



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

**TSO-C172**

Effective  
Date:

# Technical Standard Order

**Subject: Cargo Restraint Strap Assemblies**

1. **PURPOSE.** This Technical Standard Order (TSO) tells persons seeking a TSO authorization or letter of design approval what minimum performance standards (MPS) their cargo restraint strap assemblies must first meet in order to obtain approval and be identified with the applicable TSO marking:

2. **APPLICABILITY.** This TSO affects new applications for cargo restraint strap assemblies submitted after its effective date.

3. **REQUIREMENTS.** New models of cargo restraint strap assemblies that are identified and manufactured on or after the effective date of this TSO must meet the MPS, qualification requirements, and minimum documentation requirements set forth in the Society of Automotive Engineers, Inc. (SAE), Aerospace Standard (AS), 5385 Revision A, "Cargo Restraint Straps – Design Criteria and Testing Methods" dated July 2002, Sections 3 (except 3.14), 4 (except 4.5.4, 4.9.1), 5 (except 5.11), and 7, when revised by paragraphs **3.a** and **4.** of this TSO.

a. In order to meet this TSO, Revise SAE AS5385 Rev. A as follows:

(1) Replace AS5385 Rev. A, Section 4.5.1 with the following:

The available data concerning degradation of woven textile fiber performance when exposed to environmental factors, as provided in SAE Aerospace Information Report (AIR) 1490 Revision B, "Environmental Degradation of Textiles" dated August 1995, or equivalent, must be taken into account for webbing and thread selection and treatment, commensurate with the expected storage and service life of the cargo restraint strap assembly.

(2) Replace AS5385 Rev. A, Section 4.5.2 with the following:

An expiration date after which the rated performance may not be expected to be maintained must be provided to the purchaser at or before the time of delivery of each production batch, and the expiration date must be clearly marked and easily understandable to the intended user in accordance with paragraph 4 of this TSO. The expiration date may be based on a fixed time period after the date of manufacture, or may be based on a fixed time period after the cargo restraint strap assembly is first placed in-service. If the expiration date is based on the date the cargo restraint strap assembly is first placed in-service:

(i) Storage instructions must be provided to the user identifying the allowable environmental conditions to which the cargo restraint strap assembly may be exposed to ensure the expiration date remains valid.

(ii) Each strap assembly must be uniquely marked to allow tracking of individual strap assemblies (e.g. serial number).

**(3) Add the following sentence to AS5385 Rev. A, Section 4.6.2:**

For ultimate load ratings other than 22,250 N (5000 lbf), the nominal strap width must be substantiated.

**(4) Replace AS5385 Rev. A, Section 5.7.3 with the following:**

The restraint strap assembly is to be submitted to one cycle for every day of expected service life (e.g. 2 year service life would require 730 such cycles) at a frequency between 0.1 Hz and 0.4 Hz.

**b. Deviations.** The FAA has provisions for using alternative or equivalent means of compliance to the criteria set forth in the MPS of this TSO. Applicants invoking these provisions must demonstrate that an equivalent level of safety is maintained and must apply for a deviation per 14 CFR § 21.609.

**4. MARKING.** As required by 14 CFR § 21.607(d), articles manufactured under this TSO must be marked as follows:

**a.** Each cargo restraint assembly must be permanently and legibly marked in accordance with SAE AS5385 Rev A., Section 7.3, with all the information listed in 14 CFR § 21.607(d). In addition to the requirements of 14 CFR 21.607(d) the cargo strap assembly must be permanently and legibly marked with:

**b.** An expiration date comprised of the month and year of expiration on the strap assembly. The expiration date must be formatted with the 2-digit month identifier and the 4-digit year identifier. For example: 02/2004 for February 2004.

**c.** The rated ultimate load in daN (lbf).

**d.** A unique identifier if required by paragraph **3.a.(2)(ii)**.

Each cargo restraint strap assembly may be marked with any of the additional information listed in SAE AS5385 Rev A., Section 7, not specifically required in paragraphs **4.a** and **4.b**, or **4.c** of this TSO.

**5. APPLICATION DATA REQUIREMENTS.** As required by 14 CFR § 21.605(a)(2), the manufacturer must furnish the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration (FAA), responsible for the manufacturer's facilities, one copy each of the following technical data to support the FAA's approval of the cargo restraint strap assembly design and production:

**a.** Operating instructions and equipment limitations sufficient to describe the operational capability of the equipment. In particular, operational or installation limitations resulting from specific deviations granted must be described in detail.

**b.** The limitations must be sufficient to ensure that the cargo strap assembly, when utilized according to the operating instructions and limitations, continues to meet the requirements of this TSO. Finally, the limitations also must include 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 installing this article either on or within a specific type or class of aircraft to determine that the aircraft installation conditions are within the TSO standards. TSO articles must have separate approval for installation in an aircraft. The article may be installed only if performed under 14 CFR part 43 or the applicable airworthiness requirements.

**c.** Storage instructions if required by paragraph **3.a.(2)** of this TSO

**d.** Instructions, in the form of a Component Maintenance Manual (CMM), containing information on: the periodic maintenance, repair, and continued airworthiness of cargo restraint strap assemblies. The CMM must include recommended inspection intervals and service life determination. Details of deviations granted, as noted in paragraph **5.a.(1)** of this TSO, may also be described in the CMM

**e.** Data substantiating the expiration date required in paragraph **3.a.(2)** of this TSO.

**f.** List of the components, by part number, that make up the cargo restraint strap assembly complying with the standards prescribed in this TSO. Manufacturers should include vendor part number cross-references when applicable.

**g.** Material and process specifications list.

**h.** The quality control system description required by 14 CFR §§ 21.605(a)(3) and 21.143 including functional test specifications to be used to test each production article to ensure compliance with this TSO.

**i.** A drawing providing the information required by paragraph **4** of this TSO.

**j.** A list of all drawings and processes, including revision level, necessary to define the article's design. In the case of a minor change, any revisions to the drawing list need only be made available upon request.

**k.** Flammability test results as per Section 4.4 of SAE AS5385 Rev A.

**l.** Test results for the tests in Section 5 of SAE AS5385 Rev A as identified in paragraph **3** of this TSO.

**6. MANUFACTURER DATA REQUIREMENTS.** In addition to the data to be furnished directly to the FAA, each manufacturer must have available for review by the manager of the ACO responsible for the manufacturer's facilities the following technical data:

- a. The functional qualification specifications to be used to qualify each production article to ensure compliance with this TSO.
- b. Equipment calibration procedures.
- c. Corrective maintenance procedures within 12 months after TSO authorization.
- d. Material and process specifications

**7. FURNISHED DATA REQUIREMENTS.** One copy of the technical data and information specified in paragraphs **5.a.(1)**, **5.a.(2)** and **5.a.(3)** of this TSO and any other data or information necessary for the proper use and for continued airworthiness of the cargo restrain assembly, must accompany each article or multiple articles, if furnished to one source, i.e. operator, type certificate holder, etc., manufactured under this TSO.

**8. HOW TO GET REFERENCED DOCUMENTS.**

a. You may buy copies of SAE AS5385 Rev. A from the Society of Automotive Engineers Inc., Department 331, 400 Commonwealth Drive, Warrendale, PA 15096-0001. Copies also can be obtained through the SAE Internet website @ [www.sae.org](http://www.sae.org).

b. You may buy copies of Federal Aviation Regulations 14 CFR part 21, Subpart O, 14 CFR Part 23, 14 CFR Part 25, 14 CFR Part 29, and 49 CFR Part 572 from the Superintendent of Documents, Government Printing Office, Washington, D.C. 20402-9325. Copies also can be obtained from the Government Printing Office (GPO), electronic CFR Internet website @ <http://www.gpoaccess.gov/ecfr>.

c. Advisory Circular (AC) 20-110, "Index of Aviation Technical Standard Orders," and AC 20-36, "Index of Articles Certified under the Technical Standard Order System" may be obtained from the U.S. Department of Transportation, Subsequent Distribution Office, Ardmore East Business Center, 3341 Q 75<sup>th</sup> Avenue, Landover, MD 20785, telephone (301) 322-4477 or FAX (301) 386-5394. Copies also may be obtained from the FAA Internet website at <http://www2.faa.gov/regulations/Guidance.cfm> and select the "Advisory Circulars" option.

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