



Number: CTSO-C172a

Date of approval: Mar 13, 2017

Approved by: Yang Zhenmei

## China Civil Aviation Technical Standard Order

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This China Civil Aviation Technical Standard Order (CTSO) is issued according to Part 37 of the China Civil Aviation Regulations (CCAR-37). Each CTSO is a criterion which the concerned aeronautical materials, parts or appliances used on civil aircraft must comply with when it is presented for airworthiness certification.

### Cargo Restraint Strap Assemblies

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#### **1. Purpose.**

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers applying for cargo restraint strap assemblies CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards(MPS) that cargo restraint strap assemblies must first meet for approval and identification with the applicable CTSO marking.

#### **2. Applicability.**

This CTSO affects new application submitted after its effective date. Major design changes to article approved under this CTSO will require a new authorization in accordance with section 21.310 of CCAR-21R3.

#### **3. Requirements.**

New models of cargo restraint strap assemblies identified and

manufactured on or after the effective date of this CTSO must meet the MPS qualification and documentation requirements in SAE International (SAE) Aerospace Standard (AS) 5385C, Cargo Restraint Straps – Design Criteria and Testing Methods, dated January 2007, as modified by Appendix 1 of this CTSO.

a. **Functionality.** This CTSO's standards apply to equipment intended to be used to restrain cargo on board civil transport aircraft during flight.

b. **Functional Qualification.** Demonstrate the required performance under the test conditions in SAE AS5385C as modified by Appendix 1 of this CTSO.

c. **Environmental Qualification.** A cargo restraint strap assembly must meet the minimum performance requirements of this CTSO at any time during its service life.

(1) Determine when environmental degradation due to aging, ultra-violet (UV) exposure, weathering, etc., for any materials used in the construction of cargo restraint strap assemblies is unacceptable.

(2) For textile performance, see SAE Aerospace Information Report (AIR) 1490B, Environmental Degradation of Textiles, dated December 2007, for available data when exposed to environmental factors. Determine when the environmental effects of degradation on cargo restraint strap assemblies commensurate with the expected storage and service life become unacceptable for the minimum performance

requirements.

NOTE: Environmental degradation data other than that documented in AIR1490B may be used if the applicant substantiate the data and it is approved by the authorities.

d. Deviations. For using alternative or equivalent means of compliance to the criteria in this CTSO, the applicant must show that the equipment maintains an equivalent level of safety. Apply for a deviation under the provision of 21.310(b) in CCAR-21R3.

#### **4. Marking.**

a. Mark at least one major component permanently and legibly with all the information of 21.312(d) in CCAR-21R3..

b. Also, mark the following permanently and legibly, with at least the manufacturer's name, subassembly part number, and the CTSO number:

(1) Each component that is easily removable (without hand tools);

and,

(2) Each subassembly of the article that you determined may be interchangeable.

c. Mark each cargo restraint strap assembly permanently and legibly in accordance with SAE AS5385C, Section 7.3.

d. Mark the expiration date in the format “EXP YYYY-MM”:

(1) Mark the expiration date of a cargo restraint strap assembly as a limitation.

(2) Mark each component or subassembly, as described in paragraph 4.b. with its expiration date.

e. Mark the rated ultimate load in decanewton (daN) and pound force (lbf) on each strap assembly.

f. The applicant may mark each cargo restraint strap assembly with any extra information listed in SAE AS5385C, Section 7, not specifically required in this paragraph.

g. If the article includes a deviation per paragraph 3.d of this CTSO, marking must indicate a deviation was granted.

## **5. Application Data Requirements.**

The applicant must furnish the responsible certification personnel with the related data to support design and production approval. The application data include a statement of conformance as specified in section 21.310(c)(3) in CCAR-21R3 and one copy each of the following technical data:

a. A Manual(s) containing the following:

(1) Operating instructions and article 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 cargo restraint strap assembly, when installed according to the installation or operational procedures, still meets this CTSO'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 CTSO. Installation of this article requires separate approval.”

(4) Storage instructions.

(5) List of replaceable components, by part number, that makes up the cargo restraint strap assembly. Include vendor part number cross-references, when applicable.

b. Instructions covering periodic maintenance, calibration, and repair to ensure that cargo restraint strap assemblies continue to meet the CTSO approved design. Include recommended inspection intervals and service life, as appropriate.

c. A drawing depicting how the article will be marked with the information required by paragraph 4 of this CTSO.

d. Identify functionality or performance contained in the article not evaluated under paragraph 3 of this CTSO (that is, non-CTSO functions). Non-CTSO functions are accepted in parallel with the CTSO

authorization. For those non-CTSO functions to be accepted, the applicant must declare these functions and include the following information with CTSO application:

(1) Description of the non-CTSO function(s), such as performance specifications, failure condition classifications, software, hardware, and environmental qualification levels. Include a statement confirming that the non-CTSO function(s) do not interfere with the article's compliance with the requirements of paragraph 3.

(2) Installation procedures and limitations sufficient to ensure that the non-CTSO 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-CTSO function(s) described in paragraph 5.d.(1).

(4) Interface requirements and applicable installation test procedures to ensure non-CTSO function(s) 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 CTSO article is not affected by the non-CTSO function(s).

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

e. The quality system description required by section 21.143 and 21.310(c)(2) of CCAR-21R3, including functional test specifications. The quality system should ensure that it will detect any change to the approved design that could adversely affect compliance with the CTSO MPS, and reject the article accordingly.

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 CTSO qualification report showing results of testing accomplished according to paragraph 3.b of this CTSO.

## **6. Manufacturer Data Requirements.**

Besides the data given directly to the authorities, have the following technical data available for review by the authorities:

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

b. Article calibration procedures.

c. Material and process specifications.

d. The results of the environmental qualification tests conducted according to paragraph 3.c of this CTSO.

e. If the article contains non-CTSO function(s), the applicant must also make available items 6.a through 6.d as they pertain to the

non-CTSO function(s).

## **7. Furnished Data Requirements.**

a. If furnishing one or more articles manufactured under this CTSO to one entity (such as an operator or repair station), provide one copy data in paragraphs 5.a and 5.b of this CTSO. Add any other data needed for the proper installation, certification, use, or for continued compliance with the CTSO, of the aircraft audio system and equipment.

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

## **8. Availability of Referenced Documents.**

Order SAE documents from:

Society of Automotive Engineers, Inc.

400 Commonwealth Drive, WARRENDALE, PA 15096-001, USA.

You may also order them online from [www.sae.org](http://www.sae.org).

APPENDIX 1. MINIMUM PERFORMANCE STANDARD FOR  
CARGO RESTRAINT STRAP ASSEMBLIES

This appendix prescribes the MPS for cargo restraint strap assemblies. The applicable standard is SAE AS5385C, Cargo Restraint Straps – Design Criteria and Testing Methods, dated January 2007.

Note: CTSO-C172 Revision A specifically prohibits the use of the D6 end fitting defined in Section 3.6 (Figure 1) of SAE AS5385 Revision C due to risk of self or inadvertent disengagement whether or not under tension.

It is modified as follows:

When reading AS5385C	Do the following:
Section 1	Disregard.
Section 2	Modify Paragraph 2., REFERENCES, by disregarding the last sentence.
Section 3	Modify 3.6 to omit reference to D6 in the first sentence. Modify Figure 1. to disregard D6 end fitting. Disregard 3.14. Disregard 3.15.
Section 4	Modify 4.4 to read as follows: The webbing, as used in the restraint strap assembly, i.e., including sewing and any treatment, shall meet the flammability test criteria of CCAR-25 Appendix F, Part I, paragraph (a)(1)(iv); it may not have a burn rate greater than 63.5 mm (2.5 in) per minute when tested horizontally with the apparatus and test procedures required in Appendix F, Part I, paragraph (b)(5) (see 5.8). Disregard 4.5.4 and 4.9.1. Modify 4.5.1 by adding the following note: “ NOTE: Environmental degradation data other than that documented in AIR1490B may be used if you substantiate the data and it’ s approved by the CAAC” Disregard 4.5.2.°

*English Translation Version for Reference Only*

CAAC

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Section 5	Modify 5.3 by replacing “production” with “qualification” . Modify 5.1 by adding the following note: “NOTE: Equivalent alternate methods must be approved by the CAAC.” Disregard 5.9, 5.10, and 5.11
Section 6	Disregard
Section 7	Apply per Paragraph. 4, this CTSO
Section 8	Disregard
Section 9	Disregard
Section 10	Disregard