



Department of Transportation
Federal Aviation Administration
Aircraft Certification Service
Washington, D.C.

TSO-C70b

Effective
Date: 8/4/14

Technical Standard Order

Subject: *Life Rafts*

1. **PURPOSE.** This technical standard order (TSO) is for manufacturers applying for a TSO authorization (TSOA) or letter of design approval (LODA). In it, we the Federal Aviation Administration, (FAA) tell you what minimum performance standards (MPS) your life raft must first meet for approval and identification with the applicable TSO marking.
2. **APPLICABILITY.** This TSO affects new applications submitted after its effective date.
 - a. TSO-C70a will also remain effective until March 30, 2016; after this date we will no longer accept applications for TSO-C70a.
 - b. Life rafts approved under a previous TSO authorization may still be manufactured under the provisions of its original approval.
3. **REQUIREMENTS.** New models of life rafts identified and manufactured on or after the effective date of this TSO must meet the requirements in SAE International Aerospace Standard (AS) AS1356, *Life Rafts*, dated July 2012, as modified by Appendix 1 of this TSO.
 - a. **Functionality.** This TSO's standards apply to equipment intended to function as life rafts.
 - b. **Failure Condition Classifications.** There is no standard minimum failure condition classification for this TSO.
 - c. **Functional Qualification.** Demonstrate the required performance under the test conditions in AS1356, *Life Rafts*, dated July 2012, as modified by Appendix 1 of this TSO.
 - d. **Environmental Qualification.** Demonstrate the required performance under the test conditions specified in AS1356, *Life Rafts*, dated July 2012, as modified by Appendix 1 of this TSO.

- e. **Deviations.** We have provisions for using alternate or equivalent means of compliance to the criteria in the MPS of this TSO. If you invoke these provisions, you must show that your equipment maintains an equivalent level of safety to the TSO. Apply for a deviation under the provision of 14 CFR § 21.618.

4. **MARKING.**

- a. Mark at least one major component permanently and legibly with all the information in 14 CFR § 45.15(b) in addition to any marking required in SAE AS1356 subsection 7.9. The marking must include the serial number.
- b. Also, mark the following permanently and legibly, with at least the manufacturer's name, subassembly part number, and the TSO number:
 - (1) Each component that is easily removable (without hand tools); and,
 - (2) Each subassembly of the article that you determined may be interchangeable.

5. **APPLICATION DATA REQUIREMENTS.** You must give the FAA aircraft certification office (ACO) manager responsible for your facility a statement of conformance, as specified in 14 CFR § 21.603(a)(1) and one copy each of the following technical data to support your design and production approval. LODA applicants must submit the same data (excluding paragraph 5.e) through their civil aviation authority.

- a. A Manual(s) containing the following:
 - (1) Operating instructions and equipment limitations sufficient to describe the equipment's operational capability.
 - (2) Describe in detail any deviations.
 - (3) Installation procedures and limitations sufficient to ensure that the life raft, when installed according to the installation or operational procedures, still meets this TSO's requirements. Limitations must identify any unique aspects of the installation. The limitations must include a note with the following statement:

“This article meets the minimum performance and quality control standards required by a technical standard order (TSO).
Installation of this article requires separate approval.”
 - (4) Schematic drawings, wiring diagrams, and any other documentation necessary for installation of the life raft.
 - (5) List of replaceable components, by part number, that makes up the life raft. Include vendor part number cross-references, when applicable.

b. Instructions covering periodic maintenance, calibration, and repair for the life raft's continued compliance with the TSO. Include recommended inspection intervals and service life, as appropriate. If appropriate, differentiate the required inspection intervals and service life if affected by storage and operating conditions (i.e., temperature, humidity, etc.)

c. Nameplate drawing with the information required by paragraph 4 of this TSO.

d. Identify functionality or performance contained in the article not evaluated under paragraph 3 of this TSO (non-TSO functions). Non-TSO functions are accepted in parallel with the TSO authorization. For those non-TSO functions to be accepted, you must declare these functions and include the following information with your TSO application:

(1) Description of the non-TSO function(s), such as performance specifications, hardware, and environmental qualification levels. Include a statement confirming that the non-TSO function(s) don't interfere with the article's compliance with the requirements of paragraph 3.

(2) Installation procedures and limitations sufficient to ensure that the non-TSO function(s) meets the declared functions and performance specification(s) described in paragraph 5.d.(1).

(3) Instructions for continued performance applicable to the non-TSO function(s) described in paragraph 5.d.(1).

(4) Interface requirements and applicable installation test procedures to ensure compliance with the performance data defined in paragraph 5.d.(1).

(5) Test plans, analysis and results, as appropriate, to verify that performance of the hosting TSO article is not affected by the non-TSO function(s).

(6) Test plans, analysis and results, as appropriate, to verify the function and performance of the non-TSO function(s) as described in paragraph 5.d.(1).

e. The quality system description required by 14 CFR § 21.607, including functional test specifications. The quality system should ensure that you will detect any change to the approved design that could adversely affect compliance with the TSO MPS, and reject the article accordingly. (Not required for LODA applicants.)

f. Material and process specifications list.

g. List of all drawings and processes (including revision level) that define the article's design.

h. Manufacturer's TSO qualification report showing results of testing accomplished according to paragraph 3.c of this TSO.

i. A compliance matrix identifying all of the requirements in this TSO and identification of the technical data on file at the manufacturer which substantiates compliance with each TSO requirement.

6. MANUFACTURER DATA REQUIREMENTS. Besides the data given directly to the responsible ACO, have the following technical data available for review by the responsible ACO:

a. Functional qualification specifications for qualifying each production article to ensure compliance with this TSO.

b. Equipment calibration procedures.

c. Schematic drawings.

d. Wiring diagrams.

e. Material and process specifications.

f. The results of the environmental qualification tests conducted according to paragraph **3.d** of this TSO.

g. If the article contains non-TSO function(s), you must also make available items **6.a** through **6.f** as they pertain to the non-TSO function(s).

7. FURNISHED DATA REQUIREMENTS.

a. If furnishing one or more articles manufactured under this TSO to one entity (such as an operator or repair station), provide one copy or on-line access to the data in paragraphs **5.a** and **5.b** of this TSO. Add any other data needed for the proper installation, certification, use, or for continued compliance with the TSO, of the life raft.

b. If the article contains declared non-TSO function(s), include one copy of the data in paragraphs **5.d.(1)** through **5.d.(4)**.

8. HOW TO GET REFERENCED DOCUMENTS. *{List the title, organization name and address for getting all referenced documents.}*

a. Order SAE documents from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001. Telephone (724) 776-4970, fax (724) 776-0790. You can also order copies online at www.sae.org.

b. Order copies of 14 CFR parts 21 and 45 from the Superintendent of Documents, Government Printing Office, P.O. Box 979050, St. Louis, MO 63197. Telephone (202) 512-

1800, fax (202) 512-2250. You can also order copies online at www.access.gpo.gov. Select “Access,” then “Online Bookstore.” Select “Aviation,” then “Code of Federal Regulations.”

c. You can find a current list of technical standard orders and advisory circulars on the FAA Internet website Regulatory and Guidance Library at <http://rgl.faa.gov/>. You will also find the TSO Index of Articles at the same site.



Susan J. M. Cabler
Assistant Manager, Design, Manufacturing, &
Airworthiness Division
Aircraft Certification Service

Appendix 1

The following Appendix modifies the text in SAE International’s Aerospace Standard (AS) 1356, *Life Rafts*, dated July 2012. Compliance to the modified text is mandatory in order to comply with the requirements of this TSO.

When Reading ASI356...	Do the following:
Section 1	Disregard
Section 2	<p>Apply all subsections unless disregarded or modified below:</p> <hr/> <p>Page 4, Replace subsection 2.1, with the following text:</p> <p>2.1 Applicable Documents</p> <p>The following publications form a part of this document to the extent specified herein. The applicable issue of <i>cited</i> publications shall be the issue in effect on the date of the publication of this document, unless otherwise specified. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.</p> <hr/> <p>Page 7, Subsection 2.2</p> <p>Disregard</p> <hr/> <p>Pages 9 and 10, subsection 2.3, apply as written, except replace the definition of the following terms with the following text:</p> <p>APPROVED: The status of equipment that meets FAA standards</p> <p>NOMINAL OPERATING PRESSURE: The median of the Normal Conditions Pressure Range.</p> <p>NORMAL CONDITIONS PRESSURE RANGE: The range of pressures attained during all types of inflations conducted at Normal Temperature Conditions.</p> <p>READILY ACCESSIBLE: Capable of being quickly obtained for operation without requiring removal of obstacles.</p> <hr/> <p>Page 10, Section 2.3, add the following definition:</p> <p>PRIMARY BOUYANCY CHAMBER: Any buoyancy chamber which independently provides sufficient buoyancy (at Minimum Operating Pressure) to</p>

	<p>achieve the minimum required freeboard around the entire periphery of the life raft with the life raft loaded at both rated and overload capacity. A minimum of two primary buoyancy chambers are required.</p> <hr/> <p>Page 11, subsection 2.4, replace the definition of “SHOULD” with the following text:</p> <p>SHOULD: Indicates a criterion for which an alternative, including non-compliance, may be applied if an equivalent level of safety is documented, justified, and approved by the cognizant FAA Aircraft Certification Office (ACO) manager. Approval must be requested at least 30 days in advance of submitting the TSO application. Additional substantiation may be required by the ACO manager.</p>
<p>Section 3</p>	<p>Apply all subsections unless disregarded or modified below:</p> <hr/> <p>Page 12, replace subsection 3.1.3(a.) with the following text:</p> <p>Type I Marking: INTENDED FOR USE IN OPERATIONS REQUIRING A LIFE RAFT</p> <p>Type II Marking: NOT INTENDED FOR USE FOR EXTENDED OVER-WATER OPERATIONS <i>NOR</i> IN TRANSPORT CATEGORY AIRCRAFT.</p> <hr/> <p>Page 15, replace subsection 3.2.4.2 with the following text:</p> <p>3.2.4.2 Extended Marine Exposure</p> <p>The life raft shall be demonstrated by test and/or analysis <i>based on</i> test to meet the pressure retention requirements of 5.2.1 and the canopy protection of 6.5.5.1 and 6.5.7 after exposure of the fully-inflated life raft to a saltwater marine environment for at least 15 days. Installed/attached features such as the overpressure protection mechanism (e.g., pressure relief valve), manual inflation means, boarding means, sea anchor, and lifeline attachments shall retain their full functionality.</p> <hr/> <p>Page 15, replace section 3.2.5 with the following text:</p> <p>3.2.5 Flammability</p> <p>The life raft assembly shall be constructed of <i>material meeting the requirements of 14 CFR 25, Appendix F, Part I, Amendment 111</i>. Survival kit contents need not meet this requirement provided that they are fully enclosed within a container that passes the 12 s vertical burn test in Appendix F. <i>A listing of all the survival kit equipment that does not meet the requirements of 14 CFR 25, Appendix F, Part I, Amendment 111 must be documented in the manual required by paragraph 5.a of this TSO.</i></p>

	<p>Page 15, replace subsection 3.4.1 with the following text:</p> <p>3.4.1 Color</p> <p>The color of the primary exterior surfaces, buoyancy tubes, canopy, floor, and water retention features (ballast), shall be International Orange/Yellow or an equivalent, approved high-visibility color. <i>Equivalent colors must be approved by the cognizant FAA Aircraft Certification Office (ACO) manager. Approval must be requested at least 30 days in advance of submitting the TSO application. Additional substantiation may be required by the ACO manager.</i></p>
Section 4	<p>Apply all subsections unless disregarded or modified below:</p> <hr/> <p>Page 18, Add the following note to section 4.3.2 and 4.3.3</p> <p><i>Note: The deflation of each of the primary buoyancy chambers must be evaluated with the remaining primary buoyancy chamber(s) inflated to minimum operating pressure. Secondary compartments and inflatable floor, if present, are not considered “buoyancy chambers” and therefore must also be deflated.</i></p>
Section 5	<p>Apply all subsections unless disregarded or modified below:</p> <hr/> <p>Page 18, Add the following note after subsection 5.1.4:</p> <p>Note: This standard was developed for mechanically activated life raft inflation systems. Electric, electro/mechanical, or software based actuation systems are not adequately addressed by this standard.</p> <hr/> <p>Page 20, replace subsection 5.5.6 with the following text:</p> <p>5.5.6 The inflation system for Type I life rafts shall be shown to function reliably with one primary buoyancy tube open to the atmosphere. There should be independent inflation equipment for each primary buoyancy tube. A single inflation system for all buoyancy tubes may be used if data are provided that fully substantiate the reliability of the single inflation system, <i>and is approved by the cognizant FAA Aircraft Certification Office (ACO) manager. Approval must be requested at least 30 days in advance of submitting the TSO application. Additional substantiation may be required by the ACO manager.</i></p>
Section 6	<p>Apply all subsections unless disregarded or modified below:</p> <hr/> <p>Page 22, , replace subsection 6.2.3.3 with the following text:</p> <p>6.2.3.3 The use of stabilization means other than specified in 6.2.3.1 must be approved by the cognizant FAA Aircraft Certification Office (ACO) manager. The manufacturer shall provide data and analysis that substantiate an equivalent level of stability. Approval must be requested at least 30 days prior to the conduct of tests required in subsection 6.2.3.2. Additional substantiation may be required by the ACO manager.</p>

	<p>Page 25, replace subsection 6.5.7 with the following text:</p> <p>6.5.7 Primary canopy fabric(s) shall be waterproof and provide Ultraviolet Protection Factor (UPF) of 30 or greater, as determined using AATCC Test Method 183 - 2000, or equivalent. Equivalent methods must be approved by the cognizant FAA Aircraft Certification Office (ACO) manager. Approval must be requested at least 30 days in advance of submitting the TSO application. Additional substantiation may be required by the ACO manager.</p>
Section 7	<p>Apply all subsections unless disregarded or modified below:</p> <hr/> <p>Page 26, replace subsection 7.6 with the following text:</p> <p>The text, OPERATING INSTRUCTIONS, shall be marked, adjacent to the inflation instructions, in letters 2 in (5.1 cm) tall, followed by these 3 instructions, or their equivalent, rendered in letters at least 0.5 in (12.7 mm) tall:</p> <ul style="list-style-type: none"> a. ATTACH TO AIRCRAFT b. THROW/PUSH AWAY FROM AIRCRAFT c. PULL UNTIL INFLATION OCCURS <p>Comprehensibility of any variation(s) to these instructions shall be demonstrated in accordance with 2.3: Comprehensible.</p> <p><i>Life rafts stowed remotely and deployed automatically from the remote location are not eligible for approval under this TSO.</i></p> <hr/> <p>Page 26, replace subsection 7.7 with the following text:</p> <p>7.7 Identification in Stowage</p> <p>The text, LIFE RAFT, shall be marked in block letters at least 2 in (5.1 cm) tall, and FOR EMERGENCY USE ONLY shall be marked in block letters at least 1 in (2.54 cm) tall, on all surfaces of the Container/Valise.</p> <p><i>Life raft assemblies intended to be stored in a dedicated compartment or location may be marked only on the surfaces that will be visible when accessed if the installation instructions and limitations provided with the life raft provide that level of detail.</i></p>
Section 8	<p>Apply all subsections unless disregarded or modified below:</p> <hr/> <p>Page 30, Replace subsection 8.8.4 with the following text:</p> <p>8.8.4 Lithium-containing batteries used in any emergency device shall meet the requirements in TSO-C142a or equivalent. Equivalent methods must be approved by the cognizant FAA Aircraft Certification Office (ACO) manager. Approval must be requested at least 30 days in advance of submitting the TSO application. Additional substantiation may be required by the ACO manager.</p>

	<p><i>Note: A TSO approval does not include installation approval in an aircraft. However, special conditions may be required to gain installation approval if the design includes non-rechargeable (i.e. primary) lithium batteries.</i></p>
Section 9	<p>Apply all subsections unless disregarded or modified below:</p> <hr/> <p>Page 31, Replace the first sentence in subsection 9.3 with the following text:</p> <p>9.3 Content</p> <p>Survival Information should be prioritized and <i>shall</i> contain the following, at a minimum:</p>
Section 10	Disregard
APPENDIX A	No Changes
APPENDIX B	No Changes