

**STANDARDS FOR THE CONSTRUCTION
AND TESTING OF EMERGENCY BOATS**

TP 9247

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CONTENTS

| SECTION | DEPARTMENT | PAGE |
|---------------|--|------|
| PART 1 | | |
| 1 | INTERPRETATION | 1 |
| 2 | GENERAL REQUIREMENTS | 2 |
| 3 | MANOEUVRABILITY AND TOWING | 2 |
| 4 | STABILITY..... | 2 |
| 5 | CARRYING CAPACITY..... | 3 |
| 6 | FITTINGS | 3 |
| 7 | PROPULSION..... | 4 |
| 8 | MARKINGS..... | 7 |
| 9 | DETECTION..... | 7 |
| 10 | RIGID EMERGENCY BOATS - ADDITIONAL REQUIREMENTS | 10 |
| 11 | INFLATED EMERGENCY BOATS ADDITIONAL REQUIREMENTS | 11 |
| 11.1 | CONSTRUCTION..... | 11 |
| 11.2 | TRANSOM AND FLOOR | 12 |
| 11.3 | BUOYANCY TUBES | 12 |
| 11.4 | MATERIALS..... | 12 |
| 11.5 | INFLATION SYSTEM..... | 13 |
| 11.6 | CORDAGE, WEBBING AND THREAD | 14 |
| 11.7 | LAPS AND SEAMS..... | 14 |
| 12 | EMERGENCY BOAT EQUIPMENT | 15 |

PART II

TEST REQUIREMENTS

| | |
|---|----|
| 13 IMPACT TEST | 17 |
| 14 SEATING STRENGTH TEST..... | 17 |
| 15 INBOARD ENGINE TESTS..... | 17 |
| 15.1 FUEL CONSUMPTION..... | 17 |
| 15.2 OUT-OF-WATER TEST..... | 18 |
| 15.3 SUBMERGED TEST..... | 18 |
| 16. LOADING TEST..... | 18 |
| 17 ADDITIONAL TESTS FOR RIGID EMERGENCY BOATS..... | 18 |
| 17.1 STABILITY TEST..... | 18 |
| 17.2 OVERLOAD TEST..... | 19 |
| 17.3 DROP TEST..... | 20 |
| 17.4 FREEBOARD AND STABILITY..... | 21 |
| 17.5 BUOYANCY TEST..... | 21 |
| 18 ADDITIONAL TESTS FOR INFLATED EMERGENCY BOATS..... | 22 |
| 18.1 DROP TEST..... | 22 |
| 18.2 STABILITY TEST..... | 22 |
| 18.3 DAMAGE TEST..... | 22 |
| 18.4 MANOEUVRABILITY..... | 23 |
| 18.5 RIGHTING TEST..... | 23 |
| 18.6 SWAMP TEST..... | 23 |
| 18.7 OVERLOAD TEST..... | 23 |
| 19 DETAILED INSPECTION..... | 24 |
| 20 PRODUCTION AND INSTALLATION TESTS..... | 24 |
| 20.1 GENERAL REQUIREMENTS..... | 24 |
| 20.2 BUOYANCY TUBES AIR INFLATION TESTS..... | 24 |
| 21 APPROVAL PROCEDURE..... | 25 |
| 22 QUALITY CONTROL..... | 26 |
| ANNEX I - TEMPERATURE CYCLING TEST..... | 28 |
| ANNEX II - WATER ABSORPTION TEST..... | 29 |

Interpretation

1. In these Standards,

Approval authority, means the Department of Transport, Board of Steamship Inspection;

"approved" means approved by the Board;

"Board" means the Board of Steamship Inspection created pursuant to Part VIII of the Canada Shipping Act;

"C.G.S.B." means the Canadian General Standards Board;

Complement means the number of persons that an emergency boat is certified to carry;

Inflated Emergency Boat means a boat the buoyancy and shape which result solely from it's being inflated;

"inspector" means a steamship inspector appointed pursuant to Section 366 of the Canada Shipping Act;

Person means with respect to this standard, a person having a mass of 75 kgs.;

"emergency boat" means a boat other than a lifeboat or rescue boat that is approved by the Board;

Rigid Emergency Boat means a Boat the structure of which is not normally deformable, but which may include an inflatable or solid flotation collar;

"thermal protective aid" is a bag or suit made of waterproof material with low thermal conductivity.

2 **GENERAL REQUIREMENTS**

- 2.1 Every prototype emergency boat shall comply with the requirements of this standard.
- 2.2 Every productive line emergency boat shall be manufactured in accordance with the approved plans and materials.
- 2.3 Notwithstanding any requirements of these Standards, the Board may allow alternative constructional features or fittings, providing that it is satisfied that such constructional feature or fittings are equivalent to the requirements of these Standards.
- 2.4 Emergency boats shall be either rigid or inflated
- (a) not less than 2.5 m and not more than 8.5 m in length;
 - (b) capable of carrying not less than four seated persons; and,
 - (c) constructed of steel, aluminium, 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 marine environment.

3 **MANOEUVRABILITY AND TOWING**

- 3.1 Arrangements for towing shall be permanently fitted in the emergency boat and shall be sufficiently strong to marshal or tow life rafts.
- 3.2 The towing arrangements referred to in 3.1 and means of connection shall have a safety factor of 6:1

4 **STABILITY**

- 4.1 Every emergency 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.

4.2 Every emergency 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.

5 **CARRYING CAPACITY**

5.1 Seating in emergency boats shall be arranged to maintain positive stability and provided by thwarts, benches, fixed chairs, or on the deck space.

5.2 Each seating position in an emergency boat shall be clearly indicated and be capable of supporting a weight of 100 kg.

5.3 The complement of an emergency boat shall be equal to the number of persons, all wearing lifejackets that can be seated in a normal position without interfering with the means of propulsion or the operation of any of the emergency boat's equipment.

6 **FITTINGS**

6.1 All emergency boats shall be provided with means to drain water from them inside when it is not waterborne and such means of propulsion or the operation of any of the emergency boat's equipment.

6.2 Each drain valve shall be provided with a cap or plug to close the valve.

6.3 Drain valve shall be readily accessible from inside the boat and their position shall be clearly indicated.

6.4 Every emergency boat shall be provided with effective means of bailing or be automatically self-bailing.

6.5 All emergency boats shall be provided with suitable means of steering to the satisfaction of the Board.

6.6 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.

6.7 Where a rudder is provided it shall be permanently fitted.

6.8 Except in the vicinity of the rudder and propeller, a buoyant lifeline shall be becketed to the gunwale around the outside of the emergency boat.

6.9 An emergency boat, where necessary, shall be provided with skates or fenders to facilitate launching and prevent damage to the emergency boat.

7 **PROPULSION**

7.1 An emergency boat shall be fitted with an approved inboard engine or outboard motor.

7.2 No engine shall be used for any emergency boat if its fuel has a flashpoint of 43 C or less (closed cup test) except as prescribed in 7.8.

7.3 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 -15 C within two minutes of commencing the engine start procedure and at 0 C without starting aids;
- (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 propeller shafting shall be so arranged that the propeller can be disengaged from the engine;
- (g) the exhaust pipe shall be so arranged as to prevent water from entering the engine in normal operation;
- (h) provisions shall be made for ahead and astern propulsion of the emergency boat;
- (i) the engine shall operate under conditions of at least 20 degrees list and 10 degrees trim;
- (j) the engine circulating pumps shall be self-priming;

- (k) the engine shall be efficiently ventilated;
- (l) 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.

7.4 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.

7.5 Where required means shall be provided for recharging all engine starting and searchlight batteries.

7.6 All emergency 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.

7.7 An emergency 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.

7.8 Notwithstanding 7.2, gasoline driven outboard motors with an approved fuel system may be fitted in emergency boats provided the fuel tanks are specially protected against fire and explosion to the satisfaction of the Board.

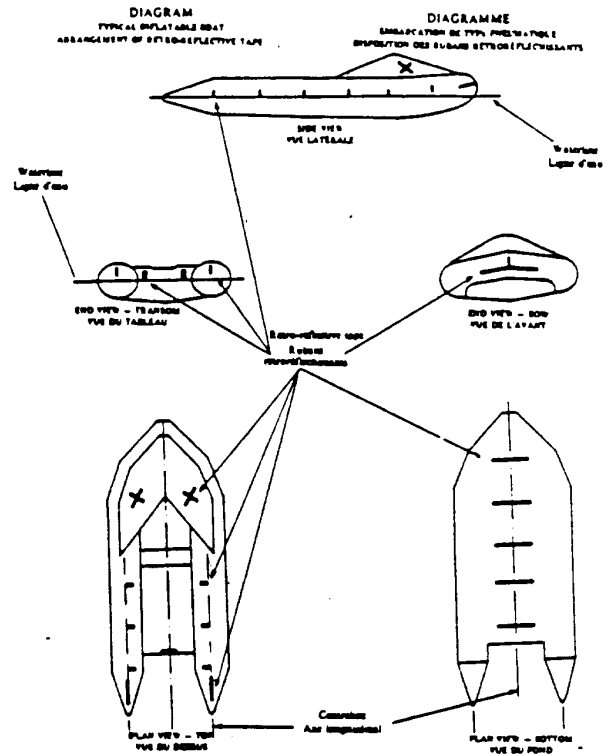
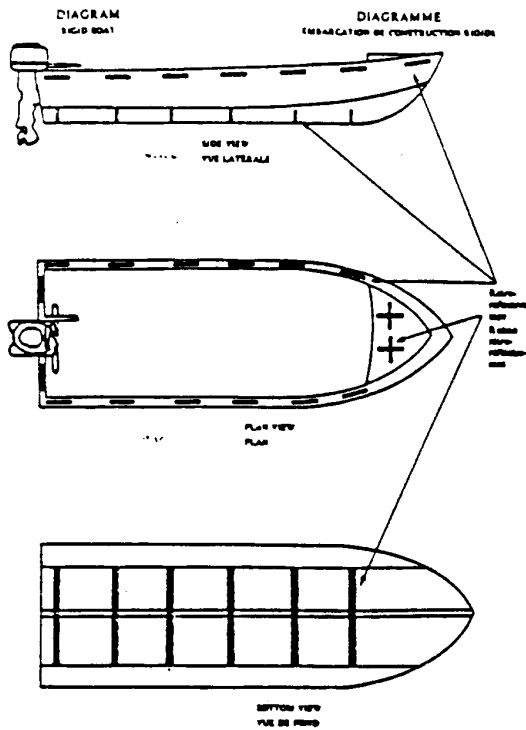
7.9 Water resistant instructions printed in both English and French for starting and operating the propulsion system shall be provided and mounted in a conspicuous place near the engine starting controls.

8 **MARKINGS**

- 8.1 The dimension of an emergency boat shall be marked on it clear permanent characters.
- 8.2 Each emergency boat shall be marked with
- (a) the manufacturers Name, Trade Mark, or Logo;
 - (b) manufacturers serial number;
 - (c) the date of manufacture;
 - (d) the number of persons for which it approved; and,
 - (e) The Department of Transport approval number.
- 8.3 All instructions shall be in both English and French.
- 8.4 Where indelible markings are made on an inflated boat, the markings material shall not contain ingredients harmful to the boat's fabric.
- 8.5 Complete details of all markings shall be included in the submission of the specifications.

9 **DETECTION**

- 9.1 Every emergency boat shall have affixed to it retro-reflective tape that is
- (a) manufactured in accordance with CGSB Specification No. 62-GP-11 or 62-GP-12 for all rigid and flexible surfaces; and
 - (b) arranged as shown in the following diagrams.



NOTE: The diagrams in this section are not to scale and are for illustration purposes only.

9.2 The retro-reflective tape referred to in paragraph 9.1 shall in the case of rigid emergency boats be

- (a) not less than 50 mm in width;
- (b) not less than 300 mm in length;
- (c) so spaced that the distance between the centres of adjacent sections is not more than 500 mm; and
- (d) fitted
 - (i) on top of the gunwale;
 - (ii) on the outside as near the gunwale as possible; and

- (iii) on the top of the canopy or exposure cover, if fitted, in the form of crosses.

9.3 The canopy or exposure cover, if fitted, shall not obscure the retro-reflective tape sections on the side of the boat.

9.4 The retro-reflective tape referred to in paragraph 9.1 shall, in the case of an inflated boat

(a) consist of

- (i) in the case of the sides of the boat, sections measuring not less than 50 mm in width and 150 mm in length, and so spaced that the distance between the centres of adjacent sections is not more than 500 mm,

- (ii) in the case of the transom, two sections, each measuring not less than 100 mm in width and 150 mm in length,

- (iii) in the case of the bow, two sections, the horizontal section measuring not less than 50 mm in width and 600 mm in length and the vertical section measuring not less than 500 mm in width and 150 mm in length,

- (iv) in the case of the top of the boat,

- (A) at least one set of two sections in the form of a cross on each side of the apron or canopy, and each section measuring not less than 50 mm in width and 300 mm in length,

- (B) sections across each float measuring not less than 50 mm in width and 150 mm in length and so spaced that the distance between the centres of adjacent sections is not more than 500 mm, and

- (C) a section at the rear of each float measuring not less than 50 mm in width and 300 mm in length, and

- (v) in the case of the outer bottom of the boat sections measuring not less than 500 mm in width and 300 mm in length and so spaced that the distance between the centres of adjacent sections is not more than 500 mm.

10 **RIGID EMERGENCY BOATS - ADDITIONAL REQUIREMENTS**

- 10.1 The hulls of rigid emergency boats shall be constructed with fire retarding or non-combustible material to the satisfaction of the Board.
- 10.2 Every rigid emergency boat shall have inherent buoyancy or shall be fitted with inherently buoyant material sufficient to float the rigid emergency boat, loaded with all its equipment when flooded and open to the sea.
- 10.3 Notwithstanding the requirements of subsection 10.2 every rigid emergency boat shall be provided with inherently buoyant material equal to 280 N of buoyant force per person for the number of persons the emergency boat is permitted to carry.
- 10.4 Inherent buoyant material, unless in addition to that required in subsections 10.2 and 10.3 shall not be installed externally to the hull of the emergency boat.
- 10.5 The inherently buoyant material referred to in subsections 10.2 and 10.3 shall meet the test requirements for such material as prescribed in section 17.5.
- 10.6 Every rigid emergency boat shall of sufficient strength to withstand a load, without residual deflection on removal of that load:
- (a) in the case of rigid emergency 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 emergency boats, twice the total mass of the emergency boat when loaded with its full complement of persons and equipment.
- 10.7 Every rigid emergency 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 emergency boat may become flooded, of not less than 1.5 per cent of its length and in no case less than 100 mm.
- 10.8 A rigid emergency 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).

11 INFLATED EMERGENCY BOATS ADDITIONAL REQUIREMENTS

11.1 CONSTRUCTION

11.1.1 Every inflated emergency boat shall be:

- (a) of sufficient strength to withstand a load of 2 times the mass of the emergency boat, its full complement of persons and equipment at an ambient temperature of between 18 to 22 deg. 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.

11.1.2 Every fully equipped inflated emergency 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.

11.2 **TRANSOM AND FLOOR**

11.2.1 The transom fitted in an inflated emergency boat shall not be inset by more than 20 per cent of its overall length.

11.2.2 A rigid flooring shall be fitted to provide a firm deck which will protect the keel and fabric forming the bottom of the boat.

11.3 **BUOYANCY TUBES**

11.3.1 The main buoyancy tubes shall be divided into not less than three air-tight compartments such that each compartment shall not exceed 40% of the total tube capacity

11.3.2 In boats or more than one tube the volume of either tube shall not exceed 60 per cent of the total volume.

11.3.3 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 emergency boat seated in their normal positions with positive freeboard over the emergency boat's entire periphery.

11.3.4 The buoyancy tubes forming the boundary of the inflated emergency boat shall on inflation provide a volume of not less than 0.17 m³ for each person the boat is certified to accommodate.

11.4 **MATERIALS**

11.4.1 The materials used in the construction of the buoyancy tubes of an inflated emergency boat shall

- (a) have a breaking strength of not less than 1780 N, tested in accordance with CGSB Specification CAN2-4.2-M77 Method 9.1 for the 25 mm strip method;
- (b) be resistant to weathering so that after 30 cycles in an Atlas twin arc Weatherometer the tensile strength of the material does not decrease by more than 10 per cent.

- (c) be resistant to petroleum products so that after 24 hours immersion in solvent, Reference Fuel A, A.S.T.M. D-471, the tensile strength of the material does not decrease by more than 5 per cent; and
- (d) be abrasion resistant to the extent that at least 5000 revolutions of a Taber abraser, using No.H22 wheel and 1000 grams loading, are required to completely wear through a sample.

11.4.2 The breaking strength of the material incorporating a seam in the buoyancy chambers of an inflated approved emergency boat shall not be less 90 per cent of the breaking strength of the material.

11.4.3 The breaking strength of the material incorporating a seam referred to in subsection 11.4.1 shall be tested by pulling the material at right angles to the seam.

11.4.4 The requirements prescribed in subsection 11.4.1, 11.4.2 and 11.4.3 shall be ascertained by a testing establishment acceptable to the Board.

11.5 **INFLATION SYSTEM**

11.5.1 Every 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.

11.5.2 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.

11.5.3 The safety relief valve shall reseal at a pressure that will give satisfactory rigidity to the buoyancy tube.

11.5.4 Means of inflating shall be fitted to each buoyancy tube and be arranged to prevent accidental deflation.

11.5.5 The gas used for inflation shall be non-inflammable and non-toxic.

11.5.6 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.

11.6 **CORDAGE, WEBBING AND THREAD**

11.6.1 All cordage, webbing and thread used in the construction of an inflated emergency boat or in the make-up 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.

11.6.2 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.

11.7 **LAPS AND SEAMS**

11.7.1 Full details of the proposed method of joining panels of the fabric of which an inflated emergency boat is to be constructed shall be submitted to the Approval Authority.

11.7.2 If an adhesive solution is to be employed in joining panels of the fabric of which an inflated emergency 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.

11.7.3 During construction of a prototype inflated boat, three samples of typical panel joints forming an inflatable chamber, manufactured with production materials, adhesives and techniques shall be tested by the manufacturer for compliance with the same strength requirements of subsections 11.4.2 and 11.4.3.

11.7.4 The external sight edges of traverse seams shall face aft and the external sight edges of longitudinal seams shall face inboard.

11.7.5 All exposed seams shall be taped externally.

12 **EMERGENCY BOAT EQUIPMENT**

- 12.1 All items of emergency boat equipment, with the exception of boat hooks which shall be kept free for fending off purposes, shall be secured within the emergency boat by lashings, storage weathertight lockers or compartments, storage in brackets or mounting arrangements, or other suitable means.
- 12.2 Equipment shall be secured in such a manner so as not to interfere with any launching or recovery procedures.
- 12.3 All items of emergency boat equipment shall be as small and of as little mass as possible and shall be packed in suitable and compact form.
- 12.4 The normal equipment of every emergency 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 sea anchor with a line of adequate strength not less than 10 m in length;
 - (e) a painter of sufficient length and strength, arranged for quick release and placed at the forward end of the emergency boat;
 - (f) one buoyant line, not less than 50 m in length, of sufficient strength to tow a fully loaded 50 person liferaft;
 - (g) one waterproof electric torch suitable for Morse signalling, together with one spare set of batteries and one spare bulb in a waterproof container;
 - (h) one whistle or equivalent sound signal;
 - (i) two buoyant emergency quoits, attached to not less than 30 m of buoyant heaving line each;

- (j) thermal protective aids sufficient for not less than 10 per cent of the number of persons the emergency boat is certified to carry or two, whichever is the greater number.

12.5 In addition to the equipment required by subsection 12.4 the equipment of every rigid emergency boat shall include

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

12.6 In addition to the equipment required by subsection 12.4 the equipment of every inflated emergency 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.

TEST REQUIREMENTS

13 IMPACT TEST

- 13.1 A fully equipped emergency boat, including engine, shall be loaded with weights equal to the complement, and with skates or fenders, if required, in place.
- 13.2 The emergency 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 rigid vertical surface at a velocity of at least 1.5 meters per second.
- 13.3 On completion of the test no damage shall be sustained which would effect the efficient functioning of the emergency boat.

14 SEATING STRENGTH TEST

- 14.1 The emergency boat seating shall be loaded with a mass of 100 kg in each position allocated for a person to sit within the emergency boat, and it shall be demonstrated that each seating position can support this loading without any permanent damage or deformation.
- 14.2 The emergency boat shall be fitted with it's engine and all equipment.
- 14.3 The complement all wearing immersion suits and any other essential equipment required shall board the emergency boat and be properly seated.
- 14.4 The loaded emergency boat shall be manoeuvred and all equipment on board tested to demonstrate that it can be operated without difficulty or interference with the occupants.

15 INBOARD ENGINE TESTS

15.1 FUEL CONSUMPTION

- 15.1.1 An emergency boat floating in the water shall be loaded with weights equal to the mass of its equipment and the complement

15.1.2 The engine shall be started, and the boat manoeuvre for a period of at least 4 hours, to demonstrate its satisfactory operation.

15.2 **OUT-OF-WATER TEST**

15.2.1 If the engine is a waterjacket type, it shall be operated for a period of at least 5 minutes at idling speed under conditions simulating the emergency boat out of the water, and shall not be damaged as a result of this test, except outboard motors shall demonstrate that they can be readily started out of the water.

15.3 **SUBMERGED TEST**

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

16. **LOADING TEST**

16.1 The freeboard of the emergency boat shall be measured when it is loaded with all its equipment, engine and fuel, and the complement, or with an equivalent mass positioned to represent engine and fuel, and persons.

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

17 **ADDITIONAL TESTS FOR RIGID EMERGENCY BOATS**

17.1 **STABILITY TEST**

17.1.1 It shall be demonstrated that the emergency boat has positive stability in the water when

- (a) loaded with a distributed mass equal to the number of persons for which it is to be approved and its equipment; and,
- (b) in a loaded condition, filled with water to represent flooding which would occur when holed in any one location below the waterline, assuming no loss of buoyancy material and no other damage.

- 17.2.1 Several tests shall be conducted if it is shown that holes in different locations would create different flooding conditions.
- 17.2 **OVERLOAD TEST**
- 17.2.1 The unloaded emergency boat shall be suspended from lifting hooks corresponding to davit falls, and sights rected for recording hull deflections.
- 17.2.2 Baseline measurements shall be taken after which the emergency boat shall be loaded with weights representing
- (a) the weight of food, equipment and water; and,
 - (b) the weight representing the complement.
- 17.2.3 Any change in length, beam or depth from the baseline measurements shall be recorded.
- 17.2.4 Additional weights shall be added in order that the suspended load is 25% and 100% greater than the emergency boat in the fully equipped and loaded condition, except metal boats shall only be submitted to an overload test of 25% by adding weights equal to the sum of 25 % of the mass of the boat and 125% of the total mass of all equipment and the number of persons for which it is approved.
- 17.2.5 Weights shall be distributed within the emergency boat to represent the loading of the boat in its service condition as far as is practicable, except the weights representing persons need not be places 300 mm above the seats to represent the center of gravity of the seated person.
- 17.2.6 Weights for the various overloads shall be correspondingly distributed.
- 17.2.7 Parts of the machinery may be removed in order to prevent damage to them and weights shall be added to correspond and compensate for the removal of such machinery parts.
- 17.2.8 Testing by filling the emergency boat with water shall not be accepted.
- 17.2.9 Measurements of the emergency boat at full load and at 25, and 100% overload shall be recorded as follows

- (a) deflection of the keel amidships;
- (b) change in length as measured between the tops of the stem and stern posts;
- (c) change in breadth over the gunwale to keel.
- (d) change in depth from gunwale to keel.

17.2.10 The maximum deflections shall not exceed

- (a) 1/400th part of the emergency boats length when subjected to 25% overload; and
- (b) 1/250th part of the emergency boats length when subjected to 100% overload.

17.2.11 Upon completion of the overload tests, all weights shall be removed and the boats dimensions measured after a suitable lapse of time sufficient to permit the boat to recover to its original form, which in the case of a glass reinforced plastic boat shall be approximately 18 hours.

17.2.12 No residue deflection shall result and any permanent deflections as a result of the overload tests shall be recorded.

17.3 **DROP TEST**

17.3.1 A fully equipped emergency boat, including engine, shall be loaded with weights equal to the complement.

17.3.2 Weights required in 17.3.1 shall be distributed with the emergency boat to represent the loading of the boat in its service condition, but the weights representing the persons need not be placed 300mm above the seats to represent the center of gravity of the seated persons.

17.3.3 The loaded emergency boat shall be suspended so that the lowest part of the boat is not less than 2m above the surface of the water.

17.3.4 On completion of the drop test the emergency boat shall be inspected and no damage shall have sustained which would affect the efficient functioning of the boat.

17.4 **FREEBOARD AND STABILITY**

17.4.1 An emergency boat freely floating, and with its engine fitted, shall be loaded with a mass equal to that of all its equipment.

17.4.2 One half of the complement, all wearing immersion suits, shall be seated in a proper seating position on one side of the centerline.

17.4.3 The freeboard shall be measured on the low side of the boat, and it should not be less than 1.5% of the boat's length, and in no case less than 100mm.

17.5 **BUOYANCY TEST**

17.5.1 Where inherent buoyancy material is required, that material shall be subjected to the tests prescribed in annex I and II to this part.

17.5.2 In addition to the tests under 17.5.1 two specimens of the buoyant material (a total of 8) shall be immersed for a period of 14 days under a 100mm head of

- (a) fuel oil;
- (b) marine diesel oil;
- (c) high octane petroleum spirit; and,
- (d) kerosene.

17.5.3 All test required under 17.5.2 shall be undertaken at a temperature of between 18 deg. to 22 deg. C. and with sample specimens as supplied.

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

17.5.5 The reduction in buoyancy, if any, of all specimens upon completion of the tests shall not exceed 5% of the original buoyancy.

18 **ADDITIONAL TESTS FOR INFLATED EMERGENCY BOATS**

18.1 **DROP TEST**

18.1.1 The inflated emergency boat complete with at its equipment and with a mass equivalent to its engine and fuel in the position of its engine and fuel tank, shall be dropped into the water from a height of at least 2m.

18.1.2 On completion of the drop tests under 18.1.1 the emergency boat and its equipment shall be carefully examined and shall show no signs of damage which would affect its efficient functioning.

18.2 **STABILITY TEST**

18.2.1 The inflated emergency boat stability test shall be undertaken in still water with all persons wearing immersion suits, and with the engine and fuel, or an equivalent mass representing engine and fuel, in place, as follows

- (a) the complement shall be crowded to one side of the boat with half of the complement seated on the buoyancy tube, at one end, and in each case the freeboard shall be everywhere positive; and,
- (b) the stability shall be ascertained by two persons in the boat demonstrating that they can readily assist from the water a third person, who is required to feign unconsciousness and who shall have his back toward the side of the boat so that he cannot assist the rescuers.

18.3 **DAMAGE TEST**

18.3.1 The damage tests shall be undertaken with the emergency boat loaded with its complement and in conditions both with and without the engine and fuel, or with an equivalent mass in the position of the engine and fuel tank on board, as follows

- (a) with the forward buoyancy compartment deflated;
- (b) with the entire buoyancy on one side of the boat deflated; and,
- (c) with the entire buoyancy on one side and the bow compartment deflated.

18.3.2 In each of the conditions of the damage test as prescribed in 18.3.1 the complement shall be supported within the boat.

18.4 **MANOEUVRABILITY**

18.4.1 It shall be demonstrated that the emergency boat can, when loaded with its equipment, engine and fuel, and the complement, all wearing immersion suits, be propelled and manoeuvred by its oars or paddle in calm water conditions at a speed of 0.5 knots, for a distance of at least 25m.

18.5 **RIGHTING TEST**

18.5.1 It shall be demonstrated that the emergency boat, when inverted in the water, both with and without engine and fuel, or an equivalent mass in place of the engine and fuel tank, is capable of being righted by not more than two persons.

18.6 **SWAMP TEST**

18.6.1 It shall be demonstrated that the emergency boat, when fully swamped, is capable of supporting its full complement, equipment, and a mass equal to the engine and fuel tank.

18.6.2 It shall be demonstrated that the emergency boat does not seriously deform when in the condition prescribed under 18.6.1.

18.7 **OVERLOAD TEST**

18.7.1 The emergency boat shall be suspended from its lifting bridle at a temperature of between 18 to 22 deg. C. with all relief valves inoperative, and loaded with two times the mass of the emergency boat, its engine and fuel, equipment, and complement, for a period of 15 minutes.

18.7.2 The emergency boat and lifting bridle shall be examined after the test under 18.7.1 is conducted, and shall show no signs of damage or deformation.

19 **DETAILED INSPECTION**

19.1 The emergency boat complete in all respects, upon completion of all tests, shall be fully inflated in the manufacturers works, and subjected to a detailed inspection to ensure that all the requirements have been fulfilled.

20 **PRODUCTION AND INSTALLATION TESTS**

20.1 **GENERAL REQUIREMENTS**

20.1.1 The Approval Authority may require a surveyor to make random inspections of a emergency boat manufacturers' premises to ensure that the quality of the emergency boat and materials used comply with the specification of the approved prototype boat.

20.1.2 Manufacturers shall be required to institute a quality control procedure to ensure that the emergency boats are produced to the same standard as the prototype emergency boat approved by the Approval Authority, and to keep records of any production tests carried out in accordance with their instructions.

20.2 **BUOYANCY TUBES AIR INFLATION TESTS**

20.2.1 Every buoyancy tube with all its valves, deflation plugs and fittings shall be inflated to 17.78 grammes/cm² (177.8 mm water gauge) above the maximum blow-off pressure of the relief valves, the valves being plugged, and allowed to stand for 30 minutes.

20.2.2 After the procedure described in 20.2.1 has been carried out

- (a) the pressure in the inflated tube shall be adjusted to the designed working pressure and the tube left for at least 30 minutes for any stretch to recover; and
- (b) the pressure in the inflated tube shall be again adjusted to the designed working pressure of the relief valves and the pressure drop after 60 minutes corrected for any temperature change in accordance with 20.2.4 shall be recorded;

- 20.2.3 Where a buoyancy tube of an inflated boat is subdivided by bulkheads or diaphragms, the pressure in each compartment shall be adjusted to the designed working pressure of the relief valves and the pressure drop after 15 minutes corrected for any temperature change in accordance with 20.2.4 shall be recorded;
- 20.2.4 The results of the pressure drop readings of then air inflation tests shall be corrected for any variation of the temperature in the vicinity of the buoyancy tube during the test, within a permissible limit of 3 deg. C as follows:
- (a) if there is a temperature rise, 0.004 kg/cm² (38 mm water gauge) shall be subtracted for every degree Celsius; and
 - (b) if there is a fall in temperature, 0.004 kg/cm² (38 mm water gauge), shall be added for every degree Celsius.
- 20.2.5 The maximum permissible corrected drop in pressure referred to in 20.2.4(b) and 20.2.3 shall not exceed 2.54 grammes/cm² (25.4 mm water gauge) from the designed working pressure.
- 20.2.6 Tests of other inflation compartments such as thwarts or keels, as applicable, shall be as specified in the manufacturer's construction specifications for the boat.
- 20.2.7 Where, during a manometer pressure test of an inflated buoyancy tube, the ambient temperature varies more than 3 deg. C, the results of the test shall be disregarded and the tests shall be repeated.

21 **APPROVAL PROCEDURE**

21.1 An application for approval of an emergency boat shall be sent to the

Superintendent
Equipment and Operational Safety (AMSFC)
Ship Safety Branch
Canadian Coast Guard
Ottawa, Ontario
K1A ON7

21.2 An application for approval of an emergency boat shall include the following:

- (a) Three sets of fully detailed boat plans;

- (b) A description of the method of construction;
- (c) Material specifications;
- (d) The amount of inherent and/or air/gas buoyancy that will be provided;
- (e) The weights of construction material and equipment;
- (f) A description of the propulsion system;
- (g) Details of the quality control procedure used in the construction of the boat;
- (h) The names and addresses of manufacturers of construction component parts and where applicable the reference numbers or trade names of the components.

21.3 The applicant shall make arrangements for the approval tests directly with the Approval Authority or as applicable with an independent laboratory that is recognized by the Approval Authority to conduct such tests.

21.4 The applicant shall ensure that an independent laboratory is recognized by the Approval Authority by contacting them for written affirmation before making test arrangements.

21.5 Each approval test shall be conducted in accordance with the requirements of these Standards.

21.6 To be an independent laboratory, a laboratory shall

- (a) be engaged in testing marine materials and equipment;
- (b) not be owned or controlled, by a manufacturer or vendor of emergency boats, or by a supplier of components to the manufacturer; and
- (c) be recognized by Ship Safety Branch, Canadian Coast Guard.

21.7 The Approval Authority reviews the test reports and advises the applicant whether the emergency boat is approved.

22 **QUALITY CONTROL**

- 22.1 The manufacturers of inflated emergency boats shall submit a detailed description of the quality control procedure used in the construction of inflated emergency boats to the Approval Authority for consideration and acceptance.
- 22.2 The manufacturer shall ensure that production inspections described in the manufacturer's accepted quality control procedures are performed to the satisfaction of the Approval Authority.
- 22.3 The manufacturer shall keep records showing:
- (a) source and type of materials, components and invoice numbers;
 - (b) acceptance of conformity of materials and components to this Standard;
 - (c) quantity of supplies received;
 - (d) quantity used by number of boats constructed; and
 - (e) balance of supplies an hand.
- 22.4 All records listed in 22.3 (a) to (e) inclusive shall be made available on demand to an inspector.
- 22.5 An inspector shall be satisfied, by examination of invoices that the materials are in accordance with the provisions of approval.

ANNEX I

- 1 Temperature Cycling Test
- 1.1 Each object shall be alternately subjected to surrounding temperatures of -30°C and +65°C.
- 1.2 These alternating cycles need not follow immediately after one another and the following procedure, repeated for a total of 10 cycles, is acceptable
 - (a) an 8 hour cycle at +65°C to be completed in one day; and
 - (b) the specimens then removed from the warm chamber and left exposed under ordinary room temperature until the next day;
 - (c) an 8 hour cycle at -30°C to be completed the next day; and
 - (d) the specimens then removed from the cold chamber and left exposed under ordinary room conditions until the next day.
- 1.3 Room temperatures is taken to be between +20°C ($\pm 2^\circ$).

ANNEX II

WATER ABSORPTION TEST

- 1.1 All specimens that are required to undergo a water absorption test shall be subjected to the following.
- 1.2 The water absorption test shall be carried out in fresh water.
- 1.3 Specimens shall be immersed for a period of 7 days under a 1.25m head of water.
- 1.4 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 diesel oil, or specified liquid test as prescribed in 17.5.
- 1.5 Two specimens shall be immersed for a period of 24 hours under a 100 mm head of diesel oil, or other specified liquid, at normal room temperature, and after this test shall show no signs of damage such as shrinking, swelling, cracking, dissolution or change in mechanical qualities.
- 1.6 Dimensions of each specimen shall be recorded prior to and upon completion of each test.
- 1.7 The results of this test shall state the mass in kilograms, which each specimen will support out of the water after one and 7 days immersion, and the reduction in buoyancy must not exceed 5% and the specimens shall show no signs of damage such as shrinking, swelling, cracking, dissolution or change in mechanical qualities.