

# **Hong Kong Aviation Requirements**

**HKAR-HTSO**

**Hong Kong Technical Standard Orders**

**10 December 2012  
Issue 1 Revision 1**

**CAD HTSO**

**Civil Aviation Department  
Hong Kong, CHINA**

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**FOREWORD**

- 1 CS-ETSO of the European Aviation Safety Agency has been selected to provide where appropriate the content of the HKAR-HTSO.
- 2 Amendments are incorporated into the text by means of a complete 'Re-issue'.
- 3 New, amended and corrected text is indicated by a marginal line.

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**HONG KONG AVIATION REQUIREMENTS**  
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ISSUE 1, dated 21 March 2012  
ISSUE 1 Revision 1, dated 10 December 2012

The following pages of HKAR-HTSO are now current:

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**PREAMBLES**

**HKAR-HTSO**

This HKAR-HTSO was issued on 21 March 2012 and became effective on the same date. The preambles are intended to be a summarised record of the main changes introduced by each amendment of HKAR-HTSO.

*Issue 1*

*21 March 2012*

- New requirements for the issue of Hong Kong Technical Standard Orders

*Issue 1 Revision 1*

*10 December 2012*

- Amended address and telephone number of CAD in page ii.

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## GENERAL

### 1 Applicability

- 1.1 Requirements for the issue of Hong Kong Technical Standard Order (HTSO) Authorisations are found in HKAR-21 Section 1 Subpart O.
- 1.2 Marking requirements for the issue of Hong Kong Technical Standard Order Authorisations are found in HKAR- 21 Section 1 Subpart Q.

### 2 Environmental And Software Standards to Meet Technical Conditions

#### 2.1 Environmental standards

Unless otherwise stated in the paragraph 3.1.2 of the specific HTSO, the applicable environmental standards are contained in EUROCAE/RTCA document ED-14D change 3/DO-160D change 3, “Environmental Conditions and Test Procedures for Airborne Equipment”, dated December 2002, or ED-14E/DO-160E dated March 2005 or ED-14F/DO-160F dated March 2008 or later approved revisions.

It is not permissible to mix version within a given qualification programme.

#### 2.2 Software standards

If the equipment design implementation includes a digital computer, the computer software must be verified and validated in an acceptable manner.

Unless stated otherwise in paragraph 3.1.3 of the specific HTSO, one acceptable means of compliance for the verification and validation of the computer software is outlined in EUROCAE/RTCA document ED-12B/DO-178B, “Software considerations in Airborne Systems and Equipment Certification”, dated December 1992, or later approved revisions.

For those applicants who elect to use EUROCAE/RTCA document ED-12B/DO-178B to demonstrate compliance for the verification and validation of the computer software, the following requirements must be met:

- (i) This document defines five levels of software: Level A, Level B, Level C, Level D, and Level E. The applicant must declare the level (or levels) to which the computer software has

been verified and validated

- (ii) If the equipment incorporates more than one software level, appropriate partitioning of different software level is required.

### 2.3 Electronic Hardware

If the article contains a complex Application-Specific Integrated Circuit (ASIC) or complex programmable logic (e.g. Programmable Array Logic components (PAL), Field-Programmable Gate Array components (FPGA), General Array Logic components (GAL), or Erasable Programmable Logic Devices) summarised as Complex Hardware to accomplish the function, develop the component in according to EUROCAE/RTCA document ED-80/DO-254 “Design Assurance Guidance for Airborne Electronic Hardware”, dated April 2000 or later approved revisions. All Complex Hardware included in the article definition must be developed in accordance with the above mentioned document.

### 2.4 Failure condition classification

When applicable, any failure condition should be classified according to the severity of its effect. For further guidance see EASA AMC 25.1309.

To develop system design assurance guidance for failure condition classifications, the applicant may use EUROCAE/SAE document ED-79/APR 4754 “Certification Consideration for Highly-Integrated or Complex Aircraft Systems” dated November 1996 or later approved revisions.

Develop the system to, at least, the design assurance level equal to the failure condition classifications provided in the HTSO. Development to a lower Design Assurance Level may be justified for certain cases and accepted during the HTSO process but will lead to installation restrictions.

## 3 Additional Information

- 3.1 In some HTSO’s, reference is made to EASA standard and in these cases the EASA standard is attached to the HTSO. Where in the associated “EASA” standard, reference is made to “EASA” or “Part/CS”, it should be substituted by equivalent reference “Director-General” or “HKAR” respectively as applicable.
- 3.2 In some HTSO’s, reference is made to FAA standard and in these cases the FAA standard is attached to the HTSO. Where in the associated “FAA” standard, reference is made to “FAA” or “FAR”, it should be substituted by

equivalent reference “Director-General” or “HKAR” respectively as applicable.

3.3 The following addresses are provided below:

- (a) EUROCAE documents may be purchased from:  
European Organisation for Civil Aviation Equipment  
102 rue Etienne Dolet – 92240 Malakoff – France  
Telephone: +33 1 40 92 79 30; Fax +33 1 46 55 62 65;  
(e-mail: [eurocae@eurocae.net](mailto:eurocae@eurocae.net), web site: [www.eurocae.net](http://www.eurocae.net))
- (b) RTCA documents may be purchased from:  
Radio Technical Commission for Aeronautics, Inc.  
1828 L Street NW, Suite 805 – Washington DC 20036 – USA  
(web site: [www.rtca.org](http://www.rtca.org))
- (c) SAE documents may be purchased from:  
Society of Automotive Engineers, Inc.  
400 Commonwealth Drive - WARRENDALE, PA 15096-001 – USA  
(web site : [www.sae.org](http://www.sae.org))
- (d) NAS specification may be obtained from:  
Aerospace Industries Association (AIA)  
1327 Jones Drive-Ann Arbor-MI 48105 – USA  
(web site: [www.techstreet.com](http://www.techstreet.com))
- (e) FAA Standards may be purchased from:  
Superintendent of Departments, Government Printing Office  
732N Capitol Street NW – Washington DC 20401 – USA  
(web site : [www.gpoaccess.gov](http://www.gpoaccess.gov))
- (f) MIL specifications may be obtained from:  
DODSSP, Standardisation Documents Order Desk  
Building 4D, 700 Robbins Avenue – PHILADELPHIA  
PA 19111-5094 – USA  
(web site :<http://dodssp.daps.mil/>)
- (g) ASTM documents may be purchased from:  
American Society for Testing and Materials, ASTM International,  
100 Barr Harbor Drive, PO Box C700, West Conshohocken,  
Pennsylvania 19428-2959, USA  
(web site : [www.astm.org](http://www.astm.org))

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## LIST OF HTSOs - (INDEX 1 AND INDEX 2)

This Section contains two Indexes:

### 1 Index 1

- 1.1 Index 1 lists all those HTSOs which are technically similar to CS-ETSOs.
- 1.2 When an article has been approved by the Director-General to a HTSO listed in Index 1 the article is to be permanently marked with the appropriate HTSO number. Also, all documentation associated with Certification and Release for installation on an aircraft must record this HTSO number. The 'H' Symbol signifies that the article has been certified to the relevant HTSO by the Director-General.
- 1.3 It should be noted that some CS-ETSO numbers have not been listed in Index 1 because they have not been published by the Director-General and cannot therefore be certified or identified by a HSTO number.
- 1.4 Index 1 will be updated from time to time, to reflect the latest edition of a HTSO. However, this does not mean that previous editions cannot still be used; it merely means that for new applications it would be the general rule to certificate to the latest edition. Exception to this rule would be subject to negotiation with the Director-General.
- 1.5 The HTSO numbering system is explained as follows:

HTSO-127a means: Hong Kong TSO-Number and revision letter, and so-  
HTSO-127 with no revision letter means initial issue.

NOTE: Copies of HTSO are listed in Index 1.

**2 Index 2 (Reserved)**

**INDEX 1**

<i>HTSO</i>	<i>Subject Title</i>
HTSO-C127a	Rotorcraft, Transport Aeroplane, and Normal and Utility Aeroplane Seating Systems

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**INDEX 1 - HONG KONG TECHNICAL STANDARD ORDERS**

**SUBJECT: ROTORCRAFT, TRANSPORT AEROPLANE, AND  
NORMAL AND UTILITY AEROPLANE SEATING  
SYSTEMS**

## **1 Applicability**

This HTSO prescribes the minimum performance standards (MPS) that rotorcraft, transport aeroplane, and normal and utility aeroplane seating systems of the following designated types that are manufactured on or after the date of this HTSO, must meet in order to be identified with the applicable HTSO marking.

Type A	Transport Aeroplane
Type B	Rotorcraft
Type C1	Normal & Utility Aeroplane - Crew Seats
Type C2	Normal & Utility Aeroplane - Passenger Seats

## **2 Procedures**

- 2.1 General  
Applicable procedures are detailed in HKAR-HTSO Section 1.
- 2.2 Specific  
None.

## **3 Technical Conditions**

- 3.1 General
  - 3.1.1 Minimum Performance Standards (MPS)

Standards set forth in Society of Automotive Engineers, Inc. (SAE), Aerospace Standard (AS), Document No. AS 8049A, "Performance Standards for Seats in Civil Rotorcraft and Transport Airplanes", dated September, 1997, as amended by Appendix 1 of this HTSO.

Additions:

Additional information on the dynamic testing of seating systems is contained in FAA Advisory Circular (AC) 20-137, "Dynamic Evaluation of Seat Restraint Systems & Occupant Restraint for Rotorcraft (Normal & Transport)", AC 23.562-1, "Dynamic Testing of Part 23 Airplane Restraint/Systems and Occupant Protection", and AC 25.562-1A, "Dynamic Evaluation of Seat Restraint Systems & Occupant Protection on Transport Airplanes". Compliance with these AC's is not necessary to receive a HTSO authorisation under this HTSO. However, the applicant for a seat installation approval should be aware that any seating system may be required to meet the criteria contained in these AC's in order to qualify for installation in an aircraft.

- 3.1.2 Environmental Standards  
None
- 3.1.3 Software Standards  
None

- 3.2 Specific  
None

## 4 Marking

- 4.1 General

Marking is detailed in HKAR-HTSO Section 1 paragraph 1.2. In addition, each seating system shall be legibly and permanently marked with the following:

- (i) the applicable seat type : "Type A-", "Type B-", "Type C1-", or "Type C2-" followed by the appropriate seat facing direction designation:

## HTSO-C127a

“FF”-forward; “RF”-rearward; or “SF”-sideward,

- (ii) for Type A passenger seating systems, the approved seat pitch necessary to maintain clearance to assure an effective emergency evacuation, as defined in FAA AC 25.562-1A, Appendix 2. Use appropriate statement as follows: “See installation limitations in component maintenance manual (CMM) or drawing number (insert number)” or “Minimum or Allowable range (if applicable) seat pitch (insert number/range).”,
- (iii) each separate component that is easily removable (without hand tools, except those components that are HTSO articles), each interchangeable element, and each separate sub-assembly of the article that the manufacturer determines may be interchangeable with other seating systems must be permanently and legibly marked with at least the name of the manufacturer, manufacturer’s subassembly part number, and the HTSO number,
- (iv) for Type A and Type B transport passenger, flight attendant, and observer seating systems, each seat cushion required for qualification of the seating system must be marked with “Complies with CS 25.853(c), or CS 29.853(b), as applicable” when tested in accordance with the requirements of Section 3.4.2 of SAE AS 8049A, as revised by subparagraph 2.2.3 of Appendix 1 of this HTSO.

#### 4.2 Specific

None.

## 5 Availability of Referenced Document

See HKAR-HTSO Section 1 paragraph 3.

## TRANSPORT AEROPLANE, AND NORMAL AND UTILITY AEROPLANE SEATING SYSTEMS

### 1 Purpose

This appendix prescribes the MPS for seating systems, as modified by the FAA for reference in this HTSO.

### 2 Requirement

The standards applicable to this HTSO are set forth in the industry standard specified in paragraph 3 of this HTSO. SAE AS 8049A, "Performance Standards for Seats in Civil Rotorcraft and Transport Airplanes, " dated September 1997, are modified as follows:

#### 2.1 Exceptions

- 2.1.1 The information contained in Section 1. SCOPE: and Section 2. REFERENCES: of SAE AS 8049A is duplicative and shall be disregarded.
- 2.1.2 Compliance with Section 3.1 Guidance: of SAE AS 8049A is not required, except for Subsections 3.1.4, 3.1.8, 3.1.11, 3.1.14 (passenger seats only), 3.1.15 and 3.1.17 through 3.1.20.
- 2.1.3 Compliance with the dynamic test procedures and documentation of Subsection 5.3.1 Dynamic Impact Test Parameters: through Subsection 5.3.9.2 Impact Pulse Shape: of SAE AS 8049A may be demonstrated by equivalent procedures such as those described in either FAA AC 23.562-1 or 25.562-1A. The simplified procedures for head injury criteria (HIC) outlined in policy letter TAD-96-002 dated February 16, 1996 also may be used in lieu of the selection of test conditions described in Subsection 5.3.6.2 of SAE AS 8049A. The use of any equivalent procedures must be established by the applicant and accepted in advance by the Manager, Aircraft Certification Office (ACO), Federal Aviation Administration (FAA), having geographic purview of the applicant's facility (See subparagraph 2.2.1 of this Appendix).
- 2.1.4 Compliance with the dynamic impact test pass/fail criteria of Subsections 5.4.3, 5.4.4, and 5.4.9 of SAE AS 8049A for permanent deformation limits, HIC, and femur loads, respectively, is not required. However, the data must be reported, as required by subparagraph 5.a

## HTSO-C127a

## APPENDIX 1

(12) of the FAA TSO-C127a.

- 2.1.5 Disregard the marking requirements specified in Section 6. MARKINGS: of SAE AS 8049A. Marking of the article shall be in accordance with paragraph 4 of this HTSO.

## 2.2 Additions

- 2.2.1 As applicable, at least 30 days prior to conducting any required TSO testing and prior to submitting an application for TSO authorisation per 14 CFR 21.605(a), the applicant shall submit, to the FAA ACO manager, a proposed plan for demonstrating compliance with the requirements of this TSO for the following:
- 2.2.1.1 Any procedures that the applicant has identified in consideration of the design guidance in the SAE AS 8049A Subsections identified in subparagraph 2.1.2 of this Appendix; and
  - 2.2.1.2 Those equivalent procedures the applicant has proposed to use to demonstrate compliance with dynamic test requirements of subparagraph 2.1.3 of this Appendix.
- 2.2.2 Under Section 3.2 Requirements: of SAE AS 8049A, add a new Subsection 3.2.15 to read as follows: Except for rearward facing seats, the pelvic restraint system shall be designed such that the vertical angle subtended by the projection of the pelvic restraint centreline and the seat reference point (SRP) water line shall not be greater than 55 degrees. The SRP water line is a line/plane passing through the SRP parallel to the horizon. The pelvic restraint centreline is formed by a line from the pelvic restraint anchorage to a point located 9.75 inches forward of the SRP and 7.00 inches above the SRP water line. In addition, the pelvic restraint anchorage point(s) must be located no further than 2.0 inches forward of the SRP (ref Figure 1A of SAE AS 8049A).
- 2.2.3 Replace Subsection 3.4.2 of SAE AS 8049A with the following: Type A-Transport Airplane and Type B-Transport Rotorcraft passenger, flight attendant, and observer seat cushion systems shall be tested and shall meet the fire protection provisions of Appendix F, Part II of 14 CFR Part 25, as required in 14 CFR 25.853(c) effective February 2, 1995 and 14 CFR 29.853(b) effective October 26, 1984

respectively, or the equivalent shall be demonstrated by analysis (similarity) to provide equivalent protection. Type B- Normal Rotorcraft upholstery shall be self extinguishing when tested to meet the fire protection provisions of 14 CFR 27.853(b) effective February 4, 1980. Type C1- and C2- Normal & Utility Airplane seat cushions shall be self extinguishing when tested to meet the fire protection provisions of paragraph (c) of Appendix F of 14 CFR Part 23, as required in 14 CFR 23.853(d)(3)(ii) effective February 9, 1995.

2.2.4 The following two items shall be included in Subsection 5.3.10.3 Test Data: of SAE AS 8049A: o. Post test retrieval of life preserver; and p. Evaluation of seat egress (See adjustable features in Subsection 3.2.6 and baggage stowed under seat in Subsection 3.2.7 of SAE AS 8049A. These two items will be part of the data submittal required by subparagraph 5.a (12)(iv) of this TSO.

2.2.5 Under APPENDIX A PROCEDURES FOR EVALUATING PULSE SHAPES, revise Subsection A.6 STEP 5 (REFERENCE FIGURE 5A): of SAE AS 8049A to read: Construct a line parallel to the ideal (minimum regulatory requirement) pulse and offset by 2g in magnitude less than the ideal during the time interval between  $T_1$  and  $T_3$ . Likewise construct a line parallel to the ideal pulse and offset by 2 g in magnitude less than the ideal (minimum regulatory requirement) pulse on the trailing side of the pulse from:

$$T_3 < t < T_1 + 1.33(T_3 - T_1)$$

If the magnitude of the acquired pulse is 2 g less than the ideal pulse shape at any point along the acquired pulse shape during the period  $T_1 < t < T_1 + 1.33(T_3 - T_1)$ , the pulse is unacceptable.

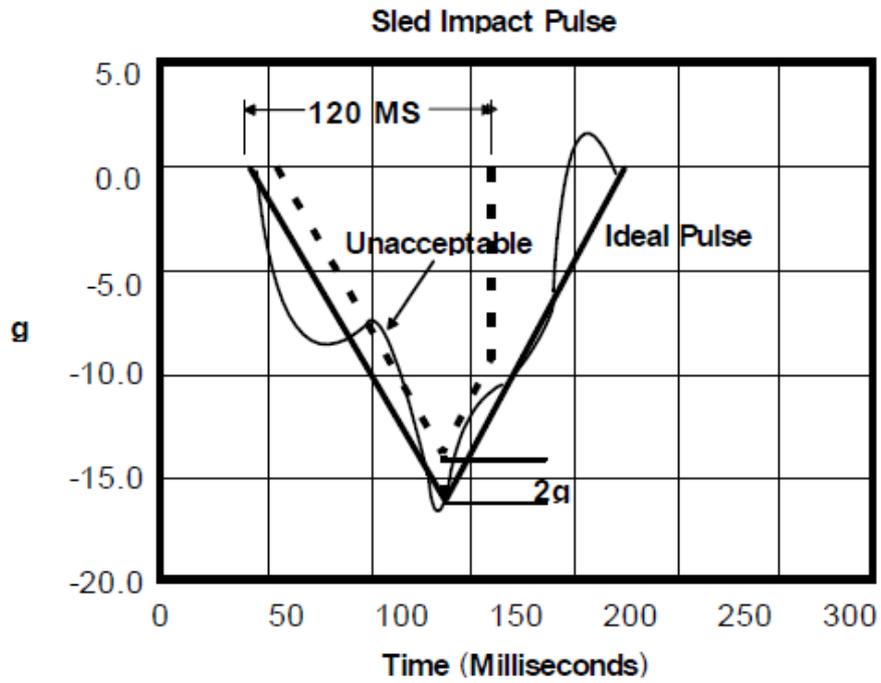


FIGURE 5A

**APPENDIX 2 TEST CONDITION**

SAE AS 8049A incorporates, as a reference, the following test standards for which a more recent version of these standards may be substituted, if approved by the FAA ACO manager having geographical purview over the manufacturer's facilities.

1. SAE J211- Instrumentation for Impact Tests.
2. Code of Federal Regulations, Title 49, Part 572, Anthropomorphic Test Dummies

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