U.S. Department
of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Installation of TSOA Articles and LODA Appliances

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Initiated by: AIR-110

AC No: 21-50
Change:

1. Purpose of this Advisory Circular (AC).

This AC:

a. Describes the appropriate use of data approved by the FAA, through a technical standard order authorization (TSOA) or TSO letter of design approval (LODA), by applicants seeking a type certificate or approval of a change to type design under the provisions of Title 14 of the Code of Federal Regulations (14 CFR) part 21. This AC does not address aircraft repairs or alterations involving TSO articles under the provisions of 14 CFR part 43, nor does it address alterations to TSOA articles by repair stations under 14 CFR part 43. For the remainder of this document, the manufacturer of these articles will be referred to as a TSOA holder. Those seeking a design approval will be referred to as applicants.

b. This AC is not mandatory and is not a regulation. This AC describes an acceptable means, but not the only means, to comply with the applicable requirements. However, if you use the means described in this AC, you must follow it entirely.

2. Applicability.

This AC applies to any person installing a TSO article into the type design of a product (aircraft, engine, or propeller).

3. Requirement to obtain approval when installing a TSO article.

Applicants installing a TSO article into the type design of a product must obtain FAA approval. The approval of a type design, or change in type design, of a product is separate from the TSOA or LODA. The procedures for obtaining this approval are defined in 14 CFR part 21 and include the following methods:

a. The issuance of a type certificate (TC), including a supplemental type certificate (STC), an amended type certificate (ATC), or an amended supplemental type certificate (ASTC).

b. The approval of changes to the type design of a TC, STC, ATC, or ASTC.

4. Substantiation and descriptive data for installing a TSO article.

a. Background: The amount of substantiation and descriptive data an applicant needs depends on several considerations. A TSO defines the minimum performance standard (MPS) for an article. The data developed by a TSOA holder is required to address the MPS defined by the TSO, and might not address all of the applicable airworthiness requirements for its installation in the type design of a product. Therefore, the TSO marking on a TSO article does not indicate that the applicable airworthiness requirements of the product on which it is being installed have been addressed.

b. What an applicant must do: An applicant must have the descriptive and substantiation data necessary to show that the product on which the TSO article is being installed meets the applicable airworthiness regulations. An applicant may use data approved by the FAA under a TSOA to support showing compliance to the airworthiness requirements applicable to the category of the product on which the TSO article is being installed. If an installer relies on data approved under the TSO approval, they must:

(1) Include in the descriptive data the TSO article manufacturer, model number, and part number(s).

(2) Identify the data approved by the FAA under the TSOA that is applicable to the airworthiness requirements (see section 5 for the types of data you may need to identify). The data, required to be supplied by the TSOA holder under their TSO, has been approved under the TSOA. To the extent that the FAA-approved TSOA data aligns with the applicable airworthiness requirements, the data needs no further substantiation or evaluation by the FAA.

5. Identifying the Data Approved by the FAA for the TSO article.
Identifying the FAA-approved data relative to the TSO MPS will allow an applicant to determine the level of performance provided by the TSO article. To do this, the applicant must thoroughly review and understand the documentation associated with the TSO approval. Look for the following types of data:

a. Minimum performance standards of the TSO: The FAA approves an article relative to the MPS in a specific version of a TSO. Some articles are approved to multiple TSOs. Articles may also be approved by a foreign authority to a standard published by that authority which may have a different MPS than the comparable FAA TSO. The TSOA holder is required to provide the applicant with certain data, typically called FURNISHED DATA in a TSO. Data provided with the TSO article may specify the manner, the environment, or conditions of the installation that are needed to assure compliance with the TSO MPS. The data relative to the TSO MPS has been approved by the FAA and may be used to show compliance with any related aspects of the applicable airworthiness requirements.

b. Deviations to the TSO: TSO articles may be approved with deviations, as long as the TSO manufacturer has shown that the article provides an equivalent level of safety to the TSO MPS. The approval of a deviation may include installation or operational conditions that are necessary to ensure the equivalent level of safety. These conditions are reflected in installation or operational instructions. An applicant must consider any TSO deviations and related instructions when establishing compliance to the applicable airworthiness requirements.

c. Incomplete TSO articles: TSO articles may be approved as incomplete systems. In this case, the TSOA shows compliance only to a subset of the MPS associated with a TSO, and may include instructions or limitations for its installation necessary to achieve the performance required by the MPS. The applicant must address the missing aspects of the MPS as it relates to the airworthiness rules, and any conditions associated with the TSO article's approval. Compliance is established to the applicable airworthiness rules. It is not necessary to establish that a complete system is achieved through the installation of the incomplete TSO into type design, or that the type design complies with the TSO MPS.

d. Non-TSO functions or performance. A TSOA may include non-TSO functions. The TSO article and any integrated non-TSO function(s) are inseparable at the article level. Since they are inseparable, if the TSO MPS requires that the article comply with DO-160 or DO-178, this data may also be used to show compliance of the non-TSO functions to any applicable airworthiness requirements. All other data supporting the non-TSO functions included in the article, and accepted under the TSOA, must be evaluated and approved at installation, just as any other non-TSO part would be approved as part of a TC/STC.

6. Responsibilities for Instructions for Continued Airworthiness.

a. An applicant must provide instructions for continued airworthiness (ICA) in accordance with the applicable airworthiness requirements. The applicant may use the maintenance instructions provided under the TSOA in developing the ICA; or, may choose to develop an ICA independent of, or partially using, the TSOA maintenance instructions. If the applicant's ICA does not adopt, or only partially adopts, the TSOA holders maintenance instructions, the applicant should show that the ICA is not only adequate for maintaining airworthiness of the installation, but also insures that the TSO article remains in compliance with the TSO MPS. If the ICA does not maintain compliance to the TSO MPS, it is considered an alteration of the article by the applicant and the TSO nameplate must be removed or obliterated (see paragraph 7b of this AC).

b. If the applicant's ICA references the TSOA holder's maintenance instructions, the applicant must show that the maintenance instructions are adequate to maintain compliance to the airworthiness requirements, and not only the requirements of the TSO MPS. The applicant should identify the revision level/version of the appropriate document(s), and evaluate changes to those documents in a manner comparable to the evaluation of changes to the article itself (see paragraph 7a of this AC).

7. Changes to the TSO article.

a. Changes to the article by the TSOA holder: This paragraph provides guidance on evaluating changes in type design as they relate to changes in the TSO article. The TSOA holder may make modifications to the design of the article as a minor change under their TSOA. These changes may affect the design approval holder's compliance to the applicable airworthiness requirements, and might only be indicated by changes to version and not the base part number (for example, a software version; change in the number in brackets; or change in the dash number). The airworthiness approval holder is responsible for evaluating minor changes to TSO articles to determine if the change affects compliance to the airworthiness requirements. The design approval holder should maintain a list of all applicable TSO article versions, for which airworthiness compliance has been established, and provide this data in the installation data for

the installer to ensure the correct TSO article version is being installed.

b. By you, the applicant: When you make changes to the design of a TSO'd article, and you are not the holder of the TSOA for the article, you must follow 14 CFR part 21 Subpart O paragraph 21.619(c), titled "Design Changes - Changes by person other than manufacturer". In addition, if you cannot demonstrate that the TSO article still meets the TSO MPS with your design changes, the data approved or accepted under the TSOA may not be valid. Additional FAA review of any TSO data affected by your changes is required to insure that the article complies with any applicable airworthiness requirements at installation.

8 How can I get this and other FAA publications?

a. Order copies of 14 CFR parts from the Superintendent of Documents, Government Printing Office, P.O. 979050, St. Louis, MO 63197. For general information telephone (202) 512-1800 or fax (202) 512-2250. You can order copies online at www.access.gpo.gov. Select "Access" then "Online Bookstore." Select "Aviation," then "Code of Federal Regulations."

b. Order copies of FAA Advisory Circulars from the U.S. Department of Transportation, Subsequent Distribution Office, M-30, Ardmore East Business Center, 3341 Q 75th Avenue, Landover, MD 20785. You can also get copies from the FAA website at http://www.faa.gov/regulations_policies/advisory_circulars/.

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