withstand a load, without residual deflection on removal of that load:
- (a) in the case of rigid rescue boats with metal hulls, 1.25 times the total mass of the boat when loaded with its full complement of persons and equipment; or
  - (b) in the case of other rigid rescue boats, twice the total mass of the rescue boat when loaded with its full complement of persons and equipment.
- 11.7 Every rigid rescue boat, when loaded with one half of the number of persons it is certificated 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 rescue boat may become flooded, of not less than 1.5% of its length and in no case less than 100 mm.
- 11.8 A rigid rescue boat may be fitted with a foam filled or inflated collar which shall
- (a) be subdivided into not less than three separate compartments, one on each side and one around the bow area;

- (b) be such that if any one compartment is damaged the boat will maintain positive stability when fully loaded;
- (c) in the case of inflated collars, comply with the requirements for inflated boats as applicable; and,
- (d) in the case of foam filled collars, the foam shall be of a non-granulating type that complies with the water absorption test (Annex II).

## 12. INFLATED RESCUE BOATS ADDITIONAL REQUIREMENTS

12.1 Every inflated rescue boat shall be:

- (a) of sufficient strength to withstand a load of 2 times the mass of the rescue boat, its full complement of persons and equipment at an ambient temperature of between 18 to 22°C with all relief valves inoperative;
- (b) provided with rubbing strips
  - (i) underneath the bottom of the boat; and
  - (ii) on vulnerable places on the outside of the buoyancy tubes;
- (c) provided with becketed lifelines inside and outside the boat;
- (d) provided with suitable patches or adequate arrangements for securing the painters for and aft and the becketed lifelines; and,
- (e) provided with suitable towing connections that have a safety factor of 6:1.

12.2 Every fully equipped inflated rescue boat shall have positive freeboard everywhere when loaded with its full complement of persons crowded to one side with half of this complement seated on the buoyancy tube and then to one end.

12.3 The transom fitted in an inflated rescue boat shall not be inset by more than 20% of its overall length.

- 12.4 A rigid flooring shall be fitted to provide a firm deck which will protect the keel and fabric forming the bottom of the boat.
- 12.5 The main buoyancy tubes shall be divided into at least two compartments along each side and one compartment in the bow, making a minimum total of five air-tight compartments such that each compartment shall not exceed 40% of the total tube capacity.
- 12.6 In boats or more than one tube the volume of either tube shall not exceed 60% of the total volume.
- 12.7 The buoyancy tubes shall be so arranged that in the event of any one of the compartments being damaged, the intact compartments shall be able to support the complement of the rescue boat seated in their normal positions with positive freeboard over the rescue boat's entire periphery.
- 12.8 The buoyancy tubes forming the boundary of the inflated rescue boat shall on inflation provide a volume of not less than  $0.17 \text{ m}^3$  for each person the boat is certified to accommodate.
- 12.9 Every inflated rescue boat shall have
- (a) a non-return valve fitted to each buoyancy tube to allow the boat to be inflated by hand and valves which enable the boat to be inflated by compressed air or gas may also be fitted; and
  - (b) valves which permit both these operations may be fitted.
- 12.10 A safety relief valve, designed to allow gas or air to escape should the pressure exceed that which would be safe for tubes to carry, shall be fitted to each buoyancy tube.
- 12.11 The safety relief valve shall reseal at a pressure that will give satisfactory rigidity to the buoyancy tube.
- 12.12 Means of inflating shall be fitted to each buoyancy tube and be arranged to prevent accidental deflation.
- 12.13 The gas used for inflation shall be non-inflammable and non-toxic.
- 12.14 Details of the construction, position and method of securing the inflation and deflation system to each buoyancy tube shall be submitted to the approval authority.

- 12.15 All cordage, webbing and thread used in the construction of an inflated rescue boat or in the makeup of fittings or equipment, shall be
- (a) specified in detail in the specifications submitted to the Board for approval; and
  - (b) either inherently rotproof or rotproofed by a process approved by the Board.
- 12.16 All cordage shall be attached to the boat in such a manner that if the cordage is accidentally detached, the buoyancy tubes will not be damaged.
- 12.17 Full details of the proposed method of joining panels of the fabric of which an inflated rescue boat is to be constructed shall be submitted to the Approval Authority.
- 12.18 If an adhesive solution is to be employed in joining panels of the fabric of which an inflated rescue boat is to be constructed, a full description including composition, directions for storage, mixing, application and tests to be applied shall be submitted to the approval Authority.
- 12.19 The external sight edges of traverse seams shall face aft and the external sight edges of longitudinal seams shall face inboard.
- 12.20 All exposed seams shall be taped externally.

### 13. RESCUE BOAT EQUIPMENT

- 13.1 All items of rescue boat equipment, with the exception of boat hooks which shall be kept free for fending off purposes, shall be secured within the rescue boat by lashings, storage in weathertight lockers or compartments, storage in brackets or mounting arrangements, or other suitable means.
- 13.2 Equipment shall be secured in such a manner so as not to interfere with any launching or recovery procedures.
- 13.3 All items of rescue boat equipment shall be as small and of as little mass as possible and shall be packed in suitable and compact form.
- 13.4 The normal equipment of every rescue boat shall consist of:
- (a) sufficient buoyant oars or paddles to make headway in calm seas;

- (b) thole pins, crutches or equivalent arrangements shall be provided for each oar; the thole pins or crutches shall be attached to the boat by lanyards or chains;
- (c) a buoyant bailer;
- (d) a binnacle containing an efficient compass which is luminous or provided with suitable means of illumination;
- (e) a sea anchor with a line of adequate strength not less than 10 m in length;
- (f) a painter of sufficient length and strength, arranged for quick release and placed at the forward end of the rescue boat;
- (g) one buoyant line, not less than 50 m in length, of sufficient strength to tow a fully loaded 50 person life raft;
- (h) one waterproof electric torch suitable for Morse signalling, together with one spare set of batteries and one spare bulb in a waterproof container;
- (i) one whistle or equivalent sound signal;
- (j) a first aid kit in a watertight case;
- (k) two buoyant rescue quoits, attached to not less than 30 m of buoyant heaving line each;
- (l) a searchlight provided with an approved source of illumination which is capable of providing effective illumination of a light coloured object at night having a width of 18 m at a distance of 180 m for a total period of 6 hours and capable of working for not less than 3 hours continuously; and
- (m) thermal protective aids sufficient for not less than 10 per cent of the number of persons the rescue boat is certified to carry or two, whichever is the greater number.

13.5 In addition to the equipment required by section 13.4 the equipment of every rigid rescue boat shall include

- (a) a boat hook;
- (b) a bucket; and
- (c) a knife or hatchet.

13.6 In addition to the equipment required by section 13.4 the equipment of every inflated rescue boat shall include

- (a) a buoyant safety knife;
- (b) two sponges;
- (c) an efficient manually operated bellows or pump;
- (d) a repair kit in a suitable container for repairing punctures; and
- (e) a safety boat hook.

## PART B

## TESTS - ALL RESCUE BOATS

### 1. IMPACT AND DROP TEST

#### 1.1 Impact test

1.1.1 A fully equipped rescue boat, 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.

1.1.2 The rescue boat 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.

1.1.3 The rescue boat shall be released to impact against the rigid vertical surface.

1.1.4 In the case of self-righting partially enclosed and totally enclosed rescue boats, the acceleration forces shall be measured and evaluated in accordance with Part F of this standard at different positions within the prototype rescue boat to determine the most severe occupant exposure to acceleration considering the effects of fenders, rescue boat elasticity, and seating arrangement.

#### 1.2 Drop test

1.2.1 A drop test shall be conducted on all rescue boats in accordance with Part C or D, as applicable, with the same rescue boat as which was used in the impact test.

#### 1.3 Acceptability criteria

1.3.1 Upon completion of the impact and drop test, the rescue boat 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.

1.3.2 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 Part F, either section 3 or section 4, when using the emergency limits specified in table 2 or table 3, respectively.

## 2. SEAT STRENGTH TEST

- 2.1 The rescue boat seating shall be loaded with a mass of 100 kg, in each position allocated for a person to sit within the rescue boat.
- 2.2 It shall be demonstrated that each seating position can support this loading without any permanent damage or deformation.

## 3. RELEASE MECHANISM TEST

- 3.1 A rescue boat, fitted with its engine, shall be suspended from its release mechanism just clear of the ground or water surface.
- 3.1.2 The rescue boat shall be loaded so that the total mass equals 1.1 times the mass of the rescue boat, all its equipment and the number of persons it is to accommodate, each having an average mass of 75 kg.
- 3.1.3 The rescue boat shall be released from each fall simultaneously without binding or damage to any part of the rescue boat or release mechanism.
- 3.1.4 It shall be confirmed that the rescue boat will release from the falls simultaneously when fully waterborne in both the light condition and in a 10% overload condition.
- 3.1.5 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.

3.1.6 It shall be demonstrated that the release mechanism can release the fully equipped rescue boat when loaded with weights equal to the mass of the number of persons for which it is to be approved when the rescue boat is being towed at speeds up to 5 knots.

3.2 In lieu of a waterborne test, the follow is acceptable;

- a. A force equal to the force necessary to tow the rescue boat 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.

#### 4. OPERATIONAL TEST

4.1 Operation of engine and fuel consumption test

4.1.1 The rescue boat, 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 hours to demonstrate satisfactory operation.

4.1.2 It shall be demonstrated that the rescue boat can tow two 25 person or one 50 person life rafts loaded with the number persons for which it is to be approved and its equipment at a speed of 2 knots.

4.1.3 The rescue boat 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.

4.2 Engine cold (-15°C) starting test.

- 4.2.1 The engine may be removed from the rescue boat for this test, however, it shall be equipped with all accessories, and the transmission that will be used in the rescue boat.
- 4.2.2 The engine, along with its fuel and coolant, shall be placed in a chamber and cooled to a temperature of  $-15^{\circ}\text{C}$ , the engine shall remain in the cooled chamber until all parts of the engine have reached the temperature of the chamber.
- 4.2.3 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.
- 4.2.4 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.
- 4.3 Engine cold ( $-30^{\circ}\text{C}$ ) starting test.
- 4.3.1 The engine may be removed from the rescue boat for this test, however, it shall be equipped with all accessories, and the transmission that will be used in the rescue boat.
- 4.3.2 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  $-30^{\circ}\text{C}$ .
- 4.3.3 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.
- 4.4 Engine out of water test

- 4.4.1 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.

#### 4.5 Submerged engine test

- 4.5.1 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.

#### 4.6 Compass

- 4.6.1 It shall be demonstrated that the compass is not unduly affected by magnetic fittings and equipment in the rescue boat.

### 5. RESCUE BOAT LIGHT TESTS

- 5.1 Twelve samples of the rescue boat exterior canopy light and twelve samples of the interior light shall be subjected to the temperature cycling test prescribed in **ANNEX 1**, except if the same type of light is used for both the interior and exterior only twelve samples need be tested.

#### 5.2 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  $20^{\circ}\text{C}$ .

- 5.3 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.

- 5.4 The interior lights shall provide sufficient luminous intensity to read survival and equipment instructions for a period of not less than 12 hours.

- 5.5 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.

- 5.6 This test may be dispensed with if a currently approved lighting system is being used.

## 6. CARRYING CAPACITY TEST

- 6.1 The rescue boat shall be fitted with its engine and all its equipment. The number of persons for which it is to be approved, having an average mass of at least 75 kg. and all wearing immersion or anti-exposure work suits and any other essential equipment required shall then board; one person shall lie down and the others shall be properly seated in the craft.
- 6.2 It shall be demonstrated that the rescue boat can be manoeuvred and all equipment operated without difficulty and without interference with the occupants.
- 6.3 The rigid surfaces, if any, on which persons might walk shall be visually examined to determine that they have non-skid finish.

## 7. TOWING AND PAINTER RELEASE TEST

### 7.1 Towing test

- 7.1.1 It shall be demonstrated that the fully equipped rescue boat, 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 rescue boat or its equipment.

### 7.2 Painter release test

- 7.2.1 It shall be demonstrated that the painter release mechanism can release the painter on a fully equipped and loaded rescue boat that is being towed at a speed of not less than 5 knots in calm water.
- 7.2.2 The painter release mechanism shall be tested with a fully equipped rescue boat loaded with full number of person for which it is to be approved in the directions specified in section 3.2 which are not obstructed by the canopy or other constructions in the rescue boat.

## PART C

## ADDITIONAL TESTING - RIGID RESCUE BOATS

### 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 6 1/2 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.

### 2. BUOYANCY MATERIAL 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. DROP TEST

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

### 4. LAUNCHING TEST

- 4.1 It shall be demonstrated that the fully equipped rigid rescue boat, 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.
- 4.2 There shall be no damage to the rigid rescue boat or its equipment as a result of this test.

## 5. OVERLOAD TEST

- 5.1 The unloaded rigid rescue boat 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 5.7 shall then be made.
- 5.2 The rigid rescue boat shall then be loaded with properly distributed weights to represent the fully equipped rigid rescue boat loaded with the full complement of persons for which it is to be approved. The measurements required in 5.7 shall then be made.
- 5.3 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 rigid rescue boat. However, in case of metal boats, the testing should stop at 25% overload. Measurements as require in 5.7 shall be taken at each increment of overload.
- 5.4 Weights shall be distributed within the rigid rescue boat to represent the loading of the rigid rescue boat 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.
- 5.5 Parts of the machinery may be removed in order to prevent damage to them and weights should be added to the rigid rescue boat to correspond and compensate for the removal of such machinery parts.
- 5.6 Testing by filling the rigid rescue boat with water shall not be accepted.
- 5.7 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.

- 5.8 The keel deflections and change in breadth in 5.7 (a) and (c) shall not exceed 1/400th of the rigid rescue boat'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.
- 5.9 Upon completion of the overload tests, all weights shall be removed from the rigid rescue boat and the boats dimensions measured. No significant residue deflection shall result and any permanent deflections as a result of the overload tests shall be recorded.
- 5.10 If the rigid rescue boat is made of GRP, such measurement shall be taken after a lapse of time sufficient to permit the GRP to recover its original form (approx. 18 hrs).

## 6. FLOODED STABILITY TEST

- 6.1 The rigid rescue boat 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. Rigid rescue boats 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.
- 6.2 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.
- 6.3 It shall be demonstrated that the rigid rescue boat has positive stability in the water, when loaded as detailed above, filled with water to represent flooding which would occur when the rigid rescue boat is holed in any one location below the waterline assuming no loss of buoyancy material and no other damage.
- 6.4 Several tests shall be conducted if it is shown that holes in different areas would create different flooding conditions.

## 7. FREEBOARD TEST

- 7.1 The life boat with its engine shall be loaded with a mass equal to that of all the equipment.

7.2 One half of the number of persons which the rigid rescue boat 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.

7.3 The freeboard shall be measured on the low side of the rigid rescue boat and it should not be less than 1.5 % of the rigid rescue boats length or 100 mm, whichever is greater.

## 8. LOAD TEST

8.1 The freeboard of the rescue boat shall be taken when it is loaded with all its equipment, engine and fuel, and the number of persons it is to accommodate, each having an average mass of 75 kg., or with an equivalent mass positioned to represent engine and fuel, and persons.

8.2 The minimum freeboard shall not be less than 300mm at the sides, and not less than 250mm at the lowest point of the transom.

## PART D

## ADDITIONAL TESTING - INFLATED RESCUE BOATS

### 1. DROP TEST

- 1.1 The inflated rescue boat complete with all its equipment and with a mass equivalent to its engine and fuel in the position of its engine and fuel tank shall be dropped three (3) times from a height of at least 3 metres on to the water. The drops shall be from the 45° bow-down, level-trim and 45° stern-down attitudes.
- 1.2 On completion of these drop tests the inflated rescue boat and its equipment shall be examined and show no signs of damage which would affect their efficient functioning.

### 2. LOADING TEST

- 2.1 The freeboard of the inflated rescue boat shall be taken in the following conditions of loading;
- a. inflated rescue boat with all its equipment;
  - b. inflated rescue boat with all its equipment, engine and fuel or an equivalent mass positioned to represent engine and fuel;
  - c. inflated rescue boat with all its equipment and the number of persons for which it is to be approved having a mass of 75 kg so arranged that a uniform freeboard is achieved at the side buoyancy tubes; and
  - d. inflated rescue boat with all its equipment and the number of persons for which it is to be approved having a mass of 75 kg and engine and fuel or an equivalent mass positioned to represent engine and fuel and the inflated rescue boat being retrimmed as necessary.
- 2.2 With the inflated rescue boat in any of the conditions prescribed in 2.1, the minimum freeboard shall not be less than 300 mm at the buoyancy tubes and not less than 250 mm from the lowest part of the transom.

### 3. STABILITY TEST

- 3.1 The following tests shall be carried out with the engine and fuel or an equivalent mass in place of the engine and fuel tanks, all persons shall wear immersion or anti-exposure work suits and the inflated rescue boat may be floating in still water:
- a. the total number of persons for which the inflated rescue boat is to be approved shall be crowded to one side with half this complement seated on the buoyancy tube, and then to one end. In each case the freeboard shall be recorded. Under these conditions the freeboard shall be everywhere positive; and
  - b. the stability of the inflated rescue boat during boarding shall be ascertained by two persons in the inflated rescue boat demonstrating that they can readily assist, from the water, a third person who is required to feign unconsciousness. The third person shall have his back towards the side of the inflated rescue boat so that he cannot assist the rescuers.

### 4. DAMAGE TEST

- 4.1 The following tests shall be carried out with the inflated rescue boat loaded with the number of persons for which it is to be approved both with and without engine and fuel or an equivalent mass in the position of the engine and fuel tank:
- a. with forward buoyancy compartment deflated;
  - b. with the entire buoyancy on one side of the inflated rescue boat deflated; and
  - c. with the entire buoyancy on one side and the bow compartment deflated.
- 4.2 In each of the conditions prescribed by 4.1, the full number of persons for which the inflated rescue boat is to be approved shall be supported within the inflated rescue boat.

## 5. MANOEUVRABILITY TEST

- 5.1 It shall be demonstrated that the inflated rescue boat can be propelled and manoeuvred by its oars or paddles in calm water conditions at a speed of at least 0.5 knots over a distance of at least 25 metres, when laden with the number of persons, all wearing immersion or anti-exposure work suits, for which it is to be approved.
- 5.2 Speed and manoeuvring trials shall be carried out with engines of various powers to assess the inflated rescue boat's performance.

## 6. RIGHTING TEST

- 6.1 It shall be demonstrated that both with and without engine and fuel or an equivalent mass in the position of the engine and fuel tank, the inflated rescue boat is capable of being righted by not more than two persons if it is inverted on the water.

## 7. SIMULATED HEAVY WEATHER TEST

- 7.1 To simulate use in heavy weather the inflated rescue boat shall be fitted with a larger powered engine than is intended to be fitted and driven hard in a wind of force 4 or 5 or equivalent rough water for at least 30 minutes.
- 7.2 The inflated rescue boat shall not show undue flexing or permanent strain nor have lost more than minimal pressure as a result of this test.

## 8. SWAMP TEST

- 8.1 It shall be demonstrated that the inflated rescue boat, when fully swamped, is capable of supporting its full equipment, the number of persons for which it is to be approved and a mass equivalent to its engine and fuel.
- 8.2 The inflated rescue boat shall also demonstrate that while in this condition it does not seriously deform.

## 9. OVERLOAD TEST

- 9.1 The inflated rescue boat shall be loaded with four (4) times the mass of the full complement of persons and equipment for which it is to be approved and suspended from its bridle at an ambient temperature of  $+20 \pm 30^{\circ}\text{C}$  with all relief valves inoperative.

- 9.2 The inflated rescue boat and bridle shall be examined after the test and shall not show any signs of damage.
- 9.3 The inflated rescue boat after six (6) hours conditioning at a temperature of -30°C shall be loaded with 1.1 times the mass of the full complement of persons and equipment for which it is to be approved and suspended from its bridle with all relief valves inoperative.
- 9.4 The inflated rescue boat and bridle shall be examined after the test and shall not show any signs of damage.

10. MATERIAL TEST

- 10.1 The material used in the construction of the buoyancy tubes shall be tested in accordance with section 3 of the standard, "Material Specifications for Coated Fabric Used in Inflatable Life Rafts", TP 1324 as amended from time to time.

11. DETAILED INSPECTION

- 11.1 The inflated rescue boat complete in all respects shall be fully inspected in the manufacturer's works and subjected to detailed inspection to ensure that all the requirements are fulfilled.

## PART E

## OUTBOARD MOTORS FOR RESCUE BOATS

When rescue boats are fitted with outboard motors, the following tests shall be applied to the motor in lieu of those tests specified in Part B, section 4.

### 1. POWER TEST

- 1.1 The motor, fitted with a suitable propeller, shall be placed in a test rig such that the propeller is completely submerged in a water tank, simulating service conditions.
- 1.2 The motor shall be run at the maximum continuous rate of speed using the maximum power obtainable for 20 minutes. The motor shall not overheat or be damaged.

### 2. WATER DRENCH TEST

- 2.1 The motor protective cover shall be removed and the motor thoroughly drenched with water, by hose, except for the intake to the carburettor. The motor shall be started and run at speed for at least 5 minutes while it is still being drenched. The motor shall not falter or be damaged by this test.

### 3. HOT START TEST

- 3.1 While still in the test rig, the motor shall be run at idling speed in order to heat up the cylinder block. At the maximum temperature achievable, the motor shall be stopped and immediately restarted. This test shall be carried out at least twice and the motor shall not fail to restart.

### 4. MANUAL START TEST

- 4.1 The motor shall be started at ambient temperature by manual means. The means shall be either a manual automatic-rewind system or a pull cord round the top flywheel of the motor. The motor shall be started twice within 2 minutes of commencement of the start procedure.
- 4.2 The motor shall be run until normal operating temperatures are reached, then it shall be stopped and restarted manually twice within 2 minutes in accordance with 4.1.

5. COLD START TEST

- 5.1 The motor, together with the fuel, fuel lines and battery, shall be placed in a chamber at a temperature of -15°C and allowed to remain until the temperature of all parts has reached the temperature of the chamber.
- 5.2 The motor shall be started twice, within 2 minutes of commencement of the start procedure, and allowed to run long enough to determine that it runs at operating speed. The running time shall not exceed 15 seconds.

## PART F

## MEASURING AND EVALUATING ACCELERATION FORCES

1. Selection, placement and mounting of accelerometers
  - 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  $\pm 5\%$ .
  - 1.1.1 The accelerometers shall be placed in the rescue boat, parallel to the principal axes of the rescue boat, at those locations necessary to determine the worst occupant exposure to acceleration.
  - 1.1.2 Accelerometers shall be mounted on a rigid part of the interior of the rescue boat in a manner to minimize vibration and slipping.
  - 1.1.3 There shall be sufficient number of accelerometers at each location to be measured so that all likely acceleration force can be measured.
2. Recording method and rate
  - 2.1 Acceleration forces may be recorded on magnetic media as either an analog or a digital signal or on a paper plot.
    - 2.1.1 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.
3. Evaluation with the dynamic response model
  - 3.1 The dynamic response model is the preferred method in evaluating potential for the occupant in the rescue boat to be injured from the acceleration forces.
    - 3.1.1 The parameters to be used in the analysis are shown in table 1 for each coordinate 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

- 3.1.2 Before performing the dynamic response analysis, the measured accelerations must be orientated to the primary axes of the seat.
- 3.1.3 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.
- 3.1.4 At all times the following expression shall be satisfied:

$$\sqrt{\left[\frac{dx}{Sx}\right]^2 + \left[\frac{dy}{Sy}\right]^2 + \left[\frac{dz}{Sz}\right]^2} \leq 1$$

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 Sx, Sy, and Sz are relative displacements which are presented in table 2 for the appropriate launch condition.

Table 2

DISPLACEMENT LIMITS FOR RESCUE BOAT

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

4. Evaluating using the SRSS method

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

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

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

4.1.3 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 rescue boat and LL is the length of the prototype rescue boat.

4.1.4 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 RESCUE BOAT

Acceleration direction	Acceleration (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 G

## APPROVAL REQUIREMENTS

### 1. APPROVAL PROCEDURE

- 1.1 The Approval Authority shall not consider approval of a rescue boat until the manufacturer has submitted
- a. all relevant plans, drawings and specifications for the rescue boat;
  - b. repair and production quality control manuals; and,
  - c. details of all components to be used in the construction and repaired of the rescue boat.
- 1.2 The Approval Authority shall not approve a rescue boat until the manufacturer has subjected a prototype rescue boat 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 rescue boats 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 rescue boat identified therein, and only when such rescue boat is manufactured in accordance with the relevant requirements of this standard and the approval certificate.
- 1.6 Any Modification to an existing approved rescue boat 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 this Standard shall be conducted at
- a. an independent testing establishment recognized by the Board;
  - b. a manufacturer's premises in the presence of an Inspector; or
  - c. any combination of (a) or (b) as applicable.

- 1.8 Prior to subjecting a prototype rescue boat to the tests required in this standard, 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 rescue boat.
- 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 rescue boat 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 C, section 2.2 (d).

## ANNEX II

### 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 rescue boat. 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.