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TP 7321 E

STANDARDS FOR LIFE RAFTS AND INFLATABLE RESCUE PLATFORMS

**MARINE SAFETY DIRECTORATE
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PART 1

1 CLASSIFICATION

- 1.1 Every life raft submitted for approval on or after April 1, 1992 shall comply with the requirements of this standard.
- 1.2 Life rafts conforming to this standard are in accordance with the provisions of the Canada Shipping Act and, of the International Convention for the Safety of Life at Sea (SOLAS) 1974, as amended from time to time.
- 1.3 Every life raft and inflatable rescue platform shall be constructed, tested, inspected and serviced in compliance with this standard and the requirements of the Life Saving Equipment Regulations.
- 1.4 The tests required under this standard shall be conducted in the presence of an inspector at a testing establishment recognized by the Board, a manufacturers premises, or a location agreeable to the Board

2 DEFINITIONS

"Approval Authority" means Transport Canada, the Board of Steamship Inspection.

"Board" means the Board of Steamship Inspection

"CGSB" means the Canadian General Standards Board.

"Complement" means the number of persons as determined by the Board that a life raft or platform is certified to carry.

"Inspector" means a steamship inspector appointed pursuant to section 301 of the Canada Shipping Act.

"Person" means a person having a mass of 75 kgs.

"Inflatable Rescue Platform (IRP)" means an inflated devise resembling that of an inflatable life raft except no protective canopy is provided and a single floor is mounted between the two buoyancy compartments making the devise reversible.

3 **GENERAL REQUIREMENTS - LIFE RAFTS**

3.1 **DESIGN AND CONSTRUCTION**

3.1.1 All materials and components used in the construction and repair of life rafts shall be of good quality and suitable for the purpose intended, and shall not deteriorate from the effects of weathering on board ship under the conditions of usual stowage, nor from contact with salt water or spray.

3.1.2 A life raft shall be so constructed as to be capable of withstanding exposure for 30 days afloat in all sea conditions.

3.1.3 Every life raft while packed in its container or valise, if applicable, shall be able to withstand 15 months on board ship in a weather deck stowage with a minimum of protection without its performance being affected.

3.1.4 A life raft shall be so constructed that when it is dropped into the water from a height of 18 m, the life raft and its equipment will operate satisfactorily, except, if it is to be stowed at a height of more than 18 m above the waterline in the lightest seagoing condition, it shall be drop-tested from at least that height.

3.1.5 A floating life raft shall be capable of withstanding jumps onto it, equal to the number of persons it is to accommodate, from a height of at least 4 m above its floor.

3.1.6 A life raft and its fittings shall be so constructed as to enable it to be towed at a speed of 3 knots in calm water when loaded with its full complement and equipment, and with one of its sea anchors streamed.

3.1.7 A life raft shall have a canopy to protect the occupants from exposure, which is automatically set in place when it is launched and waterborne, unless permanently erected.

3 2 **CANOPY**

3.2.1 A life raft canopy shall comply with the following requirements

(a) it shall provide insulation against heat and cold;

- (b) it shall be fitted with at least two diametrically opposed entrances for a life raft designed to accommodate nine or more persons, and at least one entrance for a life raft designed to accommodate eight or less persons;
- (c) every entrance shall be clearly indicated and be provided with an efficient adjustable closing arrangement which can be easily and quickly opened from the inside and outside so as to permit ventilation, but exclude seawater, wind and cold;
- (d) it shall admit sufficient air for the occupants at all times, even with the entrances closed;
- (e) it shall be provided with at least one viewing port;
- (f) it shall be provided with a means for collecting rain water; and,
- (g) provides sufficient headroom under all parts of the canopy, of the waterborne life raft, for occupants to sit comfortably upright on the floor and in the case of inflated life rafts, with the floor inflated;
- (h) erects automatically on inflation in the case of inflatable life rafts;

3.3 CANOPY SUPPORTS

3.3.1 Arches or other means for supporting the life raft canopy shall be provided unless the canopy is self-supporting, and in the case of inflatable life rafts the canopy support shall be

- (a) gas inflated automatically from by gas inflation system;
- (b) fitted with a non-return valve; and,
- (c) provided with a means of being manually topped-up.

3.3.2 Inflation arrangements must be such that should one of the buoyancy chambers of the life raft deflate, the canopy will remain substantially erect.

3.4 CAPACITY AND MASS

3.4.1 An approved life raft shall have a carrying capacity of six or more persons but no life raft shall be approved for a carrying capacity of more than fifty persons, except in special cases the Board may consider for approval a life raft which has a carrying capacity of less than six persons.

3.4.2 The total mass of a life raft, its container and its equipment shall not be more than 185 kgs, unless the life raft is designed to be launched by a launching device or it is not required to be portable.

3.5 CORDAGE, WEBBING AND THREAD

- 3.5.1 All cordage, webbing and thread used in the construction of a life raft or in the make-up of the fittings or equipment, shall be
- (a) specified in sufficient detail in the specifications submitted to the Board for approval; and,
 - (b) either inherently rot-proof or rot-proofed by an approved process.
- 3.5.2 All cordage shall be attached to the life raft in such a manner that, if the cordage is accidentally detached, the buoyancy tubes will not be damaged.

3.6 LAPS AND SEAMS

- 3.6.1 Full details of the proposed method of joining panels of the fabric of which a life raft is to be constructed shall be submitted for approval.
- 3.6.2 If an adhesive solution is to be employed in joining panels of the fabric of which the life raft is to be constructed, a full description, including composition, directions for storage, mixing, application and tests to be applied, shall be submitted for approval.

3.7 LIFE RAFT FITTINGS

- 3.7.1 Every life raft shall be fitted with arrangements for securing the entrance closures in the open, closed so as to be weathertight, and in any intermediate position between open and closed.
- 3.7.2 Every life raft shall be provided with lifelines securely becketed around the inside and outside.
- 3.7.3 Every life raft shall be fitted with an efficient painter system of not less than 8 mm in diameter and of a length equal to not less than twice the distance from the stowed position to the waterline in the lightest seagoing condition, or, 15 m whichever is the greater, which must;
- (a) provide a connection between the ship and the life raft; and,
 - (b) be so arranged that the released life raft is not dragged under by the sinking ship.

3.7.4 The efficient painter required to be fitted to every life raft shall have a breaking strength, including its means of attachment to the life raft, but excluding the weak link of not less than

- (a) 15 kN for life rafts approved for more than 25 persons;
- (b) 10 kN for life rafts approved for 9 to 25 persons; and,
- (c) 7.5 kN for any other life raft.

3.7.5 Where the stowage height on non-convention ships renders a painter length of 15 metres unnecessary, the painter length may be reduced provided allowance is made for an adverse list. The painter length shall be clearly marked on the life raft container.

3.7.6 Special consideration shall be given to the shortening of painters in the case of small vessels operating in shallow waters, where, subject to the provisions in 3.7.5, the painter shall be shorter in length than the depth of water.

3.8 FLOAT-FREE ARRANGEMENTS

3.8.1 If a weak link is used in a float-free arrangement it shall

- (a) not be broken by the force required to pull the painter from the life raft container;
- (b) be of sufficient strength, if applicable, to permit the inflation of the life raft; and,
- (c) break under a strain of 2.2 +/- 0.4 kN.

3.8.2 If a hydrostatic release unit is used in a float-free arrangement it shall approved by the Board.

3.9 EQUIPMENT

3.9.1 Every life raft shall carry

- (a) SOLAS class A or Class B equipment as described in the table to section 1 of Part 3; or,
- (b) equipment of a lesser standard, if specified in the Life Saving Equipment Regulations or is authorized by the Board.

3.10 LIGHTING SYSTEMS

- 3.10.1 Every life raft shall have fitted to the exterior top of its canopy a manually controlled lamp that shall
- (a) be visible at a distance of at least 2 miles for a period of at least 12 hours, on a dark night with a clear atmosphere;
 - (b) if a flashing light, flash at a rate of not less than 50 flashes per minute for the first two hours of the 12 hour period;
 - (c) be powered by a sea-activated or a dry chemical cell; and,
 - (d) light automatically when the life raft canopy is set in place.
- 3.10.2 The cell required by 3.10.1 shall be of a type that does not deteriorate due to dampness or humidity in the stowed life raft.
- 3.10.3 Every life raft shall be fitted inside with a manually controlled lamp that shall;
- (a) be capable of continuous operation for a period of at least 12 hours;
 - (b) light automatically when the canopy is set in place; and,
 - (c) be of sufficient intensity to enable reading of survival and equipment instructions.
- 3.10.4 Where water-activated cells for lamps are fitted they shall be;
- (a) proof against leakage of chemicals or gases that might damage or cause deterioration of the life rafts construction or its material;
 - (b) able to function satisfactorily in,
 - (i) water of varying salinity; and,
 - (ii) temperatures varying from freezing to tropical heat; and,
 - (c) stowed in a pocket on the underside of the life raft.

3.11 MARKINGS

3.11.1 Every container or valise shall be marked in English and French with the

- (a) words “**LIFE RAFT**”
- (b) manufacturer's name, logo or trade mark;
- (c) serial number;
- (d) name of the approval authority, the approved number and the number of persons it is permitted to carry;
- (e) word “**SOLAS**”, if applicable;
- (f) type of emergency pack enclosed; where no emergency pack is enclosed the container shall be marked “no pack” or “none”;
- (g) date when last serviced;
- (h) length of the painter;
- (i) maximum permitted height of stowage above the waterline; and,
- (j) launching instructions in both English and French.

3.11.2 Every inflatable and rigid life raft shall be marked with the

- (a) manufacturers name, logo or trade mark;
- (b) serial number;
- (c) month and year of manufacture;
- (d) name of the approval authority and approved number;
- (e) number of persons it is permitted to accommodate over each entrance in characters not less than 100 mm in height and of a colour contrasting with that of the life raft;
- (f) location of ready use equipment; and,

- (g) in the case of a rigid life raft the name and port of registry of the ship to which it belongs.

3.11.3 Every life raft shall be provided with a means to indicate the name and place of the servicing depot where last serviced and the date when last serviced.

3.12 COLOUR

3.12.1 The outer surface of the life raft canopy shall be of a highly visible colour.

3.12.2 The inner surface of the life raft canopy shall be of a colour that does not cause discomfort to the occupants.

3.12.3 The under surface of the floor shall be either Black, dark Grey or Dark Blue.

3.12.4 The colours proposed to be used by the manufacturer shall be stated in the specifications submitted to the Board for approval.

3.13 DAVIT LAUNCHED LIFE RAFTS

3.13.1 A life raft designed for use with a launching device, in addition to the above requirements, shall;

- (a) when loaded with its full complement of persons and equipment, be capable of withstanding a lateral impact against the ship's side at an impact velocity of not less than 3.5 m/s and a drop into the water from a height of not less than 3 m, without damage that will effect its function; and,
- (b) be of sufficient strength to permit it to be safely lowered into the water without showing signs of permanent damage when loaded with its complement and equipment, plus 10% overload, against an adverse list of 20 degrees.
- (c) be provided with a means for bringing it alongside the embarkation deck and holding it securely during embarkation.

3.13.2 The load carrying straps of every davit-launched life raft shall be spaced as to ensure that the load is evenly distributed and arranged as to minimize obstruction in boarding and to enable survivors to sit comfortably inside on the floor of the life raft.

- 3.13.3 The load carrying straps shall be joined at the top in the form of an eye or connected to a ring or shackle designed with a safety factor of 6 and proof tested to 2.5 times the maximum working load it is intended to carry in service.
- 3.13.4 Provisions shall be made as necessary to reinforce the construction material of the life raft to prevent the load carrying straps from cutting into it when under load.
- 3.13.5 Every davit-launched life raft shall be such that it can be rapidly boarded by its complement in not more than 3 minutes from the time that the instruction to board is given.
- 3.13.6 A release hook for use with davit launched life rafts shall be approved by the Board.

3.14 PASSIVE DETECTION

- 3.14.1 Every life raft shall have affixed to it a retro-reflective medium manufactured in accordance with CGSB 62-GP-11 for the type prescribed therein with the highest level of reflectivity or in accordance with CGSB 62-GP-12 which shall be arranged as shown in diagrams 1, 2 and 3.
- 3.14.2 Except in the case of the medium forming crosses on the top and bottom of the life raft, retro-reflective medium referred to in 3.14.1 shall be in sections
- (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 in accordance with 3.14.3 or 3.14.4, as the case requires.
- 3.14.3 In the case of an inflatable life raft, the retro-reflective medium sections shall be fitted on the outside
- (a) around the canopy at one-half its height;
 - (b) on top of the canopy at its centre in the form of a cross, which sections shall be one-half the length and one-half the breadth of the life raft; and,

- (c) on the bottom of the life raft at its centre and in the form of a cross similar in size to that mentioned in (b).

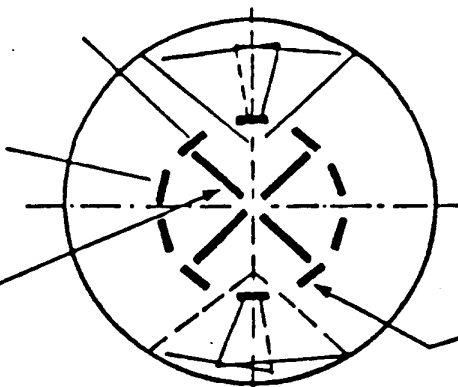
3.14.4 In the case of a rigid life raft, retro-reflective medium sections shall be fitted on the outside

- (a) around the top and bottom canopies at one-half their heights; and,
- (b) on each canopy at its centre in the form of a cross, which sections shall be one-half the length and one-half the breadth of the life raft.

TYPICAL ROUND LIFE RAFT ARRANGEMENT OF RETRO-REFLECTIVE TAPE

DIAGRAM 1

Long sections to form cross on canopy.
Length of strips to be half the diameter of the life raft.
Croix faite de longs rubans apposés sur le tendelet et mesurant la moitié du diamètre du radeau de sauvetage

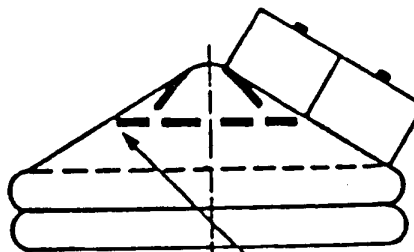


Short sections to form circle around canopy in position shown including doorways.
Rubans courts disposés en cercle autour du tendelet, y compris les portes.

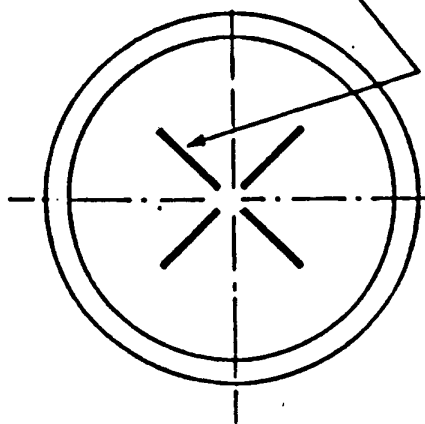
PLAN VIEW OF CANOPY
PLAN DU TENDELET

Note: Short sections to be 300 mm x 50 mm.
Long strips to be 50 mm wide.

Note: Les rubans courts mesurent 300 mm x 50 mm
Les rubans longs mesurent 50 mm de largeur



SIDE VIEW
VUE LATÉRALE

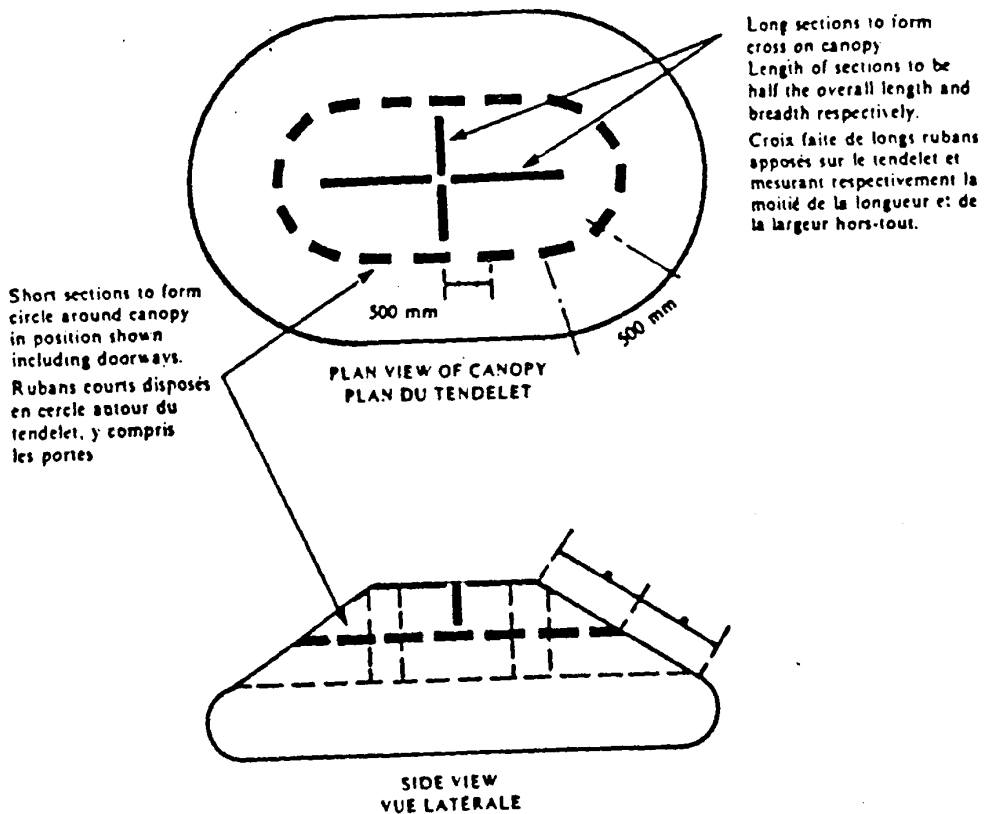


Long sections to form cross on floor.
Length of sections to be half the diameter of the life raft.
Croix faite de longs rubans apposés sur le fond et mesurant la moitié du diamètre du radeau de sauvetage.

PLAN VIEW OF FLOOR
PLAN DU FOND

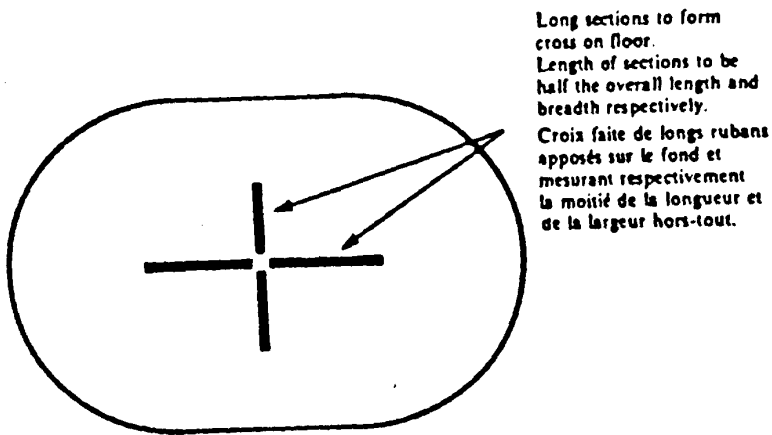
TYPICAL OVAL LIFE RAFT ARRANGEMENT OF RETRO-REFLECTIVE TAPE

DIAGRAM 2



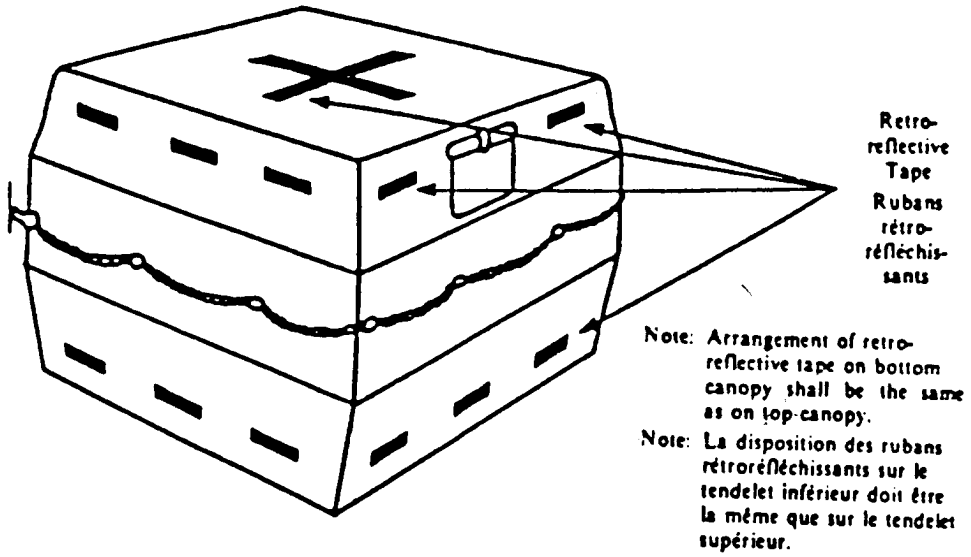
Note: Short sections to be 300 mm ± 50 mm.
Long sections to be 50 mm wide.

Note: Les rubans courts mesurent 300 mm ± 50 mm
Les rubans longs mesurent 50 mm de largeur



TYPICAL RIGID LIFE RAFT
ARRANGEMENT OF RETRO-REFLECTIVE TAPE

DIAGRAM 3



4 ADDITIONAL REQUIREMENTS FOR INFLATABLE LIFE RAFTS

4.1 CONSTRUCTION MATERIALS

4.1.1 All coated materials used on the construction of life rafts shall comply with the "Material specification for coated fabrics used in the manufacture of inflatable life rafts, TP 1324" dated February 1992, as amended from time to time.

4.2 BUOYANCY CHAMBER

4.2.1 Every inflatable life raft shall be constructed of a main buoyancy chamber which shall be divided into not less than two separate compartments each inflated through a non-return inflation valve on each compartment.

4.2.2 The buoyancy chamber shall be so arranged that in the event of any one of the compartments being damaged or failing to inflate the intact compartment shall be capable of supporting with positive freeboard over the entire periphery the number of persons which the life raft is permitted to accommodate each having an average mass of 75 kg and seated in their normal positions.

4.2.3 Each compartment shall contribute to the total buoyancy required where the maximum designed volume of either compartment shall not exceed 60% of the total volume of the buoyancy chambers.

4.2.4 The main buoyancy chamber forming the boundary of the Inflatable life raft, shall be gas inflatable from the automatic gas inflation system.

4.2.5 A life raft shall be inflated with a non-toxic gas and after inflation, maintain its form when loaded with its complement and equipment.

4.2.6 Each inflatable compartment shall be capable of withstanding a pressure equal to at least 3 times the nominal pressure and be prevented from reaching a pressure exceeding twice the nominal pressure by means of relief valves or a limited gas supply.

4.2.7 Within the buoyancy chamber there shall be an "gas diffuser sock" to prevent the buoyancy chamber from damage during rapid release of the inflation gas.

4.2.8 The "gas diffuser" shall extend around the buoyancy chamber, either side of the connection between the inflation bottles and chamber, not less than 1/3 the total circumference.

4.3 FLOOR

4.3.1 The floor of the inflatable life raft shall

- (a) be waterproof; and,
- (b) be capable of being efficiently insulated against cold by
 - (i) means of one or more compartments that the occupants can inflate or which inflate automatically and can be deflated and re-inflated by the occupants; or,
 - (ii) other equally efficient means not dependent on inflation.

4.4 CAPACITY

4.4.1 Maximum number of persons that the life raft can accommodate shall be the lesser of;

- (a) the greatest whole number obtained by dividing the volume, measured in cubic metres of the main buoyancy tubes (which for this purpose shall not include the canopy support arches nor any thwarts, if fitted) when inflated, by 0.096; or,
- (b) the greatest whole number obtained by dividing the inner horizontal cross-sectional area of the life raft measured in square metres (which for this purpose may include thwarts, if fitted) measured to 04 the innermost edge of the buoyancy tube, by 0.372; or,
- (c) the number of persons, each having an average mass of 75 kg, all wearing immersion suits, that can be seated with sufficient comfort and headroom without interfering with the operation of any of the life rafts equipment.

4.5 ACCESS

4.5.1 Every inflatable life raft shall have at least one entrance fitted with a semi-rigid boarding ramp to enable persons to board the life raft from the sea and if inflated, so arranged as to prevent deflation of the life raft if the ramp is damaged.

- 4.5.2 In the case of a davit launched life raft having more than one entrance, the boarding ramp shall be fitted at the entrance opposite the bowing lines and embarkation facilities.
- 4.5.3 Entrances that are not provided with a boarding ramp shall have a boarding ladder the lowest step of which shall not be less than 0.4 m below the light waterline of the life raft.
- 4.5.4. The life raft shall be provided inside with means to assist persons to pull themselves into it from the ladder.

4.6 STABILITY

- 4.6.1 Every life raft shall be so constructed that when fully inflated and floating with the canopy uppermost it is stable in a seaway.
- 4.6.2 Every life raft shall be fitted with water pockets on the underside meeting or exceeding the requirements as specified in **ANNEX III**.
- 4.6.3 The stability shall be such that
- (a) when in the inverted position, unless selfrighting, it can be righted by one person in a seaway and in calm water, and,
 - (b) when loaded with its full complement or persons and equipment it can be towed at a speed of not less than 3 knots in calm water.

4.7 CONTAINER and PACKING

- 4.7.1 Every inflatable life raft, together with its equipment, shall be properly packed in a valise or container that shall;
- (a) as far as practicable watertight except for drain holes in the container bottom, except in the case of a valise.
 - (b) be capable of withstanding hard wear and affording protection to the life raft and its equipment under all seagoing conditions;
 - (c) be free from sharp edges and abrasive areas on the inside
 - (d) provide a neat fit for the packed life raft so as not to cause any damage to the life raft fabric by chafing;

- (e) be constructed so as to permit the life raft to break free on inflation;
- (f) be constructed so that the aperture through which the painter runs is arranged in such a manner that the container will free itself from the painter on inflation of the life raft;
- (g) be provided with a suitable means to enable it to be carried from its place of stowage to a place of launching; and,
- (h) of sufficient inherent buoyancy when packed with the life raft and its equipment to pull the painter from within and to operate the inflation mechanism should the ship sink.

4.7.2 Ventilation openings and entrance closures shall be secured in the open position when the life raft is packed.

4.7.3 The life raft shall be packed in its container or valise in such a way as to ensure, as far as possible, that the waterborne life raft inflates in an upright position on breaking free.

4.8 DAVIT LAUNCHED LIFE RAFTS

4.8.1 In addition to complying with the above, a life raft for use with a launching device shall, when suspended from its lifting hook or bridle, be capable of withstand a load of

- (a) 4 times the mass of its full complement and equipment at an ambient temperature and a stabilized life raft temperature of 20°C ($\pm 3^\circ$) with all relief valves inoperative; and,
- (b) 1.1 times the mass of its full complement and equipment at an ambient temperature and a stabilized life raft temperature of -30°C with all relief valves operative.

4.8.2 Rigid containers for life rafts to be launched by a launching device shall be secured so as to prevent the container or parts of the container from falling into the sea during and after inflation and launching.

5 INFLATION SYSTEMS

5.1 GENERAL REQUIREMENTS

- 5.1.1 This section applies to inflatable life rafts, and any part of a life raft, other than an inflatable life raft, that employs an automatic gas inflation system.
- 5.1.2 The inflation of a life raft shall take place automatically either, upon pulling a line by one person, or, by some other equally simple and efficient means.
- 5.1.3 Means shall be provided whereby a topping-up pump or bellows may be used to maintain pressure in the life raft chambers.
- 5.1.4 The gas cylinder and operating head for the inflation of the life raft shall be stowed and secured to the outside of the life raft.
- 5.1.5 All gas cylinders, valves, and operating heads used in the automatic gas inflation system shall be tested and function to the satisfaction of the Board.

5.2 GAS

- 5.2.1 The gas used for the inflation of a life raft shall be an approved non-toxic type, and shall provide a high rate of inflation together with sufficient freedom from icing at the outlet during expansion to ensure compliance with the tests requirements detailed in part 2, section 3.

5.3 CYLINDERS

- 5.3.1 Cylinders to be used for the inflation of a life raft shall be constructed, tested and marked in accordance with the requirements of the Canadian Transport Commission, United States Department of Transportation, the British Standard Specification, or any other standard specification acceptable to the Board.
- 5.3.2 The neck of the cylinder shall be threaded to receive a valve unit that will retain the gas in the cylinder and, in conjunction with the operating head, release the gas at the desired moment in a controlled manner to satisfy all test conditions as detailed in part 2, section 3.
- 5.3.3 Each cylinder referred to in 5.3.1 shall be
 - (a) permanently marked with the specification designation appropriate to it;
 - (b) its weight when empty or maximum gas pressure; and,

- (c) stencilled or marked by other satisfactory means with details and weight or pressure of the gas charge.

5.4 OPERATING HEAD

5.4.1 The gas release mechanism for a cylinder used in the inflation of a life raft shall

- (a) if the cylinder valve and operating head are separate components, be a detachable operating head screwed onto the valve unit in the neck of the cylinder, the handing of the thread being so arranged that, when the operating head is screwed on, there is no tendency to slacken the valve in the cylinder;
- (b) operate in such a manner that a pull on the operating line opens a valve and releases gas;
- (c) incorporate
 - (i) some positive means of retaining the valve in the open position after it has been operated; and,
 - (ii) an indicator that shows whether or not the operating head has been operated; and,
- (d) be watertight.

5.4.2 Suitable means shall be provided so as to prevent chafing of the life raft fabric by the operating head.

5.4.3 No system of inflation shall be used for an inflatable life raft that draws air from outside the cylinder.

5.4.4 The inflation of an inflatable life raft shall be achieved solely by the gas provided in the inflation cylinders.

5.5 HIGH PRESSURE HOSE ASSEMBLY

5.5.1 A suitable high pressure hose or manifold, where required, shall be provided to convey the gas from the cylinder to the inflatable chambers of the life raft.

5.5.2 The hose assembly, if fitted, shall

- (a) have a minimum bursting pressure of at least 50% greater than the gas delivery pressure;
- (b) operate satisfactorily over a temperature range of -45°C to +70°C;
- (c) be capable of being bent through 180° over a former having a radius of 5 cm, after conditioning at -50°C;
- (d) after having been bent as described in (c), satisfactorily pass the hydraulic test as prescribed in part 4, section 4;
- (e) be finally inspected by the makers inspector to verify that the hose is clean and free from particles with any foreign matter; and,
- (f) be marked with
 - (i) the makers name or trade mark;
 - (ii) the makers part number; and,
 - (iii) the date of the hydraulic test described in part 4, section 4.

5.6 VALVES

- 5.6.1 Non-return valves shall be provided at each point where gas for the inflation of a life raft enters an inflatable chamber from
- (a) the cylinder; or,
 - (b) another inflatable chamber.
- 5.6.2 Each chamber of a life raft shall be capable of withstanding a pressure equal to 3 times the nominal pressure and shall be prevented from reaching a pressure exceeding twice the nominal pressure by fitting
- (a) a safety relief valve; or,
 - (b) a limited gas supply.
- 5.6.3 Means shall be provided for fitting the top-up pump or bellows provided with the life raft equipment
- 5.6.4 The two functions described in 5.6.2 may be provided by one valve.

- 5.6.5 The safety relief valve shall
- (a) function so as to allow gas to escape should the pressure exceed that which would be safe for the chambers to carry; and,
 - (b) reseal at a pressure which will give satisfactory rigidity to the chambers.

5.7 DEFLATION

- 5.7.1 Deflation arrangements shall be fitted, but shall be kept to the minimum required for deflating the fully inflated life raft for re-packing.

6 INFLATABLE RESCUE PLATFORMS

6.1 GENERAL

- 6.1.1 Every inflatable rescue platform shall be constructed and tested as an inflatable life raft in accordance with this standard except for the following;

- a. canopy is not required;
- b. a single layer floor is mounted between the buoyancy compartments; and
- c. the device must be capable in performing its intended function in exactly the same manner either side up.

6.2 CAPACITY

- 6.1.2 The maximum number of persons an inflatable rescue platform may accommodate will not be greater than 75 persons and shall be calculated as the lesser of

- a. the greatest whole number obtained by dividing the volume, measured in cubic metres, of the main buoyancy chamber when inflated by 0.064;
- b. the greatest whole number obtained by dividing the inner horizontal cross-sectional area of the platform measured in square metres (which for this purpose may include thwarts, if fitted) measured to the innermost edge of the buoyancy chamber by 0.248; or

- c. the number of persons, each having an average mass of 75 kg, all wearing standard life-jackets, that can be seated with sufficient comfort without interfering with the operation of any of the platforms' equipment.

6.3 EQUIPMENT

- 6.3.1 Equipment shall be in accordance with the Life Saving Equipment Regulations, schedule II.
- 6.3.2 Equipment packs are to be accessible from both sides of the platform.
- 6.3.3 One (1) captive safety knife, adjacent to the painter on both sides of the platform

6.4 LIGHTING SYSTEMS

- 6.4.1 Every rescue platform shall be fitted with a portable automatically activated light, complying with section 3.10 of this part, so as to be accessible from both sides of the platform.

6.5 FITTINGS

- 6.5.1 Every inflatable rescue platform shall be provided with towing patches capable of withstanding a force required to tow the platform at a speed of at least 2 knots.
- 6.5.2 Water pockets are not required but if fitted, they shall be provided on both sides of the platform and constructed in accordance with ANNEX III.
- 6.5.3 If the floor includes one or more drains, each drain must be arranged to completely drain the floor of water when the device is fully loaded, and must prevent water from flowing back onto the floor.

6.6 BOARDING RAMPS and LADDERS

- 6.6.1 Every inflatable rescue platform capable in accommodating up to 38 persons, inclusive shall have at least one (1) semi-rigid boarding ramp to enable persons to board the platform from the sea and if inflated, so arranged as to prevent deflation of the platform if the ramps are damaged. In the case where platforms are capable in accommodating 38 persons or more, they shall be fitted with at least two diametrically opposed boarding ramps.
- 6.6.2 In addition to the boarding ramps, platforms accommodating up to and including 38 persons shall be fitted with one (1) boarding ladder while platforms accommodating more than 38 shall be fitted with two (2) boarding ladders.
- 6.6.3 The total number of boarding ramps and ladders required in paragraphs 6.6.1 and 6.6.2 refer to those which are capable of being used with either side up. The total number of boarding ramps and ladders shall be doubled on those platforms where the correct function of the boarding ramp or ladder is dependent on which side of the platform is floating up.

6.7 COLD INFLATION (0°C)

- 6.7.1 The inflatable rescue platform shall be subjected to an inflation test at a temperature of 0°C as follows;
- (a) the packed platform complete with its equipment shall be placed into a cold chamber for a period time sufficient for the core of the platform to reach a temperature of 0°C; and,
 - (b) upon attaining such a temperature be inflated by pulling the painter either;
 - (i) within the cold chamber; or,
 - (ii) removed from the cold chamber and inflated within a period of 5 minutes after removal.
- 6.7.2 The device shall begin to inflate and reach its nominal pressure within a period of 3 minutes, from pulling the painter, and upon completion of inflation, there shall be no seam slippage, cracking or other defect in the platform and it shall be in all respects ready for use upon completion of inflation.

NOTE: The use of dry ice for cold testing is not acceptable.

6.8 COLOUR and PASSIVE DETECTION

- 6.8.1 If the buoyancy tubes are not reddish orange, yellow, or a fluorescent colour of a similar hue, panels of such colour must be secured to the buoyancy chambers so that a minimum of 1 m² is visible from above the platform.
- 6.8.2 Every platform irrespective of its colour shall be fitted with retro-reflective tape on the upper and outer most surfaces of each buoyancy compartment so as to be visible from above and from water level.
- 6.8.3 The retro-reflective tape required in 6.7.2 shall be in sections of not less than 50 mm in width, not less than 300 mm in length and spaced so that the distance between the centres of adjacent sections is not more than 500 mm.

6.9 MARKINGS

- 6.9.1 Every inflatable rescue platform and its container shall be marked in accordance with section 3.11 except, there shall be no references to SOLAS and all references to LIFE RAFT shall be replaced with “**INFLATABLE RESCUE PLATFORM.**”

7 ADDITIONAL REQUIREMENTS FOR RIGID LIFE RAFTS

7.1 CONSTRUCTION

- 7.1.1 Buoyancy shall be provided by inherently buoyant material placed as near as possible to the periphery of rigid life raft.
- 7.1.2 Buoyant material used in the construction of a rigid life raft shall be fire retardant or protected by a fire retardant covering.
- 7.1.3 The floor of a rigid life raft shall prevent ingress of water, effectively support the occupants out of the water and, insulate the occupants from cold.

7.2 ACCESS

- 7.2.1 Access into a rigid life raft shall be as stipulated in subsection 4.4, except the boarding ramp required under 4.4.1 shall be rigid.

7.3 STABILITY

7.3.1 The strength and stability shall be such that the life raft is either self-righting, capable of being readily righted in a seaway and in calm water by one person or capable of operating safely with either side uppermost.

7.3.2 The stability shall be such that, when loaded with its full complement of persons and equipment, it can be towed at speeds of not less than 3 knots in calm water.

7.4 DAVIT LAUNCHED

7.4.1 In addition to the above requirements a rigid life raft designed for use with a launching device shall, when suspended from its lifting hook or bridle, withstand a load of 4 times the mass of its full complement and equipment.

7.5 SERVICE AND REPAIRS

7.5.1 Every rigid life raft shall be serviced in accordance with the instructions in the manufacturer's service manual and to the satisfaction of the board.

PART 2

1 PROTOTYPE TESTING

1.1 DROP TEST

1.1.1 Each size of life raft shall be subjected to two drop tests as follows

- (a) where the life raft in its operational condition is packed in a container or valise, one such test shall be carried out with the life raft packed in each type of container or valise in which the manufacturer proposes to market it;
- (b) the life raft in the operationally packed condition shall be suspended and dropped from a height of 18 m into the water;
- (c) if the life raft is to be stowed at a height greater than 18 m above the light waterline, it shall be drop tested from the height at which it is to be stowed;
- (d) during the drop test the free end of the painter shall be attached to the point of suspension, so that it pays out as the life raft drops.

1.1.2 Upon completion of the drop the life raft in its operationally packed condition shall be left floating for at least 30 minutes, after which period it shall

- (a) in the case of a rigid life raft, be lifted from the water to permit thorough inspection of the life raft, and the contents of its equipment container; and,
- (b) in the case of an inflatable life raft, be inflated and shall
 - (i) inflate upright;
 - (ii) inflate in the time period prescribed under section 3.4 of this part; and,
 - (iii) upon completion of satisfactory inflation be removed from the water and subjected to a thorough inspection as prescribed in (a), including the container or valise.

1.1.3 Damage to the life raft container or valise, if the life raft is normally within it when launched, shall be acceptable, provided

- (a) the Board is satisfied that it would not hazard the life raft; and,
- (b) damage to any item of equipment is acceptable, subject to the Board being satisfied that the operational efficiency has not been affected, and in particular damage to any fresh water receptacles may be accepted provided that they do not leak. However, for drop tests exceeding 18 metres, leakage from up to 5% of the receptacles is acceptable provided that:
 - i. the equipment list for the life raft specifies the carriage of 5% excess water or means of desalination adequate to produce an equivalent amount; or
 - ii. the water receptacles are contained in a waterproof overwrap.

1.1.4 An equipment container which is not an integral part of the life raft shall be capable of floating for a period of not less than 30 minutes without harm to its contents

1.2 JUMP TEST

1.2.1 It shall be demonstrated that a person can jump into the life raft, with and without the canopy erect, from a height of at least 4 m above the floor of the life raft without damage to it.

1.2.2 The test subject shall weigh not less than 75 kg and be wearing hard bottom shoes with smooth soles no protruding nails.

1.2.3 The jump test may be simulated by dropping a suitable and equivalent mass.

1.2.4 The number of test jumps performed shall be equal to the total number of persons which the life raft is to accommodate.

1.2.5 There shall be not any torn fabric, or damage to the seams as a result of this test.

1.3 WEIGHT TEST

1.3.1 A full equipped and packed life raft container shall be weighed to determine whether its mass exceeds 185 kg.

1.3.2 This test shall be performed on the heaviest variation of the life raft, considering different containers and equipment packs which may be used.

1.3.3 If the mass exceeds 185 kg, the different combinations of containers and equipment packs shall be weighed to determine which will and which will not exceed 185 kg.

1.4 TOWING TEST

1.4.1 It shall be demonstrated that the fully laden life raft is capable of being satisfactorily towed at a speed of 3 knots in calm water for at least 1 km. Towing should be by a line attached to the life raft's towing connection with the sea anchor streamed.

1.5 MOORING OUT TEST

1.5.1 A life raft shall be loaded with a mass equal to the total number of persons which it is to accommodate, each having an average mass of 75 kg, and its equipment, and shall be moored in a location at sea or in a seawater harbour.

1.5.2 The loaded life raft shall remain afloat for a period of not less than 30 days, and in the case of an inflatable life raft, the pressure may be topped up once a day using the manual pump or bellows; however during any 24 hour period the life raft must retain its shape.

1.5.3 Upon completion of the mooring out period, the life raft shall not have sustained any damage that would impair its performance.

1.5.4 Upon completion of this test, an inflatable life raft shall be subjected to the pressure test prescribed under section 3.7 of this part.

1.6 PAINTER SYSTEM TEST

1.6.1 The line to be used as a painter for a life raft shall be tensile tested and shall have a breaking strength as follows;

- (a) 15 kN for life rafts approved for more than 25 persons;
- (b) 10 kN for life rafts approved for 9 to 25 persons; and,
- (c) 7.5 kN for life rafts approved for less than 9 persons.

1.6.2 The weak link used in the life raft painter system shall be tensile tested and shall have a breaking strength of 2.2 kN ± 0.4 kN.

1.7 LIFE RAFT LIGHT TEST

1.7.1 Subject to paragraph 1.7.6, twelve life raft canopy lights and twelve interior life raft lights shall be subjected to the temperature cycling test as prescribed in **ANNEX I**, except, if the same type of light is used for both canopy and interior lights, only twelve of that type need be tested.

1.7.2 Four (4) life raft lights of each type, if applicable, shall be taken from a storage temperature and operated immersed in manner:

- (a) storage temperature of -30°C seawater temperature of -1°C.
- (b) storage temperature of +65°C; seawater temperature of +30°C.
- (c) storage temperature of +20°C; fresh water of +20°C.

1.7.3 Canopy lights when subjected to the requirements of 1.7.2 shall

- (a) provide a luminous intensity sufficient to be visible at a distance of 2 miles, on a dark night with a clear atmosphere; and,
- (b) operate for a period of not less than 12 hours.

1.7.4 In the case of a flashing canopy light, it shall be established that the rate of flashing during the first 2 hours of the 12 hour operative period, is not less than 50 flashes per minute.

1.7.5 Interior lights when subjected to the requirements of 1.7.2 shall

- (a) provide sufficient luminous intensity to read survival and equipment instructions; and
- (b) operate for a period of not less than 12 hours.

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

1.8 LOADING AND SEATING TEST

- 1.8.1 The freeboard of the life raft in the light condition, including full equipment but not personnel, shall be recorded prior to this test.
- 1.8.2 The freeboard of the life raft shall again be recorded, once the full complement, having an average mass of 75 kg. and each wearing an immersion suit, have boarded and are seated.
- 1.8.3 It shall be established that all the seated persons have sufficient space and headroom and that the various items of equipment can be used within the life raft in this condition. In the case of an inflatable life raft with the floor inflated.
- 1.8.4 The freeboard of the life raft on an even keel shall be not less than 300 mm when loaded with the complement, and equipment, and in the case of an inflatable life raft not with floor inflated.

1.9 BOARDING TEST.

- 1.9.1 The boarding test shall be carried out in a swimming pool by a team of not more than four (4) persons, who should be of mature age, of differing physiques, and preferably not strong swimmers. At least one subject shall be less than 75 kg.
- 1.9.2 For this test, persons described in 1.9.1, shall be clothed in shirt and trousers, or a coverall and be wearing an approved immersion suit.
- 1.9.3 Prior to boarding the life raft, each person should swim about 100 m and upon reaching the life raft, they shall attempt to board it immediately.
- 1.9.4 Each person shall attempt to board the life raft individually with no assistance from the other swimmers or persons already on board, the water should be of sufficient depth to prevent any external assistance when boarding.
- 1.9.5 Life raft boarding arrangements will be considered satisfactory if three of the four persons board the life raft unaided and the fourth boards with the assistance of the others.

1.10 STABILITY TEST

- 1.10.1 A floating life raft shall be boarded by the complement who shall sit on one side and then one end, if the life raft is other than circular in shape, and in each case, the freeboard of the life raft shall be recorded.

1.10.2 Under the conditions of loading as prescribed in 1.10.1, the freeboard of the life raft shall be such that there is no danger of it swamping. Freeboard should be measured from the waterline to the top surface of the uppermost main buoyancy tube at its lowest point.

1.10.3 The stability of a life raft shall be determined as follows;

- (a) two persons each wearing an immersion suit shall board the empty life raft;
- (b) it shall be demonstrated that the two persons can readily assist from the water a third person, also wearing an immersion suit, who is required to feign unconsciousness;
- (c) the third person shall have his back towards the life raft so that he cannot assist the rescuers;

1.10.4 In this test it shall be demonstrated that the water pockets of the life raft adequately counteract the upsetting movement on the life raft, and that there is no danger of the life raft capsizing.

1.11 MANOEUVRABILITY TEST

1.11.1 It shall be demonstrated that the life raft when loaded with its complement and equipment is capable of being propelled, in calm conditions, a distance of over 25 m, with the paddles provided as part of the standard equipment.

1.12 SWAMP TEST

1.12.1 It shall be demonstrated that the life raft when in a fully swamped condition is capable of supporting the number of persons it is to accommodate and remain seaworthy.

1.12.2 The life raft shall not seriously deform when loaded and fully swamped.

1.12.3 It should be tested in at least 10 waves at least 0.3 metres high. The waves may be produced by the wake of a boat or by other suitable means.

1.13 CANOPY CLOSURE HOSE TEST.

1.13.1 To ensure the effectiveness of the canopy closures to prevent water entering the life raft, a hose test, or other equally effective method shall be undertaken as follows;

- (a) a hose of 63.5 mm diameter fitted with a standard adjustable fire nozzle, shall be located at a point 3.5 m away from and 1.5 m above the level of the buoyancy tubes;
- (b) water at a rate of approximately 2300 litres per minute shall be directed at and around the entrances of the life raft for a period of 5 minutes.

1.13.2 As a result of this test there shall be no significant accumulation of water inside the life raft.

1.14 FLOAT FREE BUOYANCY TEST

1.14.1 It shall be demonstrated that the life rafts packed in containers, which are designed for float free operation, have sufficient inherent buoyancy to inflate the life raft by means of the actuating line, in the event of the ship sinking. The combination of equipment and container or valise should be that which produces the maximum packed weight.

1.15 DETAIL INSPECTION

1.15.1 The life raft, complete in all respects, and, if an inflatable life raft, in a fully inflated condition, shall be subjected to a detailed inspection in the manufacturers works to ensure that all the requirements of the Board are fulfilled.

2 ADDITIONAL TESTS FOR DAVIT-LAUNCHED LIFE RAFTS

2.1 STRENGTH TESTS OF LIFTING COMPONENTS.

2.1.1 The breaking strength of the webbing or rope and the attachments to the life raft used for the lifting bridle, shall be established by tests on three (3) separate pieces of each different item.

2.1.2 The combined strength of the lifting bridle components shall be at least 6 times the mass of the life raft when loaded with its equipment, and complement.

2.2 IMPACT TEST

2.2.1 The life raft shall be loaded with a mass equal to its equipment, and complement.

2.2.2 With the raft hanging free, it shall be pulled laterally to a position so that, when released it will strike a rigid vertical surface at a velocity of 3.5 m/sec.

2.2.3 Upon completion of this test, the life raft shall show no signs of damage which would affect its efficient functioning.

2.3 DROP TEST

2.3.1 The life raft, loaded as specified under 2.2.1, shall be suspended from an on-load release at a height of 3 m above the water surface, be released and allowed to fall freely into the water.

2.3.2 The life raft, upon completion of this test, shall be examined to ensure that no damage has been sustained which would affect its efficient functioning.

2.4 BOARDING TEST

2.4.1 A davit launched life raft shall, in addition to the boarding test prescribed in section 1.9, be subjected to the following test.

2.4.2 The life raft, hanging from a launching device and bowsed in to the ship's side or simulated ship's side, shall be boarded by the complement wearing immersion suits, with no undue distortion of the life raft.

2.4.3 The life raft bowsing shall be released and the life raft left hanging for a period of 5 minutes and then lowered to the sea or floor and unloaded.

2.4.4 At least three (3) tests shall be conducted in succession, with the hook of the lowering device so positioned that its distance from the ship's side is

- (a) half the beam of the life raft plus 150 mm;
- (b) half the beam of the life raft; and,

(c) half the beam of the life raft minus 150 mm.

2.4.5 For this test, boarding is to simulate actual shipboard conditions and shall be timed and recorded.

2.5 LOWERING TEST

2.5.1 A life raft shall be loaded with a weight equal to the mass of the total complement and its heaviest equipment pack and lowered, in continuous contact for 4.5 metres against a structure erected to represent the side of a ship having a 20° adverse list.

2.5.2 During and after the test, the life raft shall not sustain damage of distortion, or assume a position which would render it unsuitable for its intended purpose.

2.5.3 Inflation of an inflatable floor shall not be permitted during this test.

3 ADDITIONAL TESTS FOR INFLATABLE LIFE RAFTS

3.1 WIND TUNNEL TEST

3.1.1 The life raft in its packed condition with entrances open, but without container or valise, shall be inflated in a wind velocity of 30 m/s and left in this condition for not less than 10 minutes.

NOTE: Life rafts may require to be securely lashed down in place during this test

3.1.2 During the conditions in paragraph 3.1.1, the life raft shall be rotated 30° to port, 30° to starboard and return to the starting position.

3.1.3 The life raft shall be inspected for damage as per paragraph 3.1.5.

3.1.4 The life raft shall again be subjected to the wind conditions as per paragraph 3.1.1 for not less than 5 minutes in each of the following conditions:

- a. with the entrance to the wind open and the other entrances closed, if there is more than one entrance;
- b. with the entrance to the wind closed and the other entrances open, if there is more than one entrance; and
- c. with all entrances closed.

3.1.5 On completion there shall be no detachment of the arch support or canopy from the upper buoyancy tube or other damage which affects the efficient function of the raft.

3.2 DAMAGE TEST

3.2.1 It shall be demonstrated that in the event of any one of the buoyancy compartments being damaged or failing to inflate, the intact compartment or compartments shall support with positive freeboard over the life rafts periphery, the complement seated in their normal positions, or an equally distributed mass.

3.3 RIGHTING TEST

3.3.1 For this test a inflated life raft loaded with its heaviest equipment pack, shall be inverted in the water.

3.3.2 All entrances, ports, and other openings in the life raft canopy shall be opened in order to allow the infiltration of water into the canopy when capsized.

3.3.3 The canopy shall be allowed to fill completely with water, if necessary by partially collapsing the canopy support. Unless the raft is self-righting, it shall remain in this condition for not less than 10 minutes before righting is attempted.

3.3.4 The righting test shall be carried out by the same team as required for the boarding test, similarly clothed and wearing an immersion suit, and after preconditioning as prescribed in section 1.9.

3.3.5 The water shall be of sufficient depth to prevent any external assistance when mounting the life raft.

3.3.6 The righting arrangement shall be considered satisfactory, if each person rights the life raft unaided.

3.3.7 There should be no damage to the structure of the inflatable life raft, and the equipment pack should remain secured in place.

3.3.8 A life raft which can demonstrate that it will right itself when inflated upside down may dispense with the requirements of the righting test.

3.4 INFLATION TEST

3.4.1 A life raft, packed in each type of container, shall be inflated by pulling the painter, and the times recorded.

- (a) for it to become boardable, that is with buoyancy tubes inflated to full shape and diameter;
- (b) for the cover to be erect; and,
- (c) for the life raft to reach its full operational pressure when tested at
 - (i) ambient temperature between 18° and 20°C;
 - (ii) a core temperature of -30°C; and,
 - (iii) a temperature of +65°C.

3.4.2 The life raft shall achieve total inflation in not more than 1 minute when inflated in an ambient temperature of between 18 and 20°C.

3.5 COLD INFLATION TEST (-30°C)

3.5.1 The life raft shall be subjected to an inflation test at a temperature of -30°C. as follows

- (a) the packed life raft complete with its equipment shall be placed into a cold chamber for a period sufficient for the core of the packed life raft to reach a temperature of -30°C; and,
- (b) upon attaining a core temperature of -30°C., the life raft may
 - (i) be inflated within the cold chamber; or,
 - (ii) be removed from the cold chamber and inflated within a period of 5 minutes after removal by pulling the painter

3.5.2 The life raft shall begin to inflate and reach its nominal pressure within a period of 3 minutes, from pulling the painter, and upon completion of inflation, there shall be no seam slippage, cracking or other defect in the life raft, and it shall be in all respects ready for use upon completion of inflation.

NOTE: The use of dry ice for cold testing is not acceptable.

3.6 HOT INFLATION TEST (+65°C)

- 3.6.1 For the inflation test at +65°C, the packed life raft shall be kept at room temperature for at least 24 hours, then placed in a heating chamber at a temperature of +65°C for not less than 7 hours prior to inflation, upon removal from the heating chamber the life raft shall be inflated by pulling the painter.
- 3.6.2 The life raft shall begin to inflate and reach its nominal pressure within a period of 1 minute, from pulling the painter, and upon completion of inflation there shall be no seam slippage, cracking, swelling or other defects, and the life raft shall be in all respects ready for use upon completion of inflation.
- 3.6.3 Upon inflation the gas pressure relief valves must be of sufficient capacity to prevent damage to the life raft by excess pressure and to prevent the maximum pressure during the inflation from reaching twice the reseal pressure of the release valve.

3.7 PRESSURE TEST

- 3.7.1 Each inflatable compartment in the life raft shall be tested to a pressure equal to 3 times the nominal pressure for not less than 30 minutes.
- 3.7.2 Each pressure relief valve shall be made inoperative, the inflation system disconnected and compressed air shall be used to inflate the life raft.
- 3.7.3 The pressure shall not decrease by more than 5% as determined without compensating for temperature and atmospheric pressure changes, and there shall be no seam slippage, cracking or other defect in the life raft.
- 3.7.4 The measurement of pressure drop due to leakage may be started when it has been assumed that compartment rubber material has completed stretching due to the inflation pressure and stabilized. This test shall be conducted after equilibrium condition has been achieved.

3.8 SEAM STRENGTH

- 3.8.1 It shall be demonstrated that sample seams can withstand a test load equal to the life raft fabric tensile strength.

3.9 DAVIT-LAUNCHED INFLATABLE LIFE RAFT STRENGTH TEST

3.9.1 It shall be demonstrated by an overload test on the life raft hanging from its centre support, that the bridle system has an adequate factor of safety, as follows

- (a) the life raft shall be placed in a temperature of 20°C ($\pm 3^\circ$) for a period of at least 6 hours;
- (b) following this period of conditioning, the life raft shall be suspended from its lifting hook or bridle, and inflated (excluding the inflatable floor);
- (c) when fully inflated and all relief valves have reseated, all valves shall be made inoperative;
- (d) the life raft shall be lowered and loaded with a distributed mass equivalent to 4 times the mass of the complement and its equipment;
- (e) the life raft shall then be raised and remain suspended for not less than 5 minutes;
- (f) the pressure shall be recorded before the test, during suspension and after the weight is removed; and
- (g) any dimensional deflections or distortions of the life raft shall be recorded. During the test and after its completion, the life raft shall remain suitable for its intended use.

3.9.2 It shall be demonstrated, as follows, that the life raft will support a load of 1.1 times the complement and its equipment in a cold chamber at a temperature of -30°C;

- (a) The life raft shall be inflated (excluding floor) in a cold chamber and remain in the chamber with all relief valves operative for not less than 6 hour;
- (b) it shall then be loaded with the test weight in the cold chamber;
- (c) the loaded life raft shall then be suspended for not less than 5 minutes. If the raft must be removed from the chamber in order to suspend it, it shall be suspended immediately upon its removal.

- (d) During and after the test, the raft shall remain suitable for its intended use.

4 ADDITIONAL TESTS APPLICABLE TO RIGID LIFE RAFTS

4.1 BUOYANCY MATERIAL TEST

- 4.1.1 A total of twelve specimens of buoyancy material shall be required for this test.
- 4.1.2 Two (2) specimens of buoyant material, shall each be immersed for a period of 14 days under 100 mm head of
 - (a) crude oil;
 - (b) fuel oil;
 - (c) diesel oil;
 - (d) high octane petroleum spirit; and,
 - (e) kerosene.
- 4.1.3 All tests required under 4.1.2 shall be undertaken at normal room temperature, approximately 18°C, and with sample specimens as supplied.
- 4.1.4 Two additional samples shall be subjected to the temperature cycling test prescribed as **ANNEX I**, and subsequently tested against high octane petroleum spirit as prescribed in 4.1.2.
- 4.1.5 Upon completion of the tests prescribed under 4.1.2 and 4.1.4, all samples shall be subjected to the water absorption test as described in **ANNEX IV**.
- 4.1.6 The dimensions of all buoyancy material specimens shall be measured and recorded prior to and upon completion of the tests prescribed in this subsection.

4.2 FLOOR STRENGTH TEST

- 4.2.1 The life raft shall be placed on a firm and level surface, and loaded over its floor area with a mass to represent 100 % overload.

4.2.2 Any deflection of the life raft floor or buoyancy section shall be recorded.

4.2.3 No permanent distortion shall be noticeable when the load has been removed.

4.3 RIGHTING TEST

4.3.1 The life raft shall be placed into the water and shall be inverted if not of a design that can be used either side uppermost

4.3.2 The righting test shall be carried out by the same team of persons as required for the boarding test, similarly clothed, wearing immersion suits and after preconditioning as prescribed in section 1.9.

4.3.3 The water shall be of sufficient depth to prevent external assistance when mounting the inverted life raft.

4.3.4 Righting arrangements shall be considered satisfactory if each person rights the life raft unaided.

4.4 DAVIT LAUNCHED STRENGTH TEST

4.4.1 It shall be demonstrated by an overload test on the life raft hanging from its centre support, that the bridle system has the required factor of safety.

4.4.2 The life raft shall be loaded with a distributed mass equivalent to 4 times the mass of the complement and its equipment.

4.5 FLOAT FREE TEST

4.5.1 Where the design of a life raft incorporates holding down arrangements provided with automatic release or breaking points, or where a cover is provided to protect the life raft in its stowed position, it shall be demonstrated that the arrangements will not inhibit the float-free characteristics of the life raft.

PART 3

1 LIFE RAFT EQUIPMENT

- 1.1 Every life raft shall carry SOLAS class A or Class B equipment in accordance with Table 1 and the voyages for which the vessel is to be certificated.
- 1.1.2 In addition to the equipment required by the equipment table, every inflatable life raft shall be provided with
- (a) one repair outfit, for repairing punctures in the buoyancy compartments;
 - (b) one topping-up pump, or bellows, in the case where it is to accommodate 12 persons or less; and,
 - (c) two topping-up pumps, or bellows, in the case where it is to accommodate more than 12 persons.
- 1.1.3 Where ships are engaged on voyages of such a nature and duration that, in the opinion of the Board, not all the items specified in the Table are necessary, the Board shall allow life rafts carried on such ships to be provided with equipment marked as Class B in Table 1.
- 1.1.4 Notwithstanding the requirements of 1.1.3 the Board shall specify the life raft equipment required for ships engaged on Home Trade IV and Minor Waters II voyages according to the circumstances of each case.
- 1.1.5 Where appropriate, the equipment specified in the Table shall be stowed in a container which, if it is not an integral part of, or permanently attached to, the life raft, shall be stowed and secured inside the life raft.
- 1.1.6 The container referred to in 1.1.5 shall be capable of floating in water for at least 30 minutes without damage to its contents.

TABLE 1

ITEM	EQUIPMENT	CLASS
1	One buoyant rescue quoit, attached to not less than 30m of buoyant line	A & B
2	One safety knife of the non-folding type, having a buoyant handle and hand guard, attached and stowed in a pocket on the exterior of the canopy near the point at which the painter is attached to the life raft. In addition, a life raft approved for 13 persons or more shall be provided with a second safety knife, which need not be of the non-folding type	A & B
3	One buoyant bailer (Two (2) where it accommodates 13 or more persons)	A & B
4	Two sponges	A & B
5	One (1) efficient radar reflector	A & B
6	Two sea anchors complying with the specifications of ANNEX II, one being spare, and one permanently attached	A & B
7	Two buoyant paddles	A & B
8	Three safety openers suitable for opening water and food containers	A
9	One whistle or equivalent sound signal	A & B
10	Four (4) parachute distress signals Two (2) parachute distress signals	A B
11	Six (6) hand distress signals Three (3) hand distress signals	A B
12	Two (2) buoyant smoke signals One (1) buoyant smoke signals	A B
13	One waterproof electric torch suitable for Morse signalling, with spare batteries and bulb in a water-proof container	A & B

14	Six (6) doses of anti-seasickness pills plus one (1) seasickness bag for each person	A & B
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ITEM	EQUIPMENT	CLASS
15	One daylight signalling mirror, with instructions for use in English and French on it's use for signalling to ships and aircraft	A & B
16	A first aid kit in a watertight resealable container	A & B
17	One illustrated copy of life saving signals in English and French, on a waterproof card or in a waterproof container.	A & B
18	A food ration totalling not less than 10,000 kJ for each person.	A
19	One set of fishing tackle	A
20	Watertight receptacles containing a total of 1.5 litres of fresh water for each person, of which 0.5 litres/person may be replaced by desalting apparatus capable of producing an equal amount of fresh water in 2 days.	A
21	One rustproof graduated drinking vessel	A
22	Instructions on how to survive in English and French	A & B
23	Instructions for immediate action in English and French.	A & B
24	Thermal protective aids for 10% of the complement or two (2) whichever is greater	A & B
25	One repair outfit for repairing punctures in buoyancy compartments	A & B
26	One topping-up pump or bellows	A & B

1.1.7 Life raft equipment shall be as follows

a. Sea Anchor

Sea anchors or drogues shall meet the specifications of ANNEX II.

b. Bailer

Bailers shall be buoyant, not less than 1 litre capacity and shall not have sharp edges.

c. Knife

A knife shall be contained in a sheath at the life raft entrance to facilitate cutting the painter, so shaped as to minimize the danger of cutting the buoyancy chamber fabric, and attached to the life raft by a lanyard.

d. Pump

A pump shall be a hand operated device for inflating the buoyancy chambers, and capable of attachment to the topping-up valves.

e. Sponges

Sponges shall be of sufficient size to dry a life raft with reasonable rapidity.

f. Repair kit

A repair kit shall contain, 3 assorted leak stoppers, rubber patching solution, and patching fabric.

g. Quoit and Heaving Line

A heaving line shall be 30m in length, flexible under all ordinary circumstances of wetness and temperature, and shall be attached to a buoyant quoit.

h. Paddles

Paddles shall be buoyant, suitable for the purpose, and may be made in sections to facilitate stowage.

i. Torch

A torch shall be of a waterproof type, suitable for Morse signalling, and shall include spare batteries and one spare bulb packed in a waterproof container.

j. Distress Signals

All distress signals shall be of an approved type.

k. Daylight Signalling Mirror (Heliograph)

A daylight signalling mirror shall consist of a reflective device with means of aiming, and shall carry operating instructions in both English and French, a means of protecting the reflective surface shall be provided.

l. Whistle

A whistle shall be made of a rustproof material, and shall have a loud shrill note.

m. Fishing Kit

A fishing kit shall contain at least one line and six (6) hooks.

n. Rations

Food rations shall consist of not less than 10,000 kJ for each person, contained in an airtight package and kept in a watertight container.

o. Fresh Water

Fresh water shall be contained in sealed units of poly-foil type material.

p. Drinking Vessel

A graduated drinking vessel shall be made of rustproof material, and marked at 30, 45 and 60 millilitre levels.

q. Opener

Safety openers suitable for opening the water containers.

r. Life Saving Signals

Illustrated table of life saving signals, TP 8121.

s. Equipment Container

The Equipment, other than ready use items such as heaving line, knife, paddles, and pump, shall be stowed in a container or containers that will, provide protection against damage by penetration of water, withstand the drop test prescribed in part 2, section 1.1. The container shall be capable of being readily opened, packed in such a manner that items of primary importance, such as distress signals are readily accessible, secured inside the life raft, buoyant when packed, if placed in the water, and, clearly marked in English and French to indicate the equipment it contains.

t. First Aid Kit

A first aid kit shall contain the following

i.	Bandage adhesive absorbent dressing 7.5 x 2.2 cm individually wrapped	16
ii.	Bandage gauze 5 cm x 4.6 m	2
iii.	Compress and bandage 10 x 10 cm (compress) with 90 cm gauze tabs	4
iv.	Sterile Abdominal Pad 15.2 x 20.3 cm	2
v.	Bandage Muslin - Triangular white folded & compressed 91.0 x 96.5 x 137 cm	2
vi.	Sterile eye pad, 4.69 x 6.98 cm	10
vii.	Extraocular ophthalmic irrigating solution (unbreakable bottle) DIN required (dated)	120ml
viii.	Eyewash cup, unbreakable plastic	1
ix.	Wire splint 9.5 x 60 cm	1
x.	Ammonia inhalant (individual packs)	10
xi.	Povidone & Iodine impregnated Pads (dated)	10
xii.	Pocket book guide to first aid St. John Ambulance (bilingual)	1
xiii.	Bilingual Sheet content list & instructions (waterproof)	1
xiv.	Safety pins (may be included in bandage packs)	6
xv.	Pair bandage scissors (Stainless Steel)	1
xvi.	Waterproof tape adhesive (roll) 2.5 cm x 4.5 m	1

N.B. All sizes and quantities are minimum requirements. Clear flexible re-sealable pack for liferafts, 0.008 ml flexible vinyl or equivalent.

Pack material must be capable of withstanding -30°C.

PART 4

PRODUCTION AND INSTALLATION TESTS

1 GENERAL REQUIREMENTS

- 1.1 The Board may require random inspections of manufacturers premises to ensure that the quality of life rafts and the materials used comply with the specifications of the approved prototype.
- 1.2 Manufacturers shall be required to institute a quality control procedure to ensure that life rafts are produced to the same standard as the prototype approved by the Board.
- 1.3 Where the proper operation of a life raft is dependent on its correct installation on board ship, the Board shall require installation tests to ensure that the life raft has been correctly fitted.

2 INFLATABLE LIFE RAFT OPERATIONAL TEST

- 2.1 The Board shall, at its discretion, select a completed and operationally packed life raft at random, and carry out an operational inflation test on a smooth dry surface or on water, as a check on the inflation and packing.
- 2.2 The actual distribution of life rafts inflated during a period is at the discretion of the Board so as to achieve an adequate sampling of the entire production, and it must be observed that undue effort is not required to secure inflation, and that the time of inflation is normal.
- 2.3 Each life raft produced shall be inspected for defects and dimensional deviations.
- 2.4 Each life raft produced shall be inflated with air to at least 1.5 times its nominal pressure, and after 30 minutes, the life raft shall not show signs of seam slippage or rupture, nor shall the pressure decrease by more than 5 %.
- 2.5 The life raft chamber relief valves shall be inoperative for the test under 2.4, and following the test, each relief valve shall be tested for proper relief and reseating pressure.

- 2.6 The gas tight integrity of each inflated compartment of each life raft produced shall be checked by inflating with air to its nominal pressure, and after 1 hour, the pressure shall not have decreased by more than 2 % after compensation for temperature and barometric pressure.
- 2.7 During the test prescribed under 2.6, the pressure shall be checked and adjusted to the nominal pressure as necessary 30 minutes after inflation, and more than one compartment may be tested at one time, but, adjacent compartments with common pressure barriers shall be open to the atmosphere during the test.
- 2.8 If the insulation of the life raft floor is obtained by inflation, it shall be inflated to its designed pressure and after a period of 1 hour, the pressure shall not have decreased by more than 2 % after compensation for temperature and barometric pressure changes.

3 DAVIT LAUNCHED LIFE RAFTS

- 3.1 Every new life raft intended for davit launching shall satisfactorily undergo a 10 % overload test in accordance with the approved drawings or construction specification before final inflation pressure test.
- 3.2 The conditions of the overload suspension test are
- (a) the 10 % overload shall be 10 % of the mass of the life raft assembly, together with its equipment and complement; and,
 - (b) the life raft must be inflated to nominal pressure determined by the reseal of the relief valves.

4 HOSE ASSEMBLY HYDRAULIC TEST

- 4.1 Each complete hose assembly shall have a test pressure of 126.5 kg. per sq. cm applied hydrostatically for a minimum duration of one (1) minute.
- 4.2 There shall be no leakage from the hose or end fitting of the assembly after the test.
- 4.3 Upon completion of the test each hose shall be
- (a) dried by blowing air through it; and,
 - (b) checked for length.

- 4.4 The length of the hose after it has been dried shall be within the limit stated on the approved drawing or specification of the hose.
- 4.5 A certificate from the manufacturer of the hose attesting to these requirements will be acceptable.

PART 5

APPROVAL CONDITIONS

1 PROCEDURE

- 1.1 The Board shall consider design approval of a life raft when the manufacturer has submitted
- (a) all relevant plans, drawings, and specifications for the life raft;
 - (b) repair and production quality control manuals; and,
 - (c) details of all components to be used in the construction and repair of the life raft.
- 1.2 The Board will consider the approval a life raft when
- a. the manufacturer has subjected a prototype life raft to all applicable tests as prescribed in this standard in the presence of a Canadian Coast Guard inspector;
 - b. it is satisfied with the submissions required under 1.1 that all applicable tests have been successfully completed;
 - c. it is satisfied that provisions have been made for the inspection, testing and servicing of production line life rafts.
- 1.3 Following testing, two (2) 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 life raft identified therein, and, only when such life raft is manufactured in accordance with the relevant requirements of this standard and the Approval Certificate.
- 1.6 Any modification to an existing approved life raft shall be submitted to the Approval Authority for its consideration, and shall be tested in accordance with the requirements of this standard, as applicable.

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 Records 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) 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 after production ceases, unless otherwise required by the Board.

2.4 In the case of a failure, a detailed report shall be forwarded to the nearest Ship Safety office.

2.5 The records shall be available for inspection by, or submission to, the Approval Authority upon request.

ANNEX I

TEMPERATURE CYCLING TEST

- 1 Each object shall be alternately subjected to surrounding temperatures of -30°C and +65°C.
- 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.
- 3 Room temperatures is taken to be between +20°C ($\pm 2^\circ$).

ANNEX II

SPECIFICATIONS FOR LIFE RAFT SEA ANCHOR

- 1 The sea anchor shall be **CONICAL** in shape and of the following principle dimensions
 - (a) for a life raft approved to accommodate up to 10 persons, it shall have a minimum mouth diameter of 400 mm and a minimum sloping length of 600 mm; and,
 - (b) for a life raft approved to accommodate more than 10 persons, it shall have a minimum mouth diameter of 500 mm and a minimum sloping length of 670 mm.
- 2 The sea anchor material shall be porous, slightly stiff and shall allow a water penetration of approximately 11 cubic centimetres per second per square centimetre, (cc/sec/cm^2), at a pressure head of 5.6 centimetres, (approximately equal to a speed through the water of 2 knots).
- 3 The line used to secure the sea anchor to the life raft shall be rot-proof and braided, and shall be at least 30 m long, not less than 8 mm in diameter and have a breaking load including attachments and knots, of not less than
 - (a) 7.5 kN for life rafts approved to accommodate 8 persons or less;
 - (b) 10 kN for life rafts approved to accommodate between 9 and 25 persons; and,
 - (c) 15 kN for life rafts approved to accommodate more than 25 persons.
- 4 Sea anchor shroud lines shall be designed to restrict the anchor from tumbling through itself.
- 5 The sea anchor shall be stable when towed at various speeds up to 6 knots through the water.
- 6 The mouth of the sea anchor shall open immediately on deployment.

ANNEX III

SPECIFICATIONS FOR WATER POCKETS - INFLATABLE LIFE RAFTS

- 1 An inflatable life raft shall be fitted with water pockets complying with the following requirements.
- 2 The cross-sectional area of the pockets shall form the shape of an ISOSCELES TRIANGLE with the base of the triangle attached to the underside of the life raft.
- 3 The design shall be such that the pockets fill to approximately 60% of capacity within 15 to 25 seconds of deployment.
- 4 The pockets shall have a normal total aggregate capacity of 250 litres for inflatable life rafts up to and including 10 person capacity, but in no case shall this total aggregate capacity be less than 225 litres.
- 5 The pockets to be fitted to life rafts approved to accommodate more than 10 persons shall normally have a total aggregate capacity of $(20 \times N)$ litres: where N = the number of persons carried, but in no case should the total aggregate capacity be less than $(18 \times N)$ litres.
- 6 The pockets shall be attached on all their base sides to the underside of the life raft.
- 7 The pockets shall be distributed symmetrically round the circumference of the life raft either side of the gas bottle (s) with sufficient separation between each pocket to enable air to escape readily.
- 8 The minimum number of pockets should normally be as follows:

Size of Life raft	Number of Pockets
Up to and including 8 persons.....	5
9 to 16 persons inclusive.....	7
17 to 25 persons inclusive.....	11
26 to 50 persons.....	as determined by the Board



ANNEX IV

WATER ABSORPTION TEST

- 1 All specimens that are required to undergo a water absorption test shall be subjected to the following:
- 2 The water absorption test shall be carried out in **FRESH WATER**.
- 3 Specimens shall be immersed for a period of 7 days under a 1.25 m head of water.
- 4 The test 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.
- 5 Two specimens shall be immersed for a period of 24 hours under 100 mm head of diesel oil (or specified), at ordinary room temperatures, and after this immersion shall show no signs of damage such as shrinking, cracking, swelling, dissolution or change in mechanical qualities.
- 6 Dimensions of the specimens shall be taken prior to and upon completion of the tests.
- 7 The results of these tests shall state the mass in kilograms, which each specimen will support out of the water after one and seven days immersion, the reduction in buoyancy must not exceed 5%, and the specimens shall show no signs of damage such as shrinking, cracking, swelling, dissolution, or change in mechanical qualities.