



Technical Standard Order

**Subject: TSO-C21b, AIRCRAFT TURNBUCKLE ASSEMBLIES AND/OR
TURNBUCKLE SAFETYING DEVICES**

a. Applicability.

(1) Minimum Performance Standards. This technical standard order (TSO) prescribes the minimum performance standards that turnbuckle assemblies and/or safetying devices must meet in order to be identified with the applicable TSO marking. Turnbuckle assemblies and/or safetying devices that are to be so identified and that are manufactured on or after the date of this TSO must meet the standards set forth in Sections 3 and 4 of Military Specification MIL-T-8878C, "Turnbuckles, Positive Safetying", dated October 8, 1985, with the exceptions/revisions and additions specified in subparagraphs a.(3) and a.(4) respectively of this TSO. Turnbuckles approved prior to the date of this TSO may continue to be manufactured under the provisions of their original approval.

(2) Test Methods. Federal Test Method Standard 151, Method 211.

(3) Exceptions/Revisions.

(i) Disregard the statement in paragraph 3.1 of MIL-T-8878C, "...and which have been listed on or approved for listing on the applicable Qualified Products List."

(ii) Compliance with paragraphs 4.1 and 4.5.2 of MIL-T-8878C are not required.

(4) Additions.

(i) In addition to requirements of paragraph 3.3.2 of MIL-T-8878C, include the following:

"Locking clips are for one time use only and shall not be reused. Refer to Military Standard MS-33736."

(ii) In addition to the requirements of paragraph 3.7 of MIL-T-8878C, include the following: “Permanently and legibly mark each article with “TSO-C21b.”

(iii) In addition to requirements of paragraph 4.6 of MIL-T-8878C, include the following:

“Torsion Fatigue. The turnbuckle assembly containing the sample component part shall be subjected to a repetitive torsional load test in which a load equal to 60 percent of the torque load specified in Table I is applied in torsion first in one direction and then reversed for a total of 3,000 complete cycles. There shall be no evidence of failure of any component part.

Vibration. Three representative turnbuckle assemblies, i.e., the smallest, the largest, and an intermediate size, shall be vibrated for 25 hours at a frequency of 3600 cpm at an amplitude of 1/8 inch. The cable tension load for the test shall be 25% of the minimum breaking strength value specified on the applicable MS standard. The locking clip shall not jump out of place or otherwise lose its safetying properties.”

(iv) In addition to the requirements of paragraph 4.3.1, of MIL-T-8878C, include 4 additional turnbuckle assemblies: one assembly for the torsion fatigue test and three assemblies for the vibration tests.

b. Marking. Requirements for marking are specified in paragraph 3.7 of MIL-T-8878C and are in general compliance with FAR § 21.607(d).

c. Data Requirements.

(1) In addition to the information specified in FAR § 21.605, the manufacturer must furnish the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration, having geographical purview of the manufacturer’s facilities, one copy of the following technical data:

(i) A complete description of turnbuckle assembly, including material identification and specification.

(ii) Installation instructions for turnbuckle assemblies and limitations.

(iii) Report of results of tests conducted in accordance with Paragraph 4.6 of MIL-T-8878C.

(iv) Maintenance instructions.

(v) Quality control test specifications to be used to test each production article to ensure compliance with this TSO.

(2) In addition, the manufacturer must furnish to the user one copy of the data and information specified in paragraphs c.(1)(ii) and c.(1)(iv) of this TSO necessary for continued airworthiness and a note with the following statement:

“The conditions and tests required for TSO approval of this article are minimum performance standards. It is the responsibility of those desiring to install the article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards, the article may be installed only if further evaluation by the applicant documents an acceptable installation and is approved by the Administrator.”

d. Availability of Reference Document.

(1) Copies of military specification MIL-T-8878C and any other specification referred to therein may be obtained from the Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, Pennsylvania 19120.

(2) Federal Aviation Regulations, Part 21, Subpart O, and Advisory Circular 20-110E, “Index of Aviation Technical Standard Orders,” may be reviewed at FAA Headquarters in the Air Certification Service, Aircraft Engineering Division, (AIR-120), and at all regional ACO’s.

/S/ Thomas E. McSweeney
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