

U.S. Coast Guard Headquarters
Lifesaving & Fire Safety Standards Division
(CG-5214)

Guideline 156

Rescue Boats to SOLAS Requirements

June 1995

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- 156-19 Operation, maintenance, and training manual.

156-1 Incorporation by reference.

(a) Certain material is incorporated by reference into this guideline.

(b) The material incorporated by reference in this guideline and the sections affected are:

American Society for Testing and Materials (ASTM)

1916 Race St., Philadelphia, PA 19103

ASTM A 36-91, Standard Specification for
Structural Steel 156-9

ASTM D 525-91b, Standard Specification for
General Requirements for Steel Sheet,
Zinc-Coated (Galvanized) by the Hot-Dip
Process 156-9

ASTM D 638-84, Standard Test Method for Tensile
Properties of Plastics 156-13

ASTM D 790-84a, Standard Test Method for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials	156-13
ASTM F 1166-88, Standard Practice for Human Engineering Design for Marine Systems, Equipment, and Facilities	156-9
ASTM D 2584-68(1979), Standard Test Method of Ignition Loss for Cured Reinforced Resins ..	156-13

International Electrotechnical Commission (IEC)

Publications can be obtained from the ISO Central Secretariat or Bureau Central de la Commission Electrotechnique Internationale
1 Rue de Varembe,
Geneve
Switzerland

IEC 529, 1976, Amendment No. 1 April 1978, Classification of degrees of protection provided by enclosures	156-11
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International Maritime Organization (IMO)

Publications Section, 4 Albert Embankment, London SE1 7SR, England	
SOLAS Consolidated Edition, 1992.....	156-9
Resolution A.689(17), "Recommendation on Testing of Life-saving Appliances", 6 November 1991	156-13
Resolution A.760(18), "Symbols Related to Life-Saving Appliances and Arrangements, 19 November 1987	156-9
Resolution A.657(16), "Instructions for Action in Survival Craft", October 1989	156-19
Resolution A.658(16), "Use and Fitting of Retro-reflective Materials on Life-saving Appliances, October 1989	156-9

International Organization for Standardization (ISO)

ISO Central Secretariat
Case Postale 56,
CH-1211 Geneve 20
Switzerland

ISO 178 : 1975 Plastics - Determination of flexural properties of rigid plastics	156-13
ISO/R 527 : 1966 Plastics - Determination of tensile properties	156-13
ISO 1172 : 1975 Textile glass reinforce plastic- Determination of loss on ignition	156-13

Military specifications and standards

Standardization Documents Order Desk,
Building 4D, 700 Robins Avenue,
Philadelphia PA 19111-5094

MIL-C-17415F Cloth, Coated, and Webbing, Inflated Boat and Miscellaneous Use ...	156-9
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National Institute of Standards and Technology (formerly National Bureau of Standards)

National Technical Information Service
Springfield, VA 22161

NBS Special Publication 440 (Order No. PB265225), Universal Language and Dictionary of Color Names, 1976	156-9
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Underwriters Laboratories (UL)

Global Engineering Documents
15 Inverness Way East
Englewood, CO, 80112 ,USA
E-Mail:global@ihs.com
Phone:+1-800-854-7179 Fax:+1-303-397-2740

UL 1102, Standard for Nonintegral Marine Fuel Tanks dated January 31, 1992	156-9
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156-3 Scope.

(a) This guideline prescribes design, construction, and performance standards, tests, and procedures for approval of rescue boats used on other than protected waters.

(b) Each rescue boat must meet the requirements of Chapter III of the International Convention for the Safety of Life at Sea, 1974, as amended by the International Maritime Organization in its Resolution MSC.6(48), dated 17 June 1983 (SOLAS) and as specified in this guideline. The following SOLAS regulations apply to the construction of rescue boats approved under this guideline:

- (1) III/3 Definitions;
- (2) III/9 Operating Instructions;
- (3) III/30.2 General requirements for life-saving appliances;
- (4) III/41 General requirements for lifeboats;
- (5) III/47 Rescue Boats;
- (6) III/51 Training Manual; and
- (7) III/52 Instructions for on-board maintenance.

156-5 Independent laboratory.

Tests and inspections in this guideline required to be conducted by an independent laboratory shall be conducted by an independent laboratory accepted by the Commandant (G-MSE) under 46 CFR 159.010 to perform such tests and inspections. A list of accepted laboratories can be obtained from the Commandant (G-MSE), upon request.

156-7 Approval Procedure.

The procedure under 46 CFR 159.005 applies to the approval of a rescue boat.

(a) Pre-approval review. The manufacturer shall submit an application for pre-approval review that meets 159.005-5. The requirements of 159.005-5(a)(2) are met by submission of the following:

- (1) General arrangement drawing including principal dimensions;
- (2) Plans showing equipment stowage locations;

- (3) Seating arrangement plan;
- (4) Hull and canopy lay-up schedule for fiber glass boats;
- (5) Hull and canopy construction drawings including particulars of joins, welds, seams, and other fabricating details;
- (6) Specification and identification of materials such as steel, aluminum, resin, foam, fiberglass, cloth, and plastic used in the boat's manufacture;
- (7) Lines plans;
- (8) Propulsion system drawings and specifications;
- (9) Steering system drawings and specifications;
- (10) Release mechanism installation drawings and specifications; and
- (11) Any other drawing(s) necessary to show that the rescue boat complies with the requirements of this guideline.

(b) Prototype construction. If the information required under paragraph (a) of this section is satisfactory to the Commandant (G-MSE), fabrication of the prototype rescue boat shall proceed in the following sequence:

(1) The manufacturer shall arrange for the independent laboratory to inspect and test the prototype rescue boat during its fabrication and prepare an inspection and test report meeting the requirements of 159.005-11. The independent laboratory shall make such inspections and conduct such laboratory tests as are necessary to determine that the prototype meets the plans examined by the Commandant. These shall include laboratory tests required under 156-13, and at least one inspection during each of the following:

(i) Construction of the hull. Each major FRP component such as the hull, canopy (if applicable), and inner liner, shall be examined and weighed after it is completed but before it is assembled. If the boat is constructed by the spray lay-up technique, the hull and canopy thicknesses shall also be measured using ultrasonic or equivalent techniques.

(ii) Construction of the inflated tube, if applicable.

(iii) Welding of structural components to determine that the welders are appropriately qualified and that the welding procedure and materials meet the examined plans.

(iv) Pouring or installation of the buoyancy foam.

(v) Installation of the propulsion system.

(vi) Installation of the steering system.

(2) The manufacturer shall submit the independent laboratory's inspection report to the Commandant (G-MSE) for review.

(3) If the Commandant (G-MSE), upon review of the inspection report of the independent laboratory, finds the prototype rescue boat to be in compliance with the requirements of this guideline, the manufacturer may proceed with the approval tests required under 156-13.

(c) Prototype tests. The manufacturer shall notify the Commandant (G-MSE) when and where the approval tests required under 156-13 will take place. The notification shall be in sufficient time to allow a Coast Guard inspector to travel to the site where the testing is to be performed.

(1) The manufacturer shall allow the inspector access to any place where work or testing is performed on rescue boats or their component parts and materials for the purpose of any of the following:

(i) Assuring that the quality control program of the manufacturer is satisfactory;

(ii) Witnessing tests; or

(iii) Taking samples of parts or materials for additional inspections or tests.

(2) The manufacturer shall make available to the inspector the affidavits or invoices from the suppliers of all essential materials used in the production of rescue boats.

(d) Final application for approval. On conclusion of the approval testing, the manufacturer shall comply with the requirements of 46 CFR 159.005-9(a)(5) submitting the following to the Commandant (G-MSE) in sufficient detail to allow confirmation that the requirements of this guideline are met:

(1) A prototype test report. The report shall include a signed statement by the Coast Guard inspector who witnessed the testing, indicating that the report accurately describes the testing and its results.

(2) The final version of the plans required under paragraph (a) of this section including-

(i) Each correction, change, or addition made during prototype construction or as a result of approval testing;

(ii) Sufficient detail to determine that each requirement of this guideline is met;

- (iii) A complete material list, with each material referenced to a U.S. national standard or equivalent; and
 - (iv) Fabrication details for each major structural component, and each welded joint.
- (3) Stability data including righting arm curves in the light and loaded condition for both intact and flooded stability.
- (4) Hydraulic system drawings and specifications.
- (5) Electrical system schematics and specifications.
- (6) Full details of any other unique capability.
- (7) Drawings of "Hazard" and "Instruction" signs, showing actual inscription, format, color, size, and location.
- (8) A list of drawings, specifications, manuals, and any other documentation submitted, each identified by number, title, revision issue, and date.
- (9) Weights and thickness of each major FRP structural component before outfitting, including the hull, canopy, and inner liners.
- (10) Condition A and Condition B weights as described in 156-17.
- (11) An operation, maintenance, and training manual as described in 156-19.
- (12) A description of the quality control procedures and record keeping that will apply to the production of the rescue boat. These shall be in accordance with 156-15, and shall also include the system for checking supplier's material certifications, controlling inventory, and inspecting welding inspection procedures.

156-9 Design and performance.

(a) All rescue boats. Each rescue boat manufactured under this guideline must meet the requirements of this paragraph in complying with Regulations 3, 30.2, and 47.1 of Chapter III of SOLAS and be designed to be occupied and operated by persons wearing immersion suits.

Note: It is recommended that standard human engineering practices as described in ASTM F1166 be followed in the design of each rescue boat. Design limits should be based on a range from the fifth percentile female to the ninety-fifth percentile male values for critical body dimensions and functional capabilities as described in ASTM F1166. The dimensions for a person wearing an immersion suit correspond to the arctic clothed dimensions of ASTM F1166.

SOLAS REGULATION

COAST GUARD GUIDELINES

Regulation3

Definitions

13 Rescue boat is a boat designed to rescue persons in distress and to marshal survival craft.

15 Retro-reflective material is a material which reflects in the opposite direction a beam of light directed on it.

17 Survival craft is a craft capable of sustaining the lives of persons in distress from the time of abandoning the ship.

(1) Regulation III/3 The following additional definition applies -

Positive Stability is that condition of the rescue boat such that when it is displaced a small amount in any direction from upright, it returns on its own to the position before displacement.

Regulation9

Operating instructions

2 Posters or signs shall be provided on or in the vicinity of survival craft and their launching controls and shall:

.1 illustrate the purpose of controls and the procedures for operating the appliance and give relevant instructions or warnings;

.2 be easily seen under emergency lighting conditions;

.3 use symbols in accordance with the recommendations of the Organization.
(See guidelines for Regulation III/41.7.13)

Regulation30

General requirements for life-saving appliances

2 Unless expressly provided otherwise or unless, in the opinion of the Administration having regard to the particular voyages on

(2) Regulation III/30.2.1. Each major rigid structural component of each rescue boat must be constructed of steel,

which the ship is constantly engaged, other requirements are appropriate, all life-saving appliances prescribed in this part shall:

.1 be constructed with proper workmanship and materials;

aluminum or Fiber Reinforced Plastic (FRP) or materials accepted by the Commandant (G-MSE) as equivalent or superior.

(i) Steel. Sheet steel and plate must be low carbon, commercial quality, either corrosion resistant or galvanized as per ASTM A525, coating designation G115. Structural steel plates and shapes must be carbon steel as per ASTM A36. All steel products, except corrosion resistant steel, must be galvanized to provide high quality zinc coatings suitable for the intended service life in a marine environment. Corrosion resistant steel shall be a standard 302 stainless steel or equal.

(ii) Aluminum. Aluminum and aluminum alloys must be high purity for good marine corrosion resistance, free of iron and containing not more than 0.6% copper.

(iii) Welding. Welding must be performed by welders qualified by the Commandant (G-MSE), American Bureau of Shipping, U.S. Navy, or a Coast Guard accepted Coast Guard inspector. Only electrodes intended for use with the material being welded may be used. All welds must be checked using appropriate non-destructive tests.

(iv) Fiber Reinforced Plastic (FRP). The reinforcement used in FRP construction must be a good quality "E" or electrical grade glass. Resin shall be fire-retardant and approved under Guideline 201. A list of approved resins may be obtained from the Commandant (G-MSE) upon request. The finished FRP laminate must be smooth and have no defects such as protruding surface fibers, open voids, pits, cracks, bubbles, or blisters. The laminate must not have resin-starved or

resin rich-areas, must be cured, free of foreign matter, and not show any tackiness, delamination, peeling, or crazing.

(v) Buoyancy material. The buoyancy material must be approved by the Commandant (G-MSE) under guideline 202. A list of approved buoyancy foams may be obtained from the Commandant (G-MSE-3) upon request.

(vi) Coated Cloth. Coated cloth material used in the construction of rescue boats must be in accordance with 46 CFR 160.051-9(1)(i) and (ii).

.2 not be damaged in stowage throughout the air temperature range - 30°C to +65°C ;

.3 if they are likely to be immersed in seawater during their use, operate throughout the seawater temperature range -1°C to +30°C ;

.4. where applicable, be rot-proof, corrosion-resistant, and not be unduly affected by seawater, oil or fungal attack;

.5 where exposed to sunlight, be resistant to deterioration;

(3) Regulation III/30.2.4. Metals in contact with each other must be either galvanically compatible or insulated with suitable non-porous materials such as plastic, rubber, or neoprene based compounds, micarta, or equivalent materials. Provisions must also be made to prevent loosening or tightening resulting from differences of thermal expansion, freezing, buckling of parts, galvanic corrosion, or other incompatibilities.

.6 be of a highly visible colour on all parts where this will assist detection;

(4) Regulation III/30.2.6. The primary color of the following parts of the rescue boat must be vivid reddish orange (color number 34 of NBS Special Publication 440), or a fluorescent color of a similar hue:

(i) Exterior of the hull;

(ii) Exterior of any canopy or bow cover; and

(iii) The interior of the boat not covered by a canopy or bow cover.

.7 be fitted with retro-reflective material where it will assist in detection and in accordance with the recommendations of the Organization*;

(5) Regulation III/30.2.7. The exterior of the boat and canopy must be marked with Type II retroreflective material approved under subpart 164.018. The arrangement of the retroreflective material must comply with IMO Resolution A.658(16).

.8 if they are to be used in a seaway, be capable of satisfactory operation in that environment.

Regulation 47

Rescue boats

1 General requirements

1.1 Except as provided by this regulation, all rescue boats shall comply with the requirements of regulations 41.1 to 41.7.4 inclusive and 41.7.6, 41.7.7, 41.7.9, 41.7.12 and 41.9.

Regulation 41

(relevant excerpts)

Construction of [rescue boats]

1.1 All [rescue boats] shall be properly constructed and shall be of such form and proportions that they have ample stability

in a seaway and sufficient freeboard when loaded with their full complement of persons and equipment. All [rescue boats] shall have rigid hulls and shall be capable of maintaining positive stability when in an upright position in calm water and loaded with their full complement of persons and equipment and holed in any one location below the waterline, assuming no loss of buoyancy material and no other damage.

1.2 All [rescue boats] shall be of sufficient strength to:

.1 enable them to be safely lowered into the water when loaded with their full complement of persons and equipment; and

.2 be capable of being launched and towed when the ship is making headway at a speed of 5 knots in calm water.

1.3 Hulls and rigid covers shall be fire-retardant or non-combustible.

1.4 Seating shall be provided on thwarts, benches or fixed chairs fitted as low as practicable in the [rescue boat] and constructed so as to be capable of supporting the number of persons each weighing 100 kg for which spaces are provided in compliance with the requirements of paragraph 2.2.2.

(7) Regulation III/41.1.4. Seating must be provided on thwarts, benches or fixed chairs which are constructed so as to be capable of supporting each of the following, as applicable:

- (i) A static load, equivalent to the weight of the number of persons, each with a mass of 100 kg (220 lb), for which spaces are provided in compliance with the requirements of Regulation 41.2.2; and
- (ii) A mass of 100 kg (220 lb) in any single seat location on a davit launched rescue boat when it is dropped into the water from a height of at least 3 m (10ft).

1.5 Each [rescue boat] shall be of sufficient strength to withstand a load, without residual deflection on removal of that load:

.1 in the case of boats with metal hulls, 1.25 times the total mass of the [rescue boat] when loaded with its full complement

of persons and equipment; or

.2 in the case of other boats, twice the total mass of the [rescue boat] when loaded with its full complement of persons and equipment.

1.6 Each [rescue boat] shall be of sufficient strength to withstand, when loaded with its full complement of persons and equipment and with, where applicable, skates or fenders in position, a lateral impact against the ship's side at an impact velocity of at least 3.5 m/s and also a drop into the water from a height of at least 3 m.

1.7 The vertical distance between the floor surface and the interior of the enclosure or canopy over 50% of the floor area shall be: (Applies only if a canopy is provided.)

.1 not less than 1.3 m for a [rescue boat] permitted to accommodate nine persons or less;

.2 not less than 1.7 m for a [rescue boat] permitted to accommodate 24 persons or more;

.3 not less than the distance as determined by linear interpolation between 1.3 m and 1.7 m for a [rescue boat] permitted to accommodate between nine and 24 persons.

2 Carrying capacity of [rescue boats]

2.1 No [rescue boat] shall be approved to accommodate more than 150 persons.

2.2 The number of persons which a [rescue boat] shall be permitted to accommodate shall be equal to the lesser of:

.1 the number of persons having an average mass of 75 kg, all wearing lifejackets, that can be seated in a normal position without

(7) Regulations III/41.2.2 and III/47.1.2. Each rescue boat must have sufficient space to carry at least six persons having an average mass of 75 kg (165 lb), all wearing immersion suits. At least one person must be able to lie down and others seated in a normal seating position without interfering with the means of propulsion or the operation of any of the rescue boat's equipment.

interfering with the means of propulsion or the operation of any of the [rescue boat]'s equipment; or

.2 the number of spaces that can be provided on the seating arrangements in accordance with figure 1. The shapes may be overlapped as shown, provided footrests are fitted and there is sufficient room for legs and the vertical separation between the upper and lower seat is not less than 350 mm.

SEE FIGURE 1

(at end of text)

2.3 Each seating position shall be clearly indicated in the [rescue boat].

(8) Regulation III/41.2.3. Each seating position not on a bench or chair clearly intended for one person, must be indicated by a semicircle of a color that contrasts with the color of the seat.

3 Access into [rescue boats]

3.1 Every passenger ship [rescue boat] shall be so arranged that it can be rapidly boarded by its full complement of persons. Rapid disembarkation shall also be possible.

3.2 Every cargo ship [rescue boat] shall be so arranged that it can be boarded by its full complement of persons in not more than 3 min from the time the instruction to board is given. Rapid disembarkation shall also be possible.

3.3 [Rescue boats] shall have a boarding ladder that can be used on either side of the [rescue boat] to enable persons in the water to board the [rescue boat]. The lowest step of the ladder shall be not less than 0.4 m below the [rescue boat]'s light waterline.

(9) Regulation III/41.3.3. Applies only to rigid rescue boats, which must have a boarding ladder that can be used at any boarding entrance of the rescue boat.

3.4 The [rescue boat] shall be so arranged that helpless people can be brought on board either from the sea or on stretchers.

3.5 All surfaces on which persons might walk shall have a non-skid finish.

4 [Rescue boat] buoyancy

All [rescue boats] shall have inherent buoyancy or shall be fitted with inherently buoyant material which shall not be adversely affected by seawater, oil or oil products, sufficient to float the [rescue boat] with all its equipment on board when flooded and open to the sea. Additional inherently buoyant material, equal to 280 N of buoyant force per person shall be provided for the number of persons the [rescue boat] is permitted to accommodate. Buoyant material, unless in addition to that required above, shall not be installed external to the hull of the [rescue boat].

(10) Regulation III/41.4. Applies only to rigid rescue boats except that the inherently buoyant material may be installed external to the boat, if it is adequately protected.

5 [Rescue boat] freeboard and stability

All [rescue boats], when loaded with 50% of the number of persons the [rescue boat] is permitted to accommodate seated in their normal positions to one side of the centreline, shall have a freeboard, measured from the waterline to the lowest opening through which the [rescue boat] may become flooded, of at least 1.5% of the [rescue boat]'s length or 100 mm, whichever is the greater.

6 [Rescue boat] propulsion

6.1 Every [rescue boat] shall be powered by a compression ignition engine. No engine shall be used for any [rescue boat] if its fuel has a flashpoint of 43°C or less (closed cup test).
(SEE REGULATION 48.1.7 FOR EXCEPTION COVERING PETROL-DRIVEN OUTBOARD ENGINES)

(11) Regulations III/41.6.1 and III/47.1.7. Each rescue boat engine must be approved by the Commandant (G- MSE) under guideline 101. A list of approved engines may be obtained from the Commandant (G-MSE) upon request.

6.2 The engine shall be provided with either a manual starting system, or a power starting system with two independent rechargeable energy sources. Any necessary starting aids shall also be provided. The engine starting systems and starting aids shall start the engine at an ambient temperature of -15°C within 2 min of commencing the start procedure unless, in the opinion of the Administration having regard to the particular voyages in which the ship carrying the [rescue boat] is constantly engaged, a different temperature is appropriate. The starting systems shall not be impeded by the engine casing, thwarts or other obstructions.

6.3 The engine shall be capable of operating for not less than 5 min after starting from cold with the [rescue boat] out of the water.

6.4 The engine shall be capable of operating when the [rescue boat] is flooded up to the centreline of the crank shaft.

6.5 The propeller shafting shall be so arranged that the propeller can be disengaged from the engine. Provision shall be made for ahead and astern propulsion of the [rescue boat].

6.6 The exhaust pipe shall be so arranged as to prevent water from entering the engine in normal operation.

6.7 All [rescue boats] shall be designed with due regard to the safety of persons in the water and to the possibility of damage to the propulsion system by floating debris.

6.8 The speed of a [rescue boat] when proceeding ahead in calm water, when loaded with its full complement of persons and equipment and with all

(12) Regulation III/41.6.2. A hydraulic system, if used to start the engine, must be in accordance with 46 CFR 58.30. If a hand pump is provided, or if the engine has a manual starting system, adequate space must be provided for the hand pump or hand start operation. [46 CFR 58.30 requires hoses and fittings to meet 46 CFR 56.60. Sec. 56.60-25(c) covers nonmetallic flexible hose, which must meet SAE J-1942 with hose end fittings meeting SAE J-1475. Push-on type fittings such as Aeroquip 1525-X, 25156-X and FC332-X are not permitted. Length of flexible hose limited to 760 mm (30 in).]

(13) Regulation III/41.6.6. Engine exhaust must be routed away from bilge and potential oil drips. Any paint used on engines, manifolds or exhaust must not give off fumes when heated. All exhaust lagging must be non-absorbent.

(14) Regulation III/41.6.8 and III/47.1.7. The fuel tank and fuel system must be in accordance with either (i), (ii) or (iii) as follows:

engine-powered auxiliary equipment in operation, shall be at least 6 knots and at least 2 knots when towing a 25-person liferaft loaded with its full complement of persons and equipment or its equivalent. Sufficient fuel, suitable for use throughout the temperature range expected in the area in which the ship operates, shall be provided to run the fully loaded [rescue boat] at 6 knots for a period of not less than [4] h.

(i) The fuel system must meet 46 CFR 56.50-75(b). Except as required in this paragraph, the fuel tank must meet 46 CFR 58.50-10. Each fuel tank over 0.75 m (30 in) long must be baffled at intervals not exceeding 0.45 m (18 in). A fuel level indicator must be provided for each fuel tank. The fuel tank vent piping must be at least 6 mm (0.25 in) outside diameter tubing. A shut-off valve must be provided at the fuel tank, but not at the fuel pump. The valve must be clearly labelled. The position of the valve must be clearly indicated by a permanent marking inside the rescue boat. The marking must be an arrow pointing in the direction of the valve, and the word "FUEL SHUT-OFF VALVE" in a color that contrasts with its background. The marking must be legible to a person within the vicinity of the engine. In addition, if FRP fuel tanks are installed, they must also be at least 5 mm (0.187 in) in wall thickness; be sealed against porosity by at least one ply of chopped strand mat; be reinforced in the way of tank openings; be fitted with corrosion-resistant fittings; have each joint at the top of the tank; and have each joint bonded and through-bolted.

(ii) Portable fuel systems for outboard engines must meet UL Standard 1185 or equal, except that hoses must be USCG Type A, and hose clamps, primers, filters, and strainers must be successfully tested in accordance with 33 CFR 183.590. Anti-siphon devices must be provided in the fuel system to prevent fuel spillage when the hose is disconnected. Arrangements must be provided to secure the fuel tank in its normal operating position on the boat.

(iii) Fuel systems for outboard engines using non-integral, permanently installed fuel tanks must meet the requirements of

33 CFR 183, Guideline J - Fuel Systems.
UL Standard 1102 meets these requirements for fuel tanks.

6.9 The [rescue boat] engine, transmission and engine accessories shall be enclosed in a fire-retardant casing or other suitable arrangements providing similar protection. Such arrangements shall also protect persons from coming into accidental contact with hot or moving parts and protect the engine from exposure to weather and sea. Adequate means shall be provided to reduce the engine noise. Starter batteries shall be provided with casings which form a watertight enclosure around the bottom and sides of the batteries. The battery casings shall have a tight fitting top which provides for necessary gas venting.

(15) Regulation III/41.6.9. Means must be provided to reduce the engine noise so that a shouted order can be heard any where within the rescue boat. All valves, filters, and other machinery components or assemblies, must be accessible and designed for maintainability in accordance with Section 33 and 34 of ASTM F1166.

6.10 The [rescue boat] engine and accessories shall be designed to limit electromagnetic emissions so that engine operation does not interfere with the operation of radio life-saving appliances used in the [rescue boat].

6.11 Means shall be provided for recharging all engine-starting, radio and searchlight batteries. Radio batteries shall not be used to provide power for engine starting. Means shall be provided for recharging [rescue boat] batteries from the ship's power supply at a supply voltage not exceeding 55V which can be disconnected at the [rescue boat] embarkation station.

6.12 Water-resistant instructions for starting and operating the engine shall be provided and mounted in a conspicuous place near the engine starting controls.

(16) Regulation III/41.6.12. A weatherproof equipment list must be permanently mounted in a conspicuous and prominent location on a stowage locker or compartment, or on inside of canopy. The list must include a stowage plan, oriented such that the stowage location of each item of loose equipment is readily apparent.

7 [Rescue boat] fittings

7.1 All [rescue boats] shall be provided with at least one drain valve fitted near the lowest point in the hull, which shall automatically open to drain water from the hull when the [rescue boat] is not waterborne and shall automatically close to prevent entry of water when the [rescue boat] is waterborne. Each drain valve shall be provided with a cap or plug to close the valve, which shall be attached to the [rescue boat] by a lanyard, a chain, or other suitable means. Drain valves shall be readily accessible from inside the [rescue boat] and their position shall be clearly indicated.

7.2 All [rescue boats] shall be provided with a rudder and tiller. When a wheel or other remote steering mechanism is also provided the tiller shall be capable of controlling the rudder in case of failure of the steering mechanism. The rudder shall be permanently attached to the [rescue boat]. The tiller shall be permanently installed on, or linked to, the rudder stock; however, if the [rescue boat] has a remote steering mechanism, the tiller may be removable and securely stowed near the rudder stock. The rudder and tiller shall be so arranged as not to be damaged by operation of the release mechanism or the propeller.

7.3 Except in the vicinity of the rudder and propeller, a buoyant lifeline shall be becketed around the outside of the [rescue boat].

7.4 [Rescue boats] which are not self-righting when capsized shall have suitable handholds on the underside of the hull to enable persons to cling to the [rescue boat].

(17) Regulation III/41.7.1. The position of each drain plug must be clearly indicated by a permanent marking inside the rescue boat. The marking must be an arrow pointing in the direction of the plug, and the words "DRAIN PLUG" in 75 mm (3 in) high letters of a color that contrasts with their background. The marking must be clearly visible to a person within the vicinity of the drain plug.

(18) Regulation III/41.7.2. The procedure to change over from remote to local steering must be simple, not require the use of tools, and be clearly posted. There must be sufficient clear space to install, operate, remove and stow the removable tiller arm. The tiller arm and its connection to the rudder stock must be of sufficient strength so that there is no slippage or bending of the tiller arm. Rudder stops or other means must be provided to prevent the rudder from turning too far on either side. If the rescue boat is fitted with an outboard engine, the rudder and tiller may form part of the engine.

(19) Regulation III/41.7.3. A buoyant lifeline of ultraviolet resistant material, or other suitable handholds, must be provided on the outside of the rescue boat, above the waterline, and within easy reach of a person in the water.

(20) Regulation III/41.7.4.

(i) Applies only to rigid and rigid-inflated rescue boats. Rails provided for this

The handholds shall be fastened to the [rescue boat] in such a way that, when subjected to an impact sufficient to cause them to break away from the [rescue boat], they break away without damaging the [rescue boat].

purpose must extend for half the length of the boat on both sides of the hull, and the clearance between the rail and hull must be at least 38mm (1.5in). The rails must be attached to the hull below the chine or turn of the bilge, must be faired to prevent any fouling, and not project beyond the widest part of the boat.

(ii) Each inflated rescue boat must be able to be righted, in all loading conditions of the boat, by not more than two persons, each with a mass of 75kg (165lb) or less.

7.6 Every [rescue boat] to be launched by a fall or falls shall be fitted with a release mechanism complying with the following requirements:

(21) Regulation III/41.7.6. Each rescue boat must be fitted with a release mechanism approved by the Commandant (G-MSE) under guideline 33 of this part. The release lever or control must be red in color, and the area immediately surrounding the control must be a sharply contrasting light color. An illustrated operating instruction plate or placard, showing the correct off-load and emergency on-load release procedure, and recovery procedure must be posted so that it is visible and legible from the helmsman's normal operating position. The plate or placard must be corrosion resistant and weather proof and must be marked with the signal word DANGER. The release gear and its components must be labeled, as required, to aid in understanding and operation of the system.

.1 The mechanism shall be so arranged that all hooks are released simultaneously.

.2 The mechanism shall have two release capabilities as follows:

2.1 a normal release capability which will release the [rescue boat] when it is waterborne or when there is no load on the hooks;

2.2 an on-load release capability which will release the [rescue boat] with a load on the hooks. This release shall be so arranged as to release the [rescue boat] under any conditions of loading from no-load with the [rescue boat] waterborne to a load of 1.1 times the total mass of the [rescue boat] when loaded with its full complement of persons and equipment. This release capability shall be adequately protected against accidental or premature use.

.3 The release control shall be clearly marked in a colour that contrasts with its surroundings.

.4 The mechanism shall be designed with a factor of safety of 6 based on the ultimate strength of the materials used, assuming the mass of the [rescue boat] is equally distributed between the falls.

7.7 Every [rescue boat] shall be fitted with a release device to enable the forward painter to be released when under tension.

7.9 [Rescue boats] intended for launching down the side of a ship shall have skates and fenders as necessary to facilitate launching and prevent damage to the [rescue boat].

7.12 Unless expressly provided otherwise, every [rescue boat] shall be provided with effective means of bailing or be automatically self-bailing.

7.13 Every [rescue boat] shall be so arranged that an adequate view forward, aft and to both sides is provided from the control and steering position for safe launching and manoeuvring.

(22) Regulation III/41.7.7. Each rescue boat must be fitted with a device to secure the painter near the bow of the rescue boat. The device must be arranged such that the rescue boat does not exhibit unsafe or unstable characteristics when being towed by the ship with the ship underway at 5 knots. A quick-release device must be provided, which allows the painter to be released while under tension, from inside the rescue boat. The quick-release handle must be clearly identified by a label.

(23) Regulation III/41.7.12. Each rescue boat which is not automatically self-bailing must be provided with a manual bilge pump approved under 46 CFR 160.044, or an engine-powered bilge pump.

(24) Regulation III/41.7.13. Rescue boat starting, maneuvering, and steering controls must be provided at the control and steering station. The throttle must be a continuous manual control and also be able to be set and locked at any position. The control and steering station must be designed and laid out in accordance with ASTM F1166, Section 30 and 31, so that controls and displays are unambiguous, accessible, and easy to reach and use from the operator's normal seated position, while wearing an immersion suit or a lifejacket. Each control, gage, or display must be identified by a marking, posted on, above,

or adjacent to the respective item. Each control must operate in a logical manner and be marked with an arrow to show direction of movement of control which will cause an increased response. Each gage must be marked with its operating range and also indicate danger or abnormal conditions. Each marking must be permanent and weatherproof. Gages, and audio and visual alarms, must be provided to monitor at least the following parameters:

- (i) Coolant temperature, for a liquid cooled engine;
- (ii) Oil pressure, for an engine with an oil pump;
- (iii) Tachometer, for an engine not provided with overspeed protection; and
- (iv) State of charge, or rate of charge for each rechargeable engine starting power source.

9.1 The dimensions of the [rescue boat] and the number of persons which it is permitted to accommodate shall be marked on it in clear permanent characters.

156-17 Marking and labeling.

The required markings and labels on each rescue boat must be in English.

(a) A corrosion-resistant nameplate must be permanently affixed to the hull near the bow. The following must be permanently marked on the nameplate:

- (1) Name and address of the manufacturer.
- (2) Serial number of the boat.
- (3) Name and address of the independent laboratory or inspecting agency.

- (4) U.S. Coast Guard approval number.
- (5) Year of manufacture.
- (6) Material of hull construction.
- (7) Number of persons for which the boat is approved.
- (8) Condition A and Condition B weight, where condition A is the light loaded condition and condition B is the fully loaded condition. Condition A is defined as the weight of the completely finished boat without loose equipment, fuel, provisions, or water. Condition B is the completely finished, furnished, and totally loaded boat including fuel, equipment, provisions, water, and the number of persons for which it is approved.

(9) The word "SOLAS."

(b) Regulation III/9.2.

(1) All labels, caution and danger notices and any operating, maintenance, or general instructions, should be in accordance with ASTM F1166, Sections 27, 28, 29, 30, and 31, in terms of format, content, lettering size and spacing, color, and posted location. They must be illustrated with symbols in accordance with Resolution A.760(18), as applicable.

(2) Information and instruction plates, not specifically mentioned here, shall not be posted in the vicinity of the control and steering station without prior approval from the Commandant (MSE-3). Identification label plates, if required, must be posted on or above the component or equipment to be identified.

1.2 Rescue boats may be either of rigid or inflated construction or a combination of both and shall:

.1 be not less than 3.8 m and not more than 8.5 m in length;

.2 be capable of carrying at least five seated persons and a person lying down.

1.3 Rescue boats which are a combination of rigid and inflated construction shall comply with the appropriate requirements of this regulation to the satisfaction of the Administration.

1.4 Unless the rescue boat has adequate sheer, it shall be provided with a bow cover extending for not less than 15% of its length.

1.5 Rescue boats shall be capable of manoeuvring at speeds up to 6 knots and maintaining that speed for a period of at least 4 h.

1.6 Rescue boats shall have sufficient mobility and manoeuvrability in a seaway to enable persons to be retrieved from the water, marshal liferafts and tow the largest liferaft carried on the ship when loaded with its full complement of persons and equipment or its equivalent at a speed of at least 2 knots.

1.7 A rescue boat shall be fitted with an inboard engine or outboard motor. If it is fitted with an outboard motor, the rudder and tiller may form part of the engine. Notwithstanding the requirements of regulation 41.6.1, petrol-driven outboard engines with an approved fuel system may be fitted in rescue boats provided the fuel tanks are specially protected against fire and explosion.

(25) Regulation III/47.1.6. The helmsman position must provide an adequate view on all sides to allow safe maneuvering of the rescue boat to bring it alongside an injured person in the water.

(11) Regulations III/41.6.1 and III/47.1.7. Each rescue boat engine must be approved by the Commandant (G-MSE) under guideline 101. A list of approved engines may be obtained from the Commandant (G-MSE) upon request.

1.8 Arrangements for towing shall be permanently fitted in rescue boats and shall be sufficiently strong to marshal or tow liferafts as required by paragraph 1.6.

1.9 Rescue boats shall be fitted with weathertight stowage for small items of equipment.

2 Rescue boat equipment

2.1 All items of rescue boat equipment, with the exception of boat-hooks which shall be kept free for fending off purposes, shall be secured within the rescue boat by lashings, storage in lockers or compartments, storage in brackets or similar mounting arrangements, or other suitable means. The equipment shall be secured in such a manner as not to interfere with any launching or recovery procedures. All items of rescue boat equipment shall be as small and of as little mass as possible and shall be packed in suitable and compact form.

2.2 The normal equipment of every rescue boat shall consist of:

.1 sufficient buoyant oars or paddles to make headway in calm seas. Thole pins, crutches or equivalent arrangements shall be provided for each oar. Thole pins or crutches shall be attached to the boat by lanyards or chains;

.2 a buoyant bailer;

.3 a binnacle containing an efficient compass which is luminous or provided

(26) Regulation III/47.1.9. Each stowage compartment must be supported and secured against movement. It must have adequate hand access for removing and storing the required equipment, and for cleaning the inside of the compartment. There must be sufficient stowage volume to store the equipment required to be carried in the rescue boat.

156-11 Equipment.

The rescue boat manufacturer must provide sufficient storage space for the listed equipment. Actual equipment carried in the boat is the responsibility of the ship operator. However, the following fixed equipment will be approved as part of the rescue boat and must meet the following requirements in complying with the applicable paragraphs of regulation III/47.2:

(a) Compass. The compass must be Coast Guard approved.

with suitable means of illumination;

.4 a sea-anchor and tripping line with a hawser of adequate strength not less than 10 m in length;

.5 a painter of sufficient length and strength, attached to the release device complying with the requirements of regulation 41.7.7 and placed at the forward end of the rescue boat;

.6 one buoyant line, not less than 50 m in length, of sufficient strength to tow a liferaft as required by paragraph 1.6;

.7 one waterproof electric torch suitable for Morse signalling, together with one spare set of batteries and one spare bulb in a waterproof container;

.8 one whistle or equivalent sound signal;

.9 a first-aid outfit in a waterproof case capable of being closed tightly after use;

.10 two buoyant rescue quoits, attached to not less than 30 m of buoyant line;

.11 a searchlight capable of effectively illuminating a light-coloured object at night having a width of 18 m at a distance of 180 m for a total period of 6h and of working for at least 3h continuously;

(b) Searchlight

(1) Each searchlight must be certified by its manufacturer to meet ASTM F1003 or meet the requirements of (i) through (iv) as follows:

(i) Be constructed of corrosion resistant material;

(ii) Have an enclosure certified by its manufacturer to meet a degree of protection of at least 5, as specified in IEC Standard, Publication 529 or meet NEMA

Type 4X protection for watertight enclosures;

(iii) Be rugged, and so designed that jars, vibrations, and atmospheric conditions likely to be encountered in a marine environment will not affect its servicability or performance; and

(iv) Along with its mounting, be able to withstand the tests described in Regulation 41.1.6 of Chapter III of SOLAS , without any adverse effect on its servicability or performance.

(2) Each searchlight must be connected to its power source via watertight electrical fittings.

(3) Each searchlight must be permanently mounted in the rescue boat, or have a stanchion or collapsible type portable mounting. The mounting must be located to enable operation of the searchlight by the boat operator in a 360° horizontal plane and 60° above and 45° below the horizontal. A means must also be provided to lock the searchlight in any desired position.

(4) The searchlight, and it's power source working on a single charge, must be capable of operating for at least

(i) 3 hours continuous operation; or

(ii) 6 hours total "on" time in cycles consisting of 15minutes on and 5 minutes off.

(5) If the power source is an engine starting battery, there must be sufficient battery capacity to start the engine at the end of either operating period specified in paragraph (b)(4) of this section.

.12 an efficient radar reflector;

.13 thermal protective aids complying with the requirements of regulation 34 sufficient for 10% of the number of persons the rescue boat is permitted to accommodate or two, whichever is the greater.

(c) Navigating lights.

(1) Each rescue boat must be fitted with navigating lights, in accordance with the International Regulations for Preventing Collisions at Sea, 1972 (COLREG 72), for a vessel of its size.

(2) Each navigating light enclosure must be certified by its manufacturer to meet a degree of protection of at least 5, as specified in IEC Standard, Publication 529 or meet NEMA Type 4X.

(3) Each navigating light and its mounting must be rugged, and so designed that jars, vibrations, and atmospheric conditions likely to be encountered in a marine environment will not effect its servicability or performance.

(4) The navigating light and its mounting must be of sufficient strength to withstand the tests described in Regulation 41.1.6 of Chapter III of SOLAS , without any adverse effect on its servicability or performance.

(5) The power source must be connected to the navigating lights using watertight electrical fittings.

2.3 In addition to the equipment required by paragraph 2.2, the normal equipment of every rigid rescue boat shall include:

.1 a boat hook;

.2 a bucket;

.3 a knife or hatchet.

2.4 In addition to the equipment required by paragraph 2.2 the normal equipment of every inflated rescue boat shall consist of:

.1 a buoyant safety knife;

.2 two sponges;

.3 an efficient manually operated bellows or pump;

.4 a repair kit in a suitable container for repairing punctures;

.5 a safety boat hook.

(c) Inflated rescue boats. In addition to meeting the applicable requirements of paragraph (a) of this section, each rescue boat manufactured under this guideline must also meet the following specific requirements in complying with Regulation 47.3 of SOLAS :

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3 Additional requirements for inflated rescue boats

3.1 The requirements of regulations 41.1.3 and 41.1.5 do not apply to inflated rescue boats.

3.2 An inflated rescue boat shall be constructed in such a way that, when suspended by its bridle or lifting hook:

.1 it is of sufficient strength and rigidity to enable it to be lowered and recovered with its full complement of persons and equipment;

.2 it is of sufficient strength to withstand a load of 4 times the mass of its full complement of persons and equipment at

an ambient temperature of $20 \pm 3^{\circ}\text{C}$ with all relief valves inoperative;

.3 it is of sufficient strength to withstand a load of 1.1 times the mass of its full complement of persons and equipment at an ambient temperature of -30°C , with all relief valves operative.

3.3 Inflated rescue boats shall be so constructed as to be capable of withstanding exposure:

.1 when stowed on an open deck on a ship at sea;

.2 for 30 days afloat in all sea conditions.

3.4 In addition to complying with the requirements of regulation 41.9, inflated rescue boats shall be marked with a serial number, the maker's name or trade mark and the date of manufacture.

3.5 The buoyancy of an inflated rescue boat shall be provided by either a single tube subdivided into at least five separate compartments of approximately equal volume or two separate tubes neither exceeding 60% of the total volume. The buoyancy tubes shall be so arranged that, in the event of any one of the compartments being damaged, the intact compartments shall be able to support the number of persons which the rescue boat is permitted to accommodate, each having a mass of 75 kg, when seated in their normal positions with positive freeboard over the rescue boat's entire periphery.

3.6 The buoyancy tubes forming the boundary of the inflated rescue boat shall on inflation provide a volume of not less than 0.17 m^3 for each person the rescue

(1) Regulation III/47.3.5. The rescue boat must be able to support with a positive freeboard on its entire periphery, the number of persons it is permitted to accommodate, seated in their normal positions, each having a mass of 75 kg. (165 lb), under each of the following conditions:

(i) With the forward buoyancy compartment deflated;

(ii) With the entire buoyancy on one side deflated; and

(iii) With the forward buoyancy and the entire buoyancy on one side deflated.

boat is permitted to accommodate.

3.7 Each buoyancy compartment shall be fitted with a non-return for manual inflation and means for deflation. A safety relief valve shall also be fitted unless the Administration is satisfied that such an appliance is unnecessary.

3.8 Underneath the bottom and on vulnerable places on the outside of the inflated rescue boat, rubbing strips shall be provided to the satisfaction of the Administration.

3.9 Where a transom is fitted it shall not be inset by more than 20% of the overall length of the rescue boat.

3.10 Suitable patches shall be provided for securing the painters fore and aft and the becketed lifelines inside and outside the boat.

3.11 The inflated rescue boat shall be maintained at all times in a fully inflated condition.

(2) Regulation III/47.3.7. If the deflation is designed to be opened by using a tool, the tool must be stowed separately with the loose equipment. Each safety valve must have a hand-operable screw-type plug, permanently secured on or near the valve, to close the valve in case of a leak.

(3) Regulation III/47.3.10. Each patch or strip must be so designed so that if the lifeline, painter or towing connection is torn away, the inflated chamber remains intact.

(d) Rigid-inflated rescue boats. A rigid-inflated rescue boat consists of a rigid hull with an inflated sponson installed above or external to the rigid hull. Except where specifically noted, the rigid portions of a rigid-inflated boat must be in accordance with paragraph (b) of this section and the inflated portion in accordance with paragraph (c) of this section.

Regulation 51

Training manual

The training manual, which may comprise several volumes, shall contain instructions and information, in easily understood terms illustrated wherever possible, on the life-saving appliances provided in the ship and on the best methods of survival. Any

156-19 Operation, maintenance, and training manual.

The manufacturer shall make an operation, maintenance and training manual available to purchasers of approved rescue boats to enable vessel operators to meet Regulations III/18.2, 19.3, 51, and 52 of SOLAS.

part of such information may be provided in the form of audio-visual aids in lieu of the manual. The following shall be explained in detail:

.3 boarding, launching, and clearing the survival craft and rescue boats;

.4 method of launching from within the survival craft;

.5 release from launching appliances;

.8 use of all survival equipment;

.9 use of all detection equipment;

.11 use of drogues;

.12 use of engine and accessories;

.13 recovery of survival craft and rescue boats including stowage and securing;

.15 best use of the survival craft facilities in order to survive;

.18 instructions for emergency repair of the life-saving appliances.

(a) The material must include a complete discussion of operation, maintenance, and safety procedures to be followed in the use of lifeboats and associated components and equipment.

(b) The material presented must be clear, sufficiently detailed, and unambiguous. The material must be in English though additional languages are acceptable. Wherever possible, the material must be-

(1) Explained with the help of diagrams;

(2) Presented in short numbered paragraphs; and

(3) Written in the active voice.

Regulation52

Instructions for on-board maintenance

Instructions for on-board maintenance of life-saving appliances shall be easily understood, illustrated wherever possible, and, as appropriate, shall include the following for each appliance:

.1 a checklist for use when carrying out the inspections required by regulation19.7;

.2 maintenance and repair instructions;

.3 schedule of periodic maintenance;

.4 diagram of lubrication points with the recommended lubricants;

.5 list of replaceable parts;

.6 list of sources of spare parts;

.7 log for records of inspections and maintenance.

156-13 Approval inspections and tests.

(e) Prototype boat readiness. In as far as possible, all tests shall be conducted on a completely outfitted rescue boat including fixed equipment such as compass, searchlight, and navigating lights. Loose equipment may be substituted by weights, as applicable.

(f) FRP prototype boat lay-up. For the prototype of each design of a FRP rescue boat, the lay-up shall be made of unpigmented resins and clear gel coat. If additives are used to make the resin fire retardant, these additives shall be omitted in the prototype boat construction in order to obtain a translucent laminate for inspection purposes. However, prototype boats made without fire-retardant additives will not be approved.

A prototype rescue boat of each design submitted for Coast Guard approval shall pass each of the tests applicable for its type as described in IMO Resolution A.689(17), Part 1, section 7, with the following additions and exceptions:

(a) All rescue boats. Each rescue boat shall be maneuvered in its light condition to demonstrate that it can be safely brought alongside an injured person in the water and that it permits easy and safe rescue of persons in the water. The test shall be conducted as follows:

(1) The rescue boat shall be equipped with all of its equipment, engine, and a full fuel tank. The person in the water shall wear a lifejacket approved to SOLAS , Chapter III regulations, and as a minimum, shirt, trousers, and shoes. The rescue boat shall start from a position at least 50m (164ft) away from the person in the water. The helmsman shall maneuver the rescue boat alongside the person in the water and must have a clear view of the rescue operation at all times. Two persons in the rescue boat wearing Coast Guard approved immersion suits shall assist the person in the water into the boat. The person in the water shall feign unconsciousness and not assist the rescuers in any manner. For the test to be considered successful, the rescuers must be able to lift the person in the water easily while remaining completely inside the rescue boat except for the head, arms and upper torso.

(b) Rigid rescue boat. In addition to 156-13(a)(1), a rigid rescue boat shall be subjected to

all the tests specified for a rigid rescue boat and the test specified in paragraph 7.2.10 of IMO Resolution A.689(17).

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(g) Prototype boat testing. Certain tests shall be conducted as follows in complying with the indicated paragraphs of IMO Resolution A.689(17):

6.2.1 Material fire-retardancy test

(1) Paragraph 1/6.2.1. The hull, canopy, and major structural laminates of an FRP boat shall be tested for resin content, ultimate flexural strength, and tensile strength. The test samples shall be cut out from the prototype boat itself or be laid up at the same time, using the same procedures, and by the same operators as the laminate used in the boat. The number of samples used for each test, and the conditions and test methods used, shall be as per the applicable test specification.

(i) Resin Content. The resin content shall be determined as per ASTM 2584 or ISO 1172.

(ii) Flexural Ultimate Strength. The flexural ultimate strength shall be determined by ASTM 790 method I (test condition "A", flatwise, dry) or the corresponding ISO 178 test method.

(iii) Tensile Tests. The tensile strength, lengthwise, shall be determined as per ASTM D 638 or ISO 527.

(iv) Steel Sheet and Plate. The steel sheet and plate for the hull, floors, and other structural components, used on a steel boat, shall be confirmed by the independent laboratory to have met the bend tests requirement specified under ASTM A 525 after galvanizing or other anti-corrosion treatment has been applied. This

compliance can be ascertained through supplier's certification papers or through witnessing actual tests.

(v) Coated cloth. Cloth material used in the construction of each rescue boat shall be confirmed by the independent laboratory to have met the requirements specified under 46 CFR 160.051-9(1)(i) and (ii). This compliance can be ascertained through supplier's certification papers or through witnessing actual tests.

(vi) Fuel Tank. Each FRP fuel tank shall be tested by a static head above the tank top of 3 m (10 ft) of water without showing any leaks or signs of permanent distortion.

6.2.2 [Rescue boat] buoyant material test

(2) Paragraph 1/6.2.2. If block foam buoyancy material is used, each piece shall be weighed after it is cut and shaped to make sure that the correct amount of foam is installed. If foamed-in-place buoyancy material is used, a separate sample of the foam must be poured, and used to make a density determination after it has set. The density must be within 32.8 kg/m^3 (2.05 lb/ft^3).

6.3 Launch test

It should be demonstrated that the fully equipped [rescue boat], loaded with a properly distributed mass equal to the mass of the number of persons for which it is to be approved, can be launched from a ship proceeding ahead at a speed of not less than 5 knots in calm water and on an even keel. There should be no damage to the [rescue boat] or its equipment as a result of this test.

6.4 [Rescue boat] overload test

6.4.1 The unloaded [rescue boat] should be placed on blocks or suspended from the lifting hooks and sights should be erected for measuring keel sag. The measurements

required in 6.4.4 should then be made.

6.4.2 The [rescue boat] should then be loaded with properly distributed weights to represent the fully equipped [rescue boat] loaded with the full complement of persons for which it is to be approved. The measurements required in 6.4.4 should again be made.

6.4.3 Additional weights should then be added so that the suspended load is 25%, 50%, 75% and 100% greater than the weight of the fully equipped and loaded [rescue boat]. In the case of metal [rescue boats], the testing should stop at 25% overload. The weights for the various overload conditions should be distributed in proportion to the loading of the [rescue boat] in its service condition, but the weights used to represent the persons need not be placed 300 mm above the seatpan. Testing by filling the [rescue boat] with water should not be accepted as this method of loading does not give the proper distribution of weight. Machinery may be removed in order to avoid damage to it, in which case weights should be added to the [rescue boat] to compensate for the removal of such machinery. At each incremental overload, the measurements required in 6.4.4 should be made.

6.4.4 The following should be measured and recorded at each condition of load specified in 6.4.1 through 6.4.3:

- .1 deflection of keel amidships;
- .2 change in length as measured between the top of stem and stern posts;
- .3 change in breadth over the gunwale at the quarter length forward, amidships and the quarter length aft; and
- .4 change in-depth measured from gunwale

to keel.

6.4.5 The keel deflection and change in breadth in 6.4.4.1 and 6.4.4.3 should not exceed $1/400^{\text{th}}$ of the [rescue boat]'s length when the [rescue boat] is subjected to 25% overload; the results at 100% overload, if required by 6.4.3, should be approximately in proportion to those obtained at 25% overload.

The weights should then be removed and the dimensions of the [rescue boat] checked. No significant residual deflection should result. Any permanent deflection as a result of these tests should be recorded. If the [rescue boat] is made of GRP, such measurement should be taken after a lapse of time sufficient to permit the GRP to recover its original form (approximately 18h).

6.5 [Rescue boat] impact and drop test

Impact test

6.5.1 The fully equipped [rescue boat], including its engine, should be loaded with weights equal to the mass of the number of persons for which the [rescue boat] is to be approved. The weights should be distributed to represent the normal loading in the [rescue boat]. Skates or fenders, if required, should be in position. The [rescue boat], in a free hanging position, should be pulled laterally to a position so that when released it will strike a fixed rigid vertical surface at a velocity of 3.5 m/s. It should be released to impact against the rigid vertical surface.

Drop test

6.5.3 The fully equipped [rescue boat], with its engine, should be loaded with weights equal to the mass of the maximum number of persons for which the [rescue boat] is to

be approved. The weights should be distributed to represent the normal loading condition but need not be placed 300 mm above the seatpan. The [rescue boat] should then be suspended above the water so that the distance from the lowest point of the [rescue boat] to the water is 3 m. The [rescue boat] should then be released so that it falls freely into the water.

6.5.4 The drop test should be conducted with the [rescue boat] that was used in the impact test.

Operational test after impact and drop test

6.5.5 After the impact and drop tests, the [rescue boat] should be unloaded, cleaned and carefully examined to detect the position and extent of damage that may have occurred as a result of the tests. An operational test should then be conducted in accordance with 6.11.1.

Acceptability criteria for impact and drop tests

6.5.6 After the tests required in this section, the [rescue boat] should be unloaded, cleaned, and inspected for possible damage.

6.5.7 The impact and drop tests should be considered successful if:

.1 no damage has been sustained that would affect the [rescue boat]'s efficient functioning;

.2 the damage caused by the impact and drop tests has not increased significantly as a result of the test specified in 6.5.5;

.3 machinery and other equipment has operated to full satisfaction;

.4 no significant ingress of seawater has

occurred.

6.7 [Rescue boat] seating strength test

6.7.1 The seating should be loaded with a mass of 100 kg in each position allocated for a person to sit in the [rescue boat]. The seating should be able to support this loading without any permanent deformation or damage.

6.8 [Rescue boat] seating space test

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

6.9 [Rescue boat] freeboard and stability tests

Flooded stability test

6.9.1 The [rescue boat] should be loaded with its equipment. If provision lockers, water tanks and fuel tanks cannot be removed, they should be flooded or filled to the final waterline resulting from the test in 6.9.3. Ballast of equivalent weight and density should be substituted for the engine and any other installed equipment that can be damaged by water.

6.9.2 Weights representing persons who would be in the water when the [rescue boat] is flooded may be omitted. Weights representing persons who would not be in the water when the [rescue boat] is flooded should be placed in the normal seating positions of such persons.

6.9.3 When loaded as specified in 6.9.1 and 6.9.2, the [rescue boat] should have positive stability when filled with water to represent flooding which would occur when the [rescue boat] is holed in any one location below the waterline assuming no loss of

buoyancy material and no other damage. Several tests may have to be conducted if holes in different areas would create different flooding conditions.

Freeboard test

6.9.4 The [rescue boat] with its engine should be loaded with a mass equal to that of all the equipment. One half of the number of persons for which the [rescue boat] is to be approved should be seated in a proper seating position on one side of the centreline. The freeboard should then be measured on the low side.

6.9.5 This test should be considered successful if the measured freeboard on the low side is not less than 1.5% of the [rescue boat]'s length or 100 mm, whichever is greater.

6.10 Release mechanism test

6.10.1 The [rescue boat] with its engine fitted should be suspended from the release mechanism just clear of the ground or the water. The [rescue boat] should be loaded so that the total mass equals 1.1 times the mass of the [rescue boat], all its equipment and the number of persons for which the [rescue boat] is to be approved. The [rescue boat] should be released simultaneously from each fall to which it is connected without binding or damage to any part of the [rescue boat] or the release mechanism.

6.10.2 It should be confirmed that the [rescue boat] will simultaneously release from each fall to which it is connected when fully waterborne in the light condition and in a 10% overload condition.

6.10.4 It should be demonstrated that the release mechanism can release the fully equipped [rescue boat] when loaded with

weights equal to the mass of the number of persons for which the [rescue boat] is to be approved, when the [rescue boat] is being towed at speeds up to 5 knots. In lieu of a waterborne test, this test may be conducted as follows:

.1 A force equal to the force necessary to tow the [rescue boat] at a speed of 5 knots should be applied to the hook in the lengthwise direction of the boat at an angle of 45° to the vertical. This test should be conducted in the aftward as well as the forward direction, depending upon the design of the release hook;

.2 A force equal to the safe working load of the hook should be applied to the hook in an athwartships direction at an angle of 20° to the vertical. This test should be conducted on both sides.

.3 A force equal to the safe working load of the hook should be applied to the hook in a direction half-way between the positions of tests 1 and 2 and within the ellipse segment formed by 1 and 2. This test should be conducted in four positions.

6.11 [Rescue boat] operational test

Operation of engine and fuel consumption test

6.11.1 The [rescue boat] should be loaded with weights equal to the mass of its equipment and the number of persons for which the [rescue boat] is to be approved. The engine should be started and the [rescue boat] manoeuvred for a period of at least 4 h to demonstrate satisfactory operation. It should be demonstrated that the [rescue boat] can tow a 25-person liferaft loaded with the number of persons for which it is to be approved and its equipment at a speed of 2 knots. The [rescue boat] should be run at

a speed of not less than 6 knots for a period which is sufficient to ascertain the fuel consumption and to establish that the fuel tank has the required capacity.

Compass

6.11.7 It should be determined that the compass performance is satisfactory and that it is not unduly affected by magnetic fittings and equipment in the [rescue boat].

6.12 [Rescue boat] towing and painter release test

Towing test

6.12.1 It should be demonstrated that the fully equipped [rescue boat], loaded with a properly distributed mass equal to the mass of the number of persons for which it is to be approved, can be towed at a speed of not less than 5 knots in calm water and on an even keel]. There should be no damage to the [rescue boat] or its equipment as a result of this test.

[Rescue boat] painter release test

6.12.2 It should be demonstrated that the painter release mechanism can release the painter on a fully equipped and loaded [rescue boat] that is being towed at a speed of not less than 5 knots in calm water.

6.12.3 The painter release mechanism should be tested in several distinct directions of the upper hemisphere not obstructed by the canopy or other constructions in the [rescue boat]. The directions specified in 6.10.4 should be used if possible.

6.13 [Rescue boat] light tests

(3) Paragraph 1/6.13. The searchlight and its power source shall be demonstrated to be in compliance with 156-11(a)(2)(v) and

(vi).

7.1.2 The largest size of fully loaded liferaft which the rigid rescue boat can tow at a speed of at least 2 knots should be determined.

Rigid rescue boat seating test

7.1.3 The rigid rescue boat should be fitted with its engine and all its equipment. The number of persons for which the rescue boat is to be approved, having an average mass of at least 75 kg and all wearing lifejackets and any other essential equipment required should then board; one person should lie down and the others should be properly seated in the rescue boat. The rigid rescue boat should then be manoeuvred and all equipment on board tested to demonstrate that it can be operated without difficulty or interference with the occupants.

7.2.4 The freeboard of the rescue boat should be taken in the loading condition as follows:

.2 rescue boat with all its equipment, engine and fuel, or an equivalent mass positioned to represent engine and fuel

7.2.5 With the rescue boat in the condition prescribed in 7.2.4, the minimum freeboard should be not less than 300 mm and not less than 250 mm from the lowest part of the transom.

7.2.10 It should be demonstrated that the rescue boat can be propelled and manoeuvred by its oars or paddles in calm water conditions at a speed of at least 0.5 knots over a distance of at least 25 m. when laden with the number of persons, all wearing lifejackets, for which it is to be approved.

(b1) Inflated rescue boat.

(g) Prototype boat testing. Certain tests shall be conducted as follows in complying with the indicated paragraphs of IMO Resolution A.689(17):

6.5 [Rescue boat] impact and drop test
Impact test

6.5.1 The fully equipped [rescue boat], including its engine, should be loaded with weights equal to the mass of the number of persons for which the [rescue boat] is to be approved. The weights should be distributed to represent the normal loading in the [rescue boat]. Skates or fenders, if required, should be in position. The [rescue boat], in a free hanging position, should be pulled laterally to a position so that when released it will strike a fixed rigid vertical surface at a velocity of 3.5 m/s. It should be released to impact against the rigid vertical surface.

6.7 [Rescue boat] seating strength test

6.7.1 The seating should be loaded with a mass of 100 kg in each position allocated for a person to sit in the [rescue boat]. The seating should be able to support this loading without any permanent deformation or damage.

6.10 Release mechanism test

6.10.1 The [rescue boat] with its engine fitted should be suspended from the release mechanism just clear of the ground or the water. The [rescue boat] should be loaded so that the total mass equals 1.1 times the mass of the [rescue boat], all its equipment and the number of persons for which the [rescue boat] is to be approved. The [rescue boat] should be released simultaneously from each fall to which it is connected without binding or damage to any part of

the [rescue boat] or the release mechanism.

6.10.2 It should be confirmed that the [rescue boat] will simultaneously release from each fall to which it is connected when fully waterborne in the light condition and in a 10% overload condition.

6.10.4 It should be demonstrated that the release mechanism can release the fully equipped [rescue boat] when loaded with weights equal to the mass of the number of persons for which the [rescue boat] is to be approved, when the [rescue boat] is being towed at speeds up to 5 knots. In lieu of a waterborne test, this test may be conducted as follows:

.1 A force equal to the force necessary to tow the [rescue boat] at a speed of 5 knots should be applied to the hook in the lengthwise direction of the boat at an angle of 45_ to the vertical. This test should be conducted in the aftward as well as the forward direction, depending upon the design of the release hook;

.2 A force equal to the safe working load of the hood should be applied to the hood in an athwartships direction at an angle of 20_ to the vertical. This test should be conducted on both sides.

.3 A force equal to the safe working load of the hook should be applied to the hook in a direction half-way between the positions of tests 1 and 2 and within the ellipse segment formed by 1 and 2. This test should be conducted in four positions.

6.11 [Rescue boat] operational test

Operation of engine and fuel consumption test

6.11.1 The [rescue boat] should be loaded

with weights equal to the mass of its equipment and the number of persons for which the [rescue boat] is to be approved. The engine should be started and the [rescue boat] manoeuvred for a period of at least 4 h to demonstrate satisfactory operation. It should be demonstrated that the [rescue boat] can tow a 25-person liferaft loaded with the number of persons for which it is to be approved and its equipment at a speed of 2 knots. The [rescue boat] should be run at a speed of not less than 6 knots for a period which is sufficient to ascertain the fuel consumption and to establish that the fuel tank has the required capacity.

Compass

6.11.7 It should be determined that the compass performance is satisfactory and that it is not unduly affected by magnetic fittings and equipment in the [rescue boat].

6.13 [Rescue boat] light tests

(3) Paragraph 1/6.13. The searchlight and its power source shall be demonstrated to be in compliance with 156-11(a)(2)(v) and (vi).

7.1.3 The rescue boat should be fitted with its engine and all its equipment. The number of persons for which the rescue boat is to be approved, having an average mass of at least 75 kg and all wearing lifejackets and any other essential equipment required should then board; one person should lie down and the others should be properly seated in the rescue boat. The rigid rescue boat should then be manoeuvred and all equipment on board tested to demonstrate that it can be operated without difficulty or interference with the occupants.

Drop tests

7.2.2 The inflated rescue boat complete with all its equipment and with a mass

equivalent to its engine and fuel in the position of its engine and fuel tank should be dropped three times from a height of at least 3 m on to water. The drops should be from the 45° bow-down, level-trim and 45° stern-down attitudes.

7.2.3 On completion of these drop tests the rescue boat and its equipment should be carefully examined and show no signs of damage which would affect their efficient functioning.

Loading tests

7.2.4 The freeboard of the inflated rescue boat should be taken in the various loading conditions as follows:

- .1 rescue boat with all its equipment;
- .2 rescue boat with all its equipment, engine and fuel, or an equivalent mass positioned to represent engine and fuel;
- .3 rescue boat with all its equipment and the number of persons for which it is to be approved having an average mass of 75 kg so arranged that a uniform freeboard is achieved at the side buoyancy tubes; and
- .4 rescue boat with the number of persons for which it is to be approved and all its equipment, engine and fuel or an equivalent mass to represent engine and fuel and the rescue boat being retrimmed as necessary.

7.2.5 With the rescue boat in any of the conditions prescribed in 7.2.4, the minimum freeboard should be not less than 300 mm at the buoyancy tubes and not less than 250 mm from the lowest part of the transom.

Stability test

7.2.6 The following tests should be carried

out with engine and fuel or an equivalent mass in place of the engine and fuel tanks:

.1 the number of persons for which the inflated rescue boat is to be approved should be crowded to one side with half this complement seated on the buoyancy tube, and then to one end. In each case the freeboard should be recorded. Under these conditions the freeboard should be everywhere positive; and

.2 the stability of the rescue boat during boarding should be ascertained by two persons in the rescue boat demonstrating that they can readily assist from the water a third person who is required to feign unconsciousness. The third person should have his back towards the side of the rescue boat so that he cannot assist the rescuers. All persons should wear approved lifejackets.

7.2.7 These stability tests may be carried out with the rescue boat floating in still water.

Damage test

7.2.8 The following tests should be carried out with the inflated rescue boat loaded with the number of persons for which it is to be approved both with and without engine and fuel or an equivalent mass in the position of the engine and fuel tank:

.1 with forward buoyancy compartment deflated;

.2 with the entire buoyancy on one side of the rescue boat deflated; and

.3 with the entire buoyancy on one side and the bow compartment deflated.

7.2.9 In each of the conditions prescribed

by 7.2.8. the full number of persons for which the rescue boat is to be approved should be supported within the rescue boat.

Manoeuvrability and towing tests

7.2.10 It should be demonstrated that the inflated rescue boat can be propelled and manoeuvred by its oars or paddles in calm water conditions at a speed of at least 0.5 knots over a distance of at least 25 m. when laden with the number of persons, all wearing lifejackets, for which it is to be approved.

7.2.11 Speed and manoeuvring trials should be carried out with engines of various powers to assess the rescue boat's performance.

Righting test

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

Simulated heavy weather test

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

Swamp test

7.2.14 It should be demonstrated that the rescue boat, when fully swamped, is capable of supporting its full equipment, the number

of persons for which it is to be approved and a mass equivalent to its engine and full tank. It should also be demonstrated that the rescue boat does not seriously deform in this condition.

Overload tests

7.2.15 The inflated rescue boat should be loaded with four times the mass of the full complement of persons and equipment for which it is to be approved and suspended from its bridle at an ambient temperature of $+20 \pm 3^{\circ}\text{C}$ with all relief valves inoperative. The rescue boat and bridle should be examined after the test is conducted and should not show any signs of damage.

7.2.16 The inflated rescue boat after 6 h conditioning at a temperature of -30°C should be loaded with 1.1 times the mass of the full complement of persons and equipment for which it is to be approved and suspended from its bridle with all relief valves operative. The rescue boat and bridle should be examined after the test is conducted and should not show any signs of damage.

Detailed inspection

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

(c) Rigid-inflated rescue boat. In addition to 156-13(a)(1), a rigid-inflated rescue boat shall be subjected to all the tests specified for a rigid rescue boat and the tests specified in paragraphs 7.2.8 through 7.2.10 of IMO Resolution A.689(17). Tests in paragraphs 7.2.15 and 7.2.16 must also be conducted if the rigid hull does not have inherent buoyancy in accordance with 156-9(a)(13).

(d) Waivers. The Commandant (G-MSE) may waive certain tests for a rescue boat which

is identical in construction to another rescue boat which has successfully completed the tests, if the rescue boats differ only in size and are of essentially the same design. Tests associated with rescue boat components that have already been approved by the Commandant (G-MSE) are not required to be repeated.

156-15 Quality control and conformance on production boats

(a) Manufacturer's responsibility. The manufacturer shall:

(1) Institute a quality control procedure to ensure that all production rescue boats are produced to the same standard, and in the same manner as the prototype boat approved by the Commandant (G-MSE). The manufacturer's quality control personnel shall not work directly under the department or person responsible for either production or sales.

(2) Schedule and coordinate with the independent laboratory, as required, to ensure that all tests are performed as described in this section. All production inspections and test shall be either performed by the manufacturer or independent laboratory, as applicable.

(3) Submit to the Commandant (G-MSE), a yearly report in accordance with 46 CFR159.007-11.

(b) Independent laboratory responsibility. The independent laboratory shall:

(1) Perform or witness the inspections and tests under this section at least once in each calendar quarter in which the manufacturer constructs Coast Guard approved rescue boats. If the manufacturer also produces Coast Guard approved lifeboats or identical rescue boats for approval by other maritime safety administrations, the inspections may be coordinated with inspection visits for those items. If possible, the time and date of each inspection shall be selected by the independent laboratory to occur when a completed rescue boat is in the manufacturing facility and others are under construction.

(2) Examine the production inspection and test records for rescue boats produced subsequent to the previous inspection by the independent laboratory to make sure that each required inspection and test has been carried out satisfactorily.

(3) Conduct a design audit on at least one Coast Guard approved boat each year. Insofar as is possible, the audit must be done on different model boats in successive years. The audit shall include a comparison of each component, part, and assembly used in the boat with that shown in the approved plans, specifications, and material lists. Each critical dimension shall be correct as shown by measurement or proper fit and function in the next higher assembly.

(c) Production inspections and tests. Each approved rescue boat shall be inspected and tested according to this section, under the procedures in 46 CFR159.007.

(1) In-process inspections and tests. Each production rescue boat shall be examined

during lay-up of the hull to verify that the lay-up conforms to the approved drawings. Each FRP major component such as the hull, canopy, and inner liner, shall be examined and weighed after they are completed but before they are assembled. If the boat is constructed by the spray lay-up technique, the hull and canopy thicknesses shall also be measured using ultrasonic or equivalent techniques. Laboratory tests of laminates shall also be conducted at this time. Test samples shall be cut out from the boat itself or be laid up at the same time, using the same procedures, and by the same operators as the laminate used in the boat. The number of samples used for each test, and the conditions and test methods used, shall be as described in the applicable test specification. The following criteria apply:

(i) Weight. The weight of each FRP section, i.e., hull, canopy, and inner liner must be within 10% of similar sections of the prototype boat. These weights must be the bare laminate weights. Backing plates that are molded into the laminate may be included.

(ii) Thickness. The average thickness of each section of sprayed-up laminate must be within 20% of the corresponding sections of the prototype.

(iii) Resin Content. Laminate samples from the hull, canopy, and inner liners shall be tested as described in 156-13(g)(1)(i). The resin content must be within 8 percentage points of the prototype results. If the resin content does not comply, flexural ultimate strength and tensile tests shall be conducted.

(iv) Flexural Ultimate Strength and Tensile Tests. Laminate samples from each major component such as hull and liner, that does not comply with the resin content requirement, and from each component of every fifth production boat, shall be subjected to the flexural ultimate strength and tensile strength tests as described in 156-13(g)(1)(ii) and (iii), respectively. The values must be at least 90% of the prototype results. If the values do not comply, the component shall be rejected.

(v) Buoyancy Material. If block foam buoyancy material is used, each piece shall be weighed after it is cut and shaped to make sure that the correct amount of foam is installed. If foamed-in-place buoyancy material is used, a separate sample of the foam shall be poured, and used to make a density determination after it has set. The density must be within $32 \pm 8 \text{ kg/m}^3$ ($2 \pm 0.5 \text{ lb/ft}^3$).

(vi) Steel Sheet and Plate. Steel sheet and plate for the hull, floors, and other structural components meeting ASTM A 525 shall be confirmed to have met the coating mass and bend tests requirement specified under ASTM A 525 after galvanizing or other anti-corrosion treatment has been applied. This compliance can be ascertained through supplier's certification papers or through conducting actual tests.

(vii) Cloth. The cloth material used for the construction of each rescue boat shall be confirmed by the independent laboratory to have met the material specification approved by the Commandant (G-MSE). This compliance can be ascertained through supplier's certification papers or through witnessing actual tests.

(viii) Fuel Tank. Each fuel tank shall be tested by a static head above the tank top of 3m (10ft) of water without showing any leaks or signs of permanent distortion.

(2) Post Assembly Inspections. The finished rescue boat shall be visually inspected inside and out. The manufacturer shall develop and maintain current, a visual inspection checklist designed to ensure that all applicable requirements have been met and the rescue boat is equipped in accordance with approved plans. A sample checklist may be obtained from the Commandant (G-MSE).

RESOLUTION A.689

COAST GUARD GUIDELINES

5.2 Inflated rescue boat test

Every new inflatable rescue boat should satisfactorily undergo a 10% overload test in accordance with the approved drawings or construction specification before the final inflation pressure test. The conditions of the 10% overload suspension test are:

.1 the rescue boat should be inflated preferably with air and stabilized at its working pressure;

.2 the working pressure should be determined by the reseal of the relief valves. The pressure relief valves should be fully operational;

.4 the 10% overload to be 10% of the mass of the rescue boat assembly together with its full equipment and complement of persons calculated at 75kg per person;

.5 the loaded rescue boat should remain suspended for not less than 5 min; and

.6 the inflated rescue boat should not sustain damage to its suspension members, their attachments, or any other structural component as a result of this test. The pressure relief valves should maintain the normal working pressure of the buoyancy

tubes and their basic shape during suspension.

5.3 Rescue boat test

5.3.1 Each new rescue boat should be loaded to 1.1 times its related load and suspended from its release mechanism. The rescue boat should then be released with the load on the release mechanism. It should also be confirmed that the rescue boat will release when fully waterborne in the light condition and in a 10% overload condition.

5.3.3 Each rescue boat should be operated for at least 2 h before it is installed on the ship. The test should include operation of all systems, including operation of the transmission through all of its positions.

(d) Recordkeeping. As part of the records required under 46 CFR159.007-13, the manufacturer shall keep records of all items listed in this section. All records shall be maintained for at least 5 years from the date of termination of approval of each rescue boat. The following records shall be kept:

- (1) Affidavits or invoices from the suppliers identifying all essential materials and components used in the production of approved rescue boats, together with an identification of the serial numbers of the rescue boats constructed with those materials;
- (2) Certification from suppliers of all essential material and component that it meets applicable requirements;
- (3) Start and finish date and time of the lay-up of each major FRP component such as the hull, canopy, and inner liner and the names of the operator(s);
- (4) Start and finish date and time of pouring of foam-in-place rigid buoyancy foam, and name of operator(s);
- (5) Records of all structural welding and name of operator(s);
- (6) Records of each required production inspection and test;

- (7) A copy of this guideline, other CFR sections referenced in this guideline, and each applicable document listed in 156-1;
- (8) a copy of approved plans and certifications;
- (9) An approval certificate;
- (10) Records of welder certificates, training and qualifications;
- (11) Date and results of calibration of test equipment and the name and address of the company or agency that performed the calibration;
- (12) The serial number of each production rescue boat, along with records of its inspections and test carried out under this section; and
- (13) The original purchaser of each rescue boat and the vessel on which it was installed, if known.

156-17 Marking and labeling.

(See Page 22)

156-19 Operation, maintenance, and training manual.

(See Page 32)

Revision history:

- 4 NOV 99 – inserted missing “+/-“ in 156-15(c)(1)(v) (SEW)
- noted location of missing final sections (SEW)