

Clearance Record
DOCUMENT COMMENT LOG (FIELD)

Originating Office: AIR-133	Document Description: TSO C-70b Life RAFTS	Project Lead/Reviewer: Jan Risheim	Reviewing Office:	Date of Review:
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Commenter	Page &	Comment	Reason for Comment	Suggested Change	Comment Resolution
Tom Jurlina - Zodiac Aerospace	General	TSO-C70b states "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)1356, Life Rafts, dated July 2012 as modified by Appendix 1 of this TSO", however the modifications are minimal to the point where TSO-C70b is essentially AS1356. The requirements in AS1356 are more in reference to a marine grade life raft than one used for aviation. A suggestion would be to reorganize requirements in either TSO-C70b or AS1356 for commercial aviation life rafts and non-commercial (i.e. general aviation and military aviation) as many of the new requirements are for longer duration and/or exposure to conditions (i.e. AS1356 Section 6.2.2, 6.2.3, 8.3)	To clarify raft design and function	Reorganize requirements for commercial and non-commercial usage	Disagree. TSO-C70 is intended for life rafts carried on civil aircraft (ref. 21.601 (b)(1)). Civil aircraft include both transport and general aviation aircraft but do not include public aircraft(i.e military, government use). It is certainly understandable that many requirements that apply to marine life rafts would be applicable to life rafts carried in civil aircraft that are intended to be used in a marine environment. The FAA feels that the Standards in SAE AS1356 (as modified by the TSO) are appropriate. The commenter fails to provide specific recommendations on their proposed revision of the industry standard or the TSO. No Change to the Proposed TSO.
Tom Jurlina - Zodiac Aerospace	TSO paragraph 2, page 6	TSO section 2, page 6, has a typographical error in definitions where NOMINAL OPERATIN PRESSURE should be NOMINAL OPERATING PRESSURE.	Document correction	Operatin change to Operating	Agree. Typo will be corrected

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Tom Jurlina - Zodiac Aerospace	TSO paragraph 2, page 6	TSO section 2, page 6, which replaces the definition of "SHOULD" given in AS1356 Page 11, subsection 2.4 indicates that any AS1356 requirement that stated "should" cannot be replaced with an acceptable alternative without advance notice and 30 day approval from ACO manager prior to TSO application. What is the rationale for requesting approval for equivalent methods or alternatives 30 days prior of submitting the actual TSO application? The submittal of the TSO application is on its own a request for approval. There seems no value added to the application process to submit specific requests for approval in advance of the actual application approval. Why is the requirement only mentioned in specific paragraphs along with the "SHOULD" definition (i.e. TSO section 3 reference to AS1356 subsection 3.4.1, TSO section 5 reference to AS1356 subsection 5.5.6, TSO section 6 reference to AS1356 subsection 6.5.7)? Does this mean applicants cannot propose equivalent alternatives for requirements of other paragraphs in either TSO-C70b or AS1356 that may not include this statement?	Redundancy in application process and allow for equivalent alternatives	Remove requirement	Disagree. The intention of allowing the ACO manager to make a determination on the acceptability of equivalent alternatives for the specific paragraphs identified in the TSO is to streamline the process. The TSO wording allows the local ACO manager to make a determination without the requirement to submit a recommendation to FAA headquarters and waiting for the approval from headquarters that would be required for a formal deviation request. Applicants always have the option of formally requesting a deviation to the TSO standard under 14 CFR 21.618 if they desire. The TSO application includes a statement by the applicant that their design and production system meets the TSO standard and 14 CFR part 21. The FAA may rely solely on the applicant statement to issue an approval. The applicant is fully accountable for meeting the TSO and part 21 requirements. It is not the FAA's responsibility to review the documentation to "find" non-compliances, or deviations with the TSO. No change to the TSO

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Tom Jurlina - Zodiac Aerospace	TSO paragraph 5, page 8 referring to AS1356 subsection 5.1.4 and TSO paragraph 7, page 9 referring to AS1356 subsection 7.6	TSO section 5, page 8 referring to AS1356 subsection 5.1.4 and TSO section 7, page 9 referring to AS1356 subsection 7.6 raft activation other than mechanical and remote raft stowage and automatic deployment for rafts are not covered in this new TSO revision. Please explain the rationale for this? What type of approvals will these raft designs require? One of the advantages of having rafts remotely stowed and automatically deployed is the raft is ready for immediate occupancy. It eliminates the time it would take to remove what will now be a heavier and larger raft due to the new requirements from its stowage, take to an exit then manually deploy. Having an inflation system with multiple means of activation such as electrical with mechanical secondary means increases safety and reliability.	Determine how rafts with alternative activation means and remote stowage will be approved	Include these types of rafts in the TSO	Disagree. Ref TSO Appendix Para 5, page 8: AS1356 as referenced in the TSO does not contain the standards appropriate to evaluate the design and performance of electric, electro/mechanical, or software based actuation systems. The applicant may apply for a deviation from the standard for the actuation system and provide the substantiation data needed for the FAA to make a determination that the proposed deviation results in an equivalent level of safety to the TSO standard. The data necessary to make the determination will be dependent on the specific design. Ref TSO Appendix Para 7, page 9: TSO approval is based on the TSO approval holder controlling the design and production of the article meeting the TSO (Ref 14 CFR 21.601(b)(2)). Actuation systems which are not under the design and production control of the TSO holder would result in an article which is not in compliance with 14 CFR 21.601 (b)(2). A life raft design which is stowed remotely and/or actuated automatically may be included under the Type Certificate (TC), Supplemental Type Certificate (STC), or Parts Manufacturer Approval (PMA) of the product (i.e. Aircraft) . No change to the proposed TSO.
	TSO section 5 referring to AS1356 subsection 5.5.6	TSO section 5 referring to AS1356 subsection 5.5.6 requires notification to the FAA-ACO office if a single inflation system is used for multiple buoyancy tubes. This requirement was in TSO-C12c and removed in TSO-C70a due to the high reliability of the inflation systems. What is the rationale to add this back into the TSO?	High reliability of inflation systems	Allow for single inflation system as in TSO-C70a	Disagree. AS1356 allows the use of single inflation systems IF data are provided to substantiate the reliability of the single inflation system. The TSO requires that the applicant provide the data and request approval at least 30 days prior to submitting the TSO application. No change to the proposed TSO.
Tom Jurlina - Zodiac Aerospace	General	AS1356 has requirements of more markings and instructions on the raft and equipment than C70a. This could be an issue depending on the amount of surface area of the raft and equipment in trying to incorporate every marking and instruction AS1356 is requiring. Too much text and pictographs can clutter the raft, carrying case and equipment surfaces, causing confusion in an emergency situation where occupants are distracted by the amount of markings on the raft and trying to read instructions to use the equipment. Simple and easy to read instructions are all that should be needed.	Prevent confusion of raft and equipment use during an emergency	Minimize minimum amount of markings on system and/or make as an option for commercial life rafts and requirement for non-commercial life rafts.	Disagree. The FAA understands that a balance between marking/instructions and user confusion must be drawn. This was discussed during the development of the SAE standard and a consensus reached. The FAA feels that the SAE standard contains the appropriate balance. It would not make sense to reduce the safety level on commercial rafts by not requiring the markings as requested by the commenter. No change to the TSO

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Tom Jurlina - Zodiac Aerospace	TSO paragraph 8 referring to AS1356 subsection 8.8.4	TSO section 8 referring to AS1356 subsection 8.8.4 has a new requirement that all lithium-containing batteries shall meet the requirements of TSO-C142a. Is this applicable to small lithium batteries in flashlights?	To address flashlights stowed in survival kits	Should not be applicable to survival kit components such as flashlights.	Yes. The intention is to use lithium batteries that have been evaluated to ensure they are safe to use in an aircraft environment. Applicants who wish to propose alternate methods of compliance with the TSO may do so following the deviation process available under 14CFR 21.618. No change to proposed TSO.
Tom Jurlina - Zodiac Aerospace	Subparagraph 3.4.2 of AS1356	Subsection 3.4.2 of AS1356 requires the addition of retro-reflective material that may aid in enhancing the visibility of the raft, however this poses a potential safety concern. Due to the large amount of tape required over the raft surfaces this may increase the overall flammability of materials.	Increased flammability	Reduce the amount of reflective tape for commercial life rafts.	Disagree. The TSO requirement is for all materials to meet the appropriate flammability requirements. The increased amount of retro-reflective tape on the raft surface does not change the requirement for the material to meet the flammability standards. No change to the proposed TSO.
Tom Jurlina - Zodiac Aerospace	Subparagraph 4.4 of AS1356	Subsection 4.4 of AS1356 lists only one method for determining usable sitting area (e.g. 3.6 sq. ft. per occupant, 2.4 sq. ft. per occupant for overload). TSO-C70a offered alternative rating methods (ref. TSO-C70a Appendix 1 Para. 4.1.1). We recommend the continued use of these alternative rating methods as design options.	To allow alternative methods of occupancy rating	Continued use of these alternative rating methods as stated in TSO-C70a	Disagree. The usable sitting area requirement was the subject of significant discussion during the development of the SAE standard. The earlier alternate rating methods were created to accommodate <i>temporary</i> use of evacuation slides as life rafts. The size and shape requirements defined in the SAE standard are more appropriate for dedicated life raft designs. No Change to the proposed TSO.

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Doug Ritter - Equipped to Survive Foundation	TSO Paragraph 2	Add a new subparagraph	Going forward, new aircraft which themselves must incorporate the latest technologies and safety requirements of the FAA should be required to also incorporate life rafts that meet the latest technology and safety requirements. It is unfortunate that for practical reasons we cannot mandate the replacement of deficient life rafts in existing aircraft, but those same reasons are not present in new aircraft that can be readily designed to incorporate the latest life raft safety technology, as they do in all other areas. Failure to do so would be an abrogation of the FAA's responsibility to the flying public.	Under "2 APPLICABILITY" we propose the following addition: c. Life rafts approved for use in all new aircraft certifications initiated after the effective date of TSO-C70b are required to meet TSO-C70b.	Disagree. We understand and agree with the commenter's desire to encourage all aircraft manufacturers to include safety equipment designed to the latest standards in their aircraft designs. However, use of a TSO approved article is not a requirement to receive a Type Certificate or Supplemental Type Certificate. To meet the 14CFR part 25 requirements when installed in aircraft, the life raft must be approved (ref 14CFR 25.1415). A TSO approval is acceptable in meeting that requirement but is not the only way to meet the requirement (Ref 14CFR 21.8) . No change to proposed TSO
Tom Knott	General	I am in favor of the draft TSO as written. As background, I am a DER who does cabin interior compliance inspections, and this TSO revision will improve the level of safety without placing a burden on industry.	N/A	N/A	N/A
Tom Anderson - Goodrich Corp.	TSO Paragraph 1	Revise document to correct typo	Typo	Remove the parentheses mark in front of "the Federal ...	Agree. Typo will be corrected
Tom Anderson - Goodrich Corp.	TSO Paragraph 3	Revise document to correct formatting error	Formatting error	Para. 3: Align first line to the left.	Agree. Typo will be corrected
Tom Anderson - Goodrich Corp.	TSO Para. 3, 3.c & 3.d	The SAE Standard number should be "AS1356" not (AS) 1356.	Inappropriate reference to the SAE document number	Correct the reference	Agree. Reference will be corrected
Tom Anderson - Goodrich Corp.	TSO Para. 3.a	Period missing at the end of Para. 3.a.	Typo	Add period	Agree. Typo will be corrected

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Tom Anderson - Goodrich Corp.	TSO Para 4.b.	This paragraph would require that the TSO marking would be required on items such as the Hook Knife, Heaving Ring, Charged Cylinder Assembly, Lifeline, Sea Anchor, Survival Kit, Aspirator and Hose (if applicable).	This does not seem to add value to the manufacture or use of the product. If any of these subcomponents are used on other TSO assemblies (e.g. TSO-C69c assemblies) would both TSO numbers be marked?	none included	The requirement in Para 4.b.1 is intended to apply to the assembled article. In the case of life rafts, in the assembled condition, the life raft is generally packed in a way that many of the <i>components</i> identified by the commenter would not be accessible without disassembly.(i.e. hook knife, heaving ring, lifeline, hose). However Para 4.b.2 requires that <i>subassemblies</i> that are interchangeable be marked. (i.e. survival kit, sea anchor, aspirator). There is no requirement to mark multiple TSO numbers on components or subassemblies, nor is there a restriction on marking the components with multiple TSO numbers. The basic requirement is that the item be marked with the TSO number when it is installed on the article for which application for TSO is made.
Tom Anderson - Goodrich Corp.	TSO Para 5.d.(6)	Add a requirement to the TSO	none included	Add: A compliance matrix listing all of the TSO requirements and the location of the data showing compliance with those requirements shall be provided.	Agree. Each manufacturer of a TSO article must provide a statement of conformance certifying that the applicant has met the requirements of 14CFR part 21,subpart O, and that the article concerned meets the applicable TSO that is effective on the date of application for that article. (Ref 14CFR 21.603(a)(1)). In order to make that statement, the applicant must have an internal listing of the applicable TSO requirements and identification of the data showing compliance to the requirements. This additional data requirement provides the FAA with the listing of the substantiation data for the TSO requirements, and provides a clear audit trail in investigating any suspected non-compliances to the TSO. The proposed TSO will be changed to by adding para 5.i to incorporate the comment.
Tom Anderson - Goodrich Corp.	TSO Appendix 1	Again they list AS1356 as (as) 1356.	Inappropriate reference to the SAE document number	Correct the reference	Agree. Reference will be corrected
Tom Anderson - Goodrich Corp.	TSO Appendix 1, Section 3	Type I Marking:” INTENDED FOR USE IN OPERATIONS REQUIRING A LIFE RAFT.” Doesn’t seem to make good sense to me; a bit too vague, especially in comparison to the Type II marking.	none included	none included	The commenter states an opinion but does not provide any suggested changes to the TSO. No change to the proposed TSO.

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Tom Anderson - Goodrich Corp.	SAE AS1356	Tear, Tensile, Ply Adhesion, Seam Adhesion, etc. minimums are not changed. These minimums are still too low to be meaningful for design or manufacture	Materials designed to meet these minimums - which have been carried over for more than 50 years - would not support the performance requirements in this standard. While their inadequacies should be discovered during the testing specified, validation of materials based upon analysis (not test) against this baseline requirement could result in approval of inadequate material designs.	none included	The commenter states an opinion but does not provide any suggested changes to the Aerospace Standard. This concern should be discussed and resolved within the SAE and AS1356 updated if necessary. No change to proposed TSO.
Tom Anderson - Goodrich Corp.	SAE AS1356	There don't appear to be specific requirements pertaining to Seam Tape (Ref. C70a, Para 3.1.5)	Seam tape is typically too narrow to allow performance of the testing specified in TSO-C70a, therefore it was not included in the SAE standard or this TSO. The materials testing which is specified for the life raft assembly seams is sufficient to provide the data previously required by this section in TSO-C70a.	Observation - No change suggested	Agree
Tom Anderson - Goodrich Corp.	SAE AS1356	The alternate capacity rating (Para. 4.1.1 of C70a) is not in AS1356	The alternate capacity rating methods were created to accommodate temporary use of evacuation slides as life rafts. The size and shape of the space allocated by these methods were/are totally inappropriate for dedicated life raft designs.	Observation - No change suggested	See resolution of similar comment above by Tom Jurlina regarding AS1356 paragraph 4.4
Tom Anderson - Goodrich Corp.	SAE AS1356	I don't see anything pertaining to Metallic Parts (Ref. C70a, Para. 3.2)	Metallic parts requirements are found in 3.2.4.1	Observation - No change suggested	Agree

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Tom Anderson - Goodrich Corp.	SAE AS1356	I did not find any reference to Sea Trials as per Para. 6.2.3.2 of C70a	Sea trial requirements have been made a part of Sections 5 and 6 in the AS. They are a bit more difficult to recognize because they are not identified as Sea Trials.	Observation - No change suggested	Agree
EASA	AS1356, para 4.3 Freeboard	In 4.3.3 and 4.3.2 a certain freeboard has to be demonstrated after the deflation of any primary Buoyancy Chamber, with the remaining chamber(s) inflated to MinOpPressure. Does the term "remaining chamber(s)" also include secondary chambers (inflatable boarding aids, inflatable canopy hoop, etc.)?	Need for Clarification: Secondary chambers could certainly provide additional buoyancy and thus be beneficial for freeboard assessment. It needs to be clarified what is intended	Change wording.... Has to be demonstrated after the deflation of any primary buoyancy chamber, with the remaining primary buoyancy chamber inflated to minimum operating pressure. Secondary inflation chambers shall also be deflated.	Agree. The AS makes a distinction between primary buoyancy chambers and secondary compartments (i.e. inflatable boarding aids, etc.) as well as inflatable floors. The requirement is that the freeboard be evaluated with each of the primary buoyancy chambers deflated and the remaining chamber(s) inflated to minimum operating pressure. Secondary compartments and inflatable floors are not considered "buoyancy chambers" so must also be deflated. The end result is in line with the EASA suggestion but the wording has been modified for clarity. The FAA and EASA have coordinated the following wording to be added to both 4.3.2 and 4.3.3. <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>
EASA	AS1356, para 2.3 Definitions	A definition of Primary Buoyancy Chamber should be introduced.	Primary Chamber could be wrongly interpreted to be only the one with the largest volume	Add definition in AS1356 para 2.3	Agree. The following definition has been coordinated with and agreed by EASA and will be added to section 2.3 of AS1356. <i>"Primary buoyancy chamber: Any buoyancy chamber which independently provides sufficient buoyancy (at Minimum Operating Pressure) to 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."</i>

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