

**STANDARDS FOR
LIFEBUOYS AND INTEGRAL EQUIPMENT**

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1 SCOPE

- 1.1 Every lifebuoy, lifebuoy self-igniting light, and self-activating smoke signal that is manufactured on or after July 1, 1986, for use on board a Canadian ship, shall comply with the requirements of this standard.
- 1.2 Lifebuoys, self-igniting lights, and self-activating smoke signals conforming to this standard shall be 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 1983.
- 1.3 Tests required by this standard shall be conducted by
- a. a testing establishment recognized by the Board; or,
 - b. at a manufacturer's premises in the presence of an inspector.
- 1.4 Every production line lifebuoy, self-igniting light, or self-activating smoke signal shall be manufactured to the same standard as the approved prototype device

2 DEFINITIONS

- 2.1 A 762 lifebuoy means in respect to these standards, a lifebuoy having an outside diameter of not more than 800 mm, an inside diameter of not less than 400 mm, a major axis of 150 mm, and a minor axis of 100 mm.
- 2.2 A 610 lifebuoy means, in respect to these standards, a lifebuoy having an outside diameter of not more than 610 mm, an inside diameter of not less than 356 mm, a major axis of 127 mm, and a minor axis of 95 mm.
- 2.3 A 508 lifebuoy means, in respect to these standards, a lifebuoy having an outside diameter of not more than 508 mm, an inside diameter of not less than 280 mm, a major axis of 114 mm, and a minor axis of 89 mm.
- 2.4 Approval Authority means the Department of Transport, Board of Steamship Inspection;
- 2.5 Approved means approved by the Board;
- 2.6 C.G.S.B. means the Canadian General Standards Board;

- 2.7 Independent Laboratory, means a laboratory engaged in the testing and inspection of marine equipment and material, that is not owned or controlled by a manufacturer, or by a supplier of materials to a manufacturer
- 2.8 Inspector means a steamship inspector appointed pursuant to section 366 of the Canada Shipping Act;
- 2.9 Self-igniting light, means a light which upon entry into the water will self ignite to display a light of luminous intensity as required by this standard.
- 2.10 Self-activating smoke signal, means a signal which upon entry into the water will self activate and provide a dense volume of smoke as required by this standard.
- 2.11 Storage life of a power source of a light, means the length of time that a power source may be stored under typical marine environmental conditions while retaining sufficient power to meet the performance requirements of this standard.

PART I - LIFEBOUYS

3 GENERAL REQUIREMENTS

3.1 CONSTRUCTION

- 3.1.1 Every lifebuoy shall be constructed of inherently buoyant material and not be dependent on, cork shavings or granulated material, any other loose granulated material or any air compartment which depends on inflation for buoyancy.
- 3.1.2 A 762 lifebuoy shall be capable of supporting a weight of 14.5 kg. of iron in freshwater for a period of 24 hours.
- 3.1.3 A 610 and 508 lifebuoy shall be capable of supporting a weight of 7.5 kg. of iron in freshwater for a period of 24 hours.
- 3.1.4 A 762 lifebuoy shall have a mass of not less than 2.5 kg. nor more than 6 kg.
- 3.1.5 A 610 and 508 lifebuoy shall have a mass of not less than 1.1 kg. nor more than 6 kg.

- 3.1.6 A lifebuoy shall not sustain burning or continue melting after being enveloped in fire for a period of 2 seconds.
- 3.1.7 Every 762 lifebuoy shall be constructed to withstand a drop into water from a height of at least 30 m without impairing either its operating capability or that of its attached components.
- 3.1.8 Every 762 lifebuoy shall have a mass **of not less than 4 kg. if it is intended to operate** the quick-release arrangement provided for self-igniting lights or self-activating smoke signals.

3.2 LIFEBOUY COVERING

- 3.2.1 If a covering is fitted on a lifebuoy, it shall be made with suitable material approved by the Board.
- 3.2.2 A lifebuoy that is not covered shall have a hard smooth surface that is resistant to usage.
- 3.2.3 The cover shall be coloured
- a. a highly visible shade of
 - i yellow,
 - ii orange, or
 - iii Red and white quartered; or
 - b. in the case of a 610 and 508 lifebuoy, white.
- 3.2.4 Every 762 lifebuoy shall have affixed to it retro-reflective tape in accordance with the provisions of section 3.4

3.3 LIFEBOUY GRAB LINES

- 3.3.1 Every lifebuoy that is covered shall have grablines of good quality, unkinkable line, not less than 9.5 mm in diameter, well secured to the cover by sewing, seizing or bonding, and, in addition, by bands of double thickness of the lifebuoy covering material 75 mm wide around the section of the lifebuoy at four equidistant points, providing four loops of line each not less than,
- a. in the case of a 762 lifebuoy, 710 mm long;

- b. in the case of a 610 lifebuoy, 610 mm long; and,
- c. in the case of a 508 lifebuoy, 460 mm long.

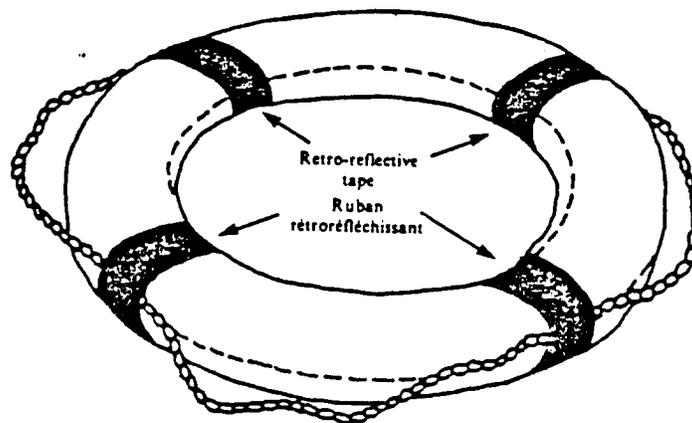
3.3.2 Each uncovered lifebuoy shall have the grab lines specified in 3.3.1 secured in a manner equivalent to the manner specified in respect to covered lifebuoys.

3.4 RETRO-REFLECTIVE TAPE

3.4.1 Every 762 lifebuoy shall have affixed to it retro-reflective tape as follows

- a. in this subsection CGSB means the Canadian General Standards Board;
- b. retro-reflective tape required under this subsection shall be manufactured in accordance with CGSB specifications 62.GP.11 or 62.GP.12;
- c. retro-reflective tape shall be not less than 50mm width; and,
- d. affixed at four equidistant points around the core, so as to be visible on both sides of the lifebuoy, as shown in the following diagram.

DIAGRAM



4 BUOYANT LIFELINE

- 4.1 Buoyant lifelines shall
- a. be non-kinking;
 - b. have a diameter of not less than 8 mm;
 - c. have a breaking strength of not less than 5 kN; and,
 - d. float for a period of at least 6 hours.

5 TESTING REQUIREMENTS

5.1 TEMPERATURE CYCLING TEST

- 5.1.1 A sample of two lifebuoys shall be subjected to the Temperature Cycling test specified under annex 1 attached.
- 5.1.2 During the temperature cycling test the lifebuoys shall show no signs of loss of rigidity under the high temperatures specified in Annex 1.
- 5.1.3 Upon completion of the Temperature cycling test the lifebuoys shall show no sign of damage such as shrinking, swelling, cracking, dissolution or change in mechanical properties.

5.2 DROP TEST

- 5.2.1 A sample of two 762 lifebuoys shall be dropped into the water from the height at which they are to be stowed on ships in their lightest seagoing condition, or, 30 m, whichever is greater, without showing damage.
- 5.2.2 Upon completion of the drop test, one lifebuoy shall be dropped 3 times from a height of 2 m onto a concrete floor.
- 5.2.3 The lifebuoys shall show no signs of damage that would effect their function upon completion of the drop tests.

5.3 OIL RESISTANCE TEST

- 5.3.1 One of the two sample lifebuoys shall be immersed horizontally for a period of 24 hours under a 100 mm head of DIESEL OIL at a temperature of 20 +/- 2 deg.C
- 5.3.2 Upon completion of the 24 hour period, the lifebuoy shall be removed, inspected and shall show no sign of damage such as, shrinking, swelling, cracking, dissolution or change in mechanical properties.

5.4 FIRE TEST

- 5.4.1 The sample lifebuoy other than that lifebuoy used for the Oil Resistance test shall be subjected to a fire test.
- 5.4.2 A test pan 30cm x 35cm x 6cm shall be placed in an essentially draught-free area and water added to the pan to a depth of 1 cm.
- 5.4.3 N-heptane shall be added to the pan on top of the water layer to form a total depth of liquid in the pan of not less than 4 cm.
- 5.4.4 The liquid in the pan shall be ignited and allowed to burn freely for a period of at least 30 Sec.
- 5.4.5 The sample lifebuoy shall be moved through the flames in an upright, forward, free-hanging position with the bottom of the lifebuoy 25 cm above the top edge of the test pan so that the duration of exposure to the flames is 2 Sec.
- 5.4.6 The lifebuoy shall not sustain burning or continue melting after being removed from the flames.

5.5 FLOTATION TEST

- 5.5.1 Each sample 762 lifebuoy upon completion of the tests under 5.1, 5.2, 5.3, and 5.4, shall be floated in fresh water with a weight of not less than 14.5 kg of iron freely suspended from them, for a period of 24 hours and at the end of the 24 hour period, both lifebuoys shall remain floating at essentially the same level as that at the commencement of the test.

5.5.2 Every 610 and 508 lifebuoy upon completion of the tests under 5.1, 5.3, and 5.4, shall be floated in fresh water with a weight of not less than 7.5 kg. of iron freely suspended from them for a period of 24 hours, and at the end of the 24 hour period, each lifebuoy shall remain floating at essentially the same level as that at the commencement of the test.

5.6 **STRENGTH TEST**

5.6.1 The strength test is applicable to all lifebuoys.

5.6.2 A sample lifebuoy body shall be suspended by a strap 50 mm wide.

5.6.3 A second strap 50 mm wide shall be passed around the opposite part of the lifebuoy body with a mass of 90 kg suspended from it.

5.6.4 After a period of 30 minutes the lifebuoy shall be examined and there shall be no evidence of breaks, cracks or permanent deformation.

5.7 **QUICK RELEASE OPERATION TEST**

5.7.1 The quick-release operation test is applicable to 762 lifebuoys.

5.7.2 A lifebuoy intended for quick release operation with a light or smoke signal attached shall, in addition to the tests previously described, be subjected to the following test.

5.7.3 A sample lifebuoy shall be arranged in a manner simulating its installation on a ship for release from the navigating bridge.

5.7.4 A lifebuoy light and smoke signal shall be attached to the lifebuoy in the manner recommended by the manufacturer of the light and smoke signal.

5.7.5 It shall be demonstrated that the lifebuoy can be released by a single action and upon entry into the water both the light and smoke signals shall be activated.

6 LIFEBUOY MARKINGS

- 6.1 Every lifebuoy shall be clearly and permanently marked **in english and French to show**
- a. the manufacturers name or logo;
 - b. the lot or batch number;
 - c. the height at which it was drop tested, in the case of a 762 lifebuoy;
 - d. **Department of Transport Approval Number in the following format "T.C.xxx.xxx.xxx"**
 - e. the mass of the lifebuoy in kilograms; and
 - f. the type number i.e. 508, 610 or 762.

7 PART II - LIFEBUOY SELF-IGNITING LIGHTS

7.1 GENERAL REQUIREMENTS

- 7.1.1 Lifebuoy self-igniting lights shall;
- (a) be such that they cannot be extinguished by water,
 - (b) be capable of either;
 - (i) burning continuously with a luminous intensity of not less than 2 cd in all directions of the upper hemisphere, or,
 - (ii) flashing at a rate of not less than 50 flashes per minute with at least the effective luminous intensity,
 - (c) be provided with a source of energy capable of meeting the requirements of subparagraph (b) for a period of at least 2 hours, and,
 - (d) be capable of withstanding the drop test required by paragraph 5.2.
- 7.1.2 Three sample lights shall be required for testing which shall be marked as "A", "B", and "C" to distinguish them from each other.

8 TESTING REQUIREMENTS

8.1 TEMPERATURE CYCLING TEST

8.1.1 A sample of three self-igniting lights shall be subjected to the Temperature cycling test prescribed in annex 1 attached.

8.1.2 Upon completion of the temperature cycling test the lights shall show no sign of damage such as shrinking, swelling, cracking, dissolution or change in mechanical properties.

8.2 OPERATION TEST

8.2.1 Immediately upon completion of the temperature cycling test self-igniting lights A and B shall be operated;

a. one in salt water at a temperature of -1 deg C, and

b. one in salt water at a temperature of +30 deg C,

both lights shall continue to provide a luminous intensity of not less than 2 cd or in the case of a flashing light, flash at a rate of not less than 50 flashes per minute with at least the corresponding effective luminous intensity.

8.2.2 The effective luminous intensity may be found from the formula;

$$\left[\frac{t_2}{1dt} \right] \left[\frac{t_1}{0.2 + (t_2 - t_1)} \right] \text{ Maximum}$$

8.2.3 At the end of one hour of operation the lights shall be immersed to a depth of 1 m for 1 minute, and shall not be extinguished and shall continue to operate

8.3 **DROP TEST**

8.3.1 Self igniting light A shall be subjected to two drop tests into water as prescribed in paragraph 5.2

8.3.2 The light shall be dropped;

(a) by itself, and

(b) attached to a lifebuoy.

8.3.3 Upon completion of each drop the light shall operate satisfactorily.

8.4 **SALT SPRAY TEST**

8.4.1 Self-igniting light B shall be subjected to a 5% NATRIUM CHLORIDE Solution spray at a temperature of +35 ($\pm 3^{\circ}\text{C}$) for a period of at least 100 hours.

8.4.2 At the end of the test period the light shall operate satisfactorily.

8.5 **FLOAT TEST**

8.5.1 Self-igniting light A or B shall be allowed to float in water in its normal operating position for a period of 24 hours.

8.5.2 If the light is an electric light, it shall be dismantled at the end of the test period and examined for the presence of water.

8.5.3 No evidence of water having penetrated the light.

8.6 **UNDERWATER TEST**

8.6.1 Self-igniting light C shall be immersed horizontally under 300 mm of water for a period of 24 hours.

8.6.2 If the light is an electric light, it shall be dismantled at the end of the test period and examined for the presence of water.

8.6.3 There shall be no evidence of water having penetrated the light.

8.7 LENS TEST

8.7.1 If the self-igniting light has a lens, one sample of the light shall be selected and cooled to a temperature of -18 deg C.

8.7.2 When cooled, the light shall be dropped twice from a height of 1 m, lens first, onto a rigidly mounted steel plate or concrete surface so that the center of the lens strikes the surface.

8.7.3 The distance of 1 m shall be measured from the top of the lens to the impact surface.

8.7.4 Upon completion of both drops, the lens shall not crack or have broken.

8.8 IMPACT TEST

8.8.1 One sample of a self-igniting light shall be placed on its side on a rigid surface.

8.8.2 A steel sphere, having a mass of 500 grams shall be dropped three times from a height of 1.3 m onto the case of the light.

8.8.3 It shall be arranged that the steel sphere strike the light case

- (a) near its center;
- (b) approximately 12mm from one end of the case; and,
- (c) approximately 12mm from the other end of the case.

8.8.4 The light case shall not break or crack, or be distorted in any way that would effect its watertight or operational integrity.

8.8.5 A force of 225 N shall be applied to the fitting that attaches the light to the lifebuoy, and neither the fitting nor the light shall be damaged as a result of this test.

9 **PART III - LIFEBUOY SELF-ACTIVATING SMOKE SIGNALS**

9.1 **GENERAL REQUIREMENTS**

9.1.1 Self-activating smoke signals shall

- (a) emit smoke of a highly visible color at a uniform rate for a period of at least 15 minutes when floating in calm water;
- (b) not ignite explosively or emit any flame during the entire smoke emission period of the signal;
- (c) not be extinguished by water in a seaway;
- (d) continue to emit smoke when fully submerged in water for a period of at least 10 Sec.; and,
- (e) be capable of withstanding the drop test required by section 5.2.

10 **TESTING REQUIREMENTS**

10.1 **TEMPERATURE CYCLING TEST**

10.1.1 Nine samples of self-activating smoke signals shall be subjected to the temperature cycling test prescribed in Annex 1 attached.

10.1.2 Upon completion of the temperature cycling test, the signals shall show no sign of damage such as shrinking, swelling, cracking, dissolution, or change in mechanical properties.

10.2 **OPERATION TEST**

10.2.1 Upon completion of the temperature cycling in Annex I, three signals shall be subjected to an ambient temperature of -30°C.; and three shall be subjected to an ambient temperature of +65°C. After a period of at least 48 hours respectively, the signals shall be operated in the following condition:

- (a) signals stored at -30°C; immersed in seawater at a temperature of -1°C; and

- (b) signals stored at +65°C; immersed in seawater at a temperature of +30°C.

10.2.2 The smoke signals shall emit smoke for a period of 7 minutes, after which the smoke emitting end of the signal shall be immersed to a depth of 25 mm for a period of not less than 10 sec. and upon being released the smoke signal shall emit smoke for the remainder of the required emitting period.

10.2.3 The smoke signal shall not ignite explosively or in a manner dangerous to persons close by.

10.3 DROP TEST

10.3.1 Three smoke signals attached to a lifebuoy in the manner recommended by the signal manufacturer, shall be subjected to the drop tests into the water as described under section 5.2.1.

10.3.2 The lifebuoy and attached smoke signal used in this test shall be dropped from a quick release fitting.

10.3.3 Upon completion of the drop test the smoke signal shall not be damaged, and shall function for a period of at least 15 minutes.

10.4 ADDITIONAL TESTS

10.4.1 Three sample signals shall be subjected to a temperature of +65°C and 90% relative humidity for at least 96 hours, followed by ten days at 20°C at 65% relative humidity and then function effectively.

10.4.2 It shall be demonstrated that three smoke signals will function effectively for each test after being

- (a) immersed horizontally for 24 hours under 1 m of water; and,
- (b) subjected to a 5% NATRIUM CHLORIDE Solution spray at a temperature of +35 (± 3°C) for at least 100 hours.

10.4.3 It shall be established by visual inspection that the smoke signal

- a. does not depend on adhesive tape or plastic envelopes for its water resistant properties; and,

b. can be indelibly marked with means for determining its age.

- 10.4.4 It shall be demonstrated that three smoke signals will function when floating in water covered by a 2 mm layer of N-heptane, without igniting the N-heptane.
- 10.4.5 Laboratory testing of the smoke signal shall establish that at least 70% obscuration throughout the minimum emission time is attained, when the smoke is drawn through a 19 cm diameter duct by a fan capable of producing an entrance air flow of 18.4 cu.m per minute.
- 10.4.6 It shall be established that the color of the smoke emitted is orange as defined by sections 34, 48, 49 or 50 of the publication "Color, Universal Language and Dictionary of names".
- 10.4.7 It shall be demonstrated that a smoke signal will function properly and for the minimum time period required in waves of at least 300 mm high.

11 MARKINGS

- 11.1 Every self-activating smoke signal and self-igniting light shall be clearly and permanently marked in both English and French, or with illustrations where necessary, with
- (a) the Manufacturers name, Trade Mark, or Logo;
 - (b) the type of device, its function, and operating period;
 - (c) Mounting, operating and maintenance instructions, if applicable;
 - (d) the Date of Manufacture;
 - (e) Batch or Lot number; and,
 - (f) Department of Transport Approval Number in the following format "T.C.xxx.xxx.xxx"

12 APPROVAL PROCEDURES

- 12.1 The Application for approval and test reports shall be sent to the Superintendent, Equipment and Operational Safety, Ship Safety Branch, Canadian Coast Guard, Ottawa, KIA ON7.

- 12.2 The tests required under this standard shall be conducted by or under the supervision of an Independent Laboratory
- 12.3 The Board shall consider approval of a lifebuoy, lifebuoy light, or lifebuoy smoke signal, when the manufacturer has submitted
- (a) all relevant plans, drawings, and specifications for the device;
 - (b) repair and production quality control manuals, as applicable;
 - (c) details of all components to be used in the construction, and repair if applicable, of the device; and,
 - (d) the name of the proposed independent laboratory, a description of the laboratory's qualifications to conduct or supervise the approval tests, and, an approved test plan describing in detail the proposed test procedures, apparatus and facilities
- 12.4 The Board shall consider approval a lifebuoy, lifebuoy light or lifebuoy smoke signal, when the manufacturer has subjected a prototype device to all applicable tests as prescribed in this standard, and it is satisfied with the submissions required under 12.3, and that all applicable tests have been successfully completed, that provisions have been made for inspection and testing of production line devices, is to its satisfaction.
- 12.5 Two copies of the test reports shall be forwarded to the Board for its consideration.
- 12.6 The Board shall review the test reports, and if the results in the report comply with the requirements of this standard, approval shall be granted.
- 12.7 The Approval granted is valid only for the device identified thereon, and, only when such device is manufactured in accordance with the relevant requirements of this standard and the Approval certificate.
- 12.8 Any modification to an existing approved device shall be submitted to the Board for its consideration, and shall be tested in accordance with the requirements of this standard, as applicable.

13 INSPECTION

13.1 LIFEBOUY

- 13.1.1 Before a batch of lifebuoys is shipped from the manufacturers premises, the manufacturer shall
- (a) select one lifebuoy from each batch of 250 or less and verify that it passes the strength and buoyancy tests prescribed in these standards and meets the other requirements of this standard; and,
 - (b) where the tested lifebuoy meets the test and requirements procedures of this standard, inspect the other lifebuoys in the batch to ascertain that they appear to be similar to the tested lifebuoy.
- 13.1.2 The manufacturer shall maintain records of each batch tested, such records shall be made available to the Approval Authority upon request.

13.2 LIFEBOUY LIGHTS AND LIFEBOUY SMOKE SIGNALS

- 13.2.1 A sample of 1% of each batch produced, and where a batch exceeds 1000, of every 1000 devices produced, shall be selected at random and shall be activated and observed for proper operation.
- 13.2.2 The tests required by this standard shall be conducted on at least 10 random samples selected from every 10 batches produced.
- 13.2.3 Notwithstanding the requirements of 13.2.2, tests shall be undertaken at least once annually, but need not be conducted more often than once in every calendar quarter.
- 13.2.4 Where production of a device is continuous, the tests required by this standard need only be performed every year, provided the Board is satisfied that the quality control procedures are being followed together with continuous production methods make more frequent testing unnecessary.

14 QUALITY CONTROL AND PRODUCTION INSPECTIONS

- 14.1 The manufacturers of lifebuoys, lifebuoy self-igniting lights and self-activating smoke signals shall

- (a) submit a detailed description of the quality control procedure used in production of that device to the Board for consideration and acceptance; and
- (b) ensure that production inspections described in the manufacturer's accepted quality control procedures are performed to the satisfaction of the Board.

15 RECORDS

15.1 Manufacturers are required to maintain records relating to the quality control and production tests carried out in accordance with this standard.

15.2 Records shall include

- (a) details of material purchases and use;
- (b) date when production commenced and terminated, if production was 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.

15.3 Manufacturers shall retain the records for a period of at least 60 months, unless otherwise required by the Board.

15.4 The records shall be available for inspection by, or submission to the Board upon request.

16 INSTRUCTIONS

16.1 The manufacturers of lifebuoys, lifebuoy self-igniting lights, and lifebuoy self-activating smoke signals, shall supply maintenance and installation instructions in both English and French with such device in a manner suitable for inclusion in an on-board training manual.

Annex 1

Temperature Cycling Test

1. All items that are required to undergo the temperature cycling test shall be subjected to the following:

Each object shall be alternately subjected to surrounding temperatures of -30 C and +65 C.

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 (+20°C) 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.