*English Translation Version for Reference Only*

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Approved by：Xu Chaoqun

# China Civil Aviation Technical Standard Order

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.

## Carbon Monoxide Detector Instruments

**1. Purpose.**

This China Civil Aviation Technical Standard Order (CTSO) is for manufacturers applying for Carbon Monoxide Detector Instruments CTSO authorization (CTSOA). This CTSO prescribes the minimum performance standards (MPS) that Carbon Monoxide Detector Instruments 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 21.353 of CCAR-21R4.

**3. Requirements**

The carbon monoxide detector instruments identified and manufactured on or after the effective date of this CTSO must meet the MPS qualification and documentation requirements in the SAE International's Aerospace Standard (AS) 412, carbon monoxide detector instruments, dated July 2001, Revision B (AS412B). See paragraph 4 of this CTSO for an exception to the marking requirements.

a. Functionality.

This CTSO's standards apply to equipment intended to detect carbon monoxide and emit a warning when levels become dangerous.

b. Failure Condition Classifications.

Failure of the function defined in paragraph 3.a of this CTSO is a major failure condition. Develop each instrument to, at least, the design assurance level for this failure condition.

c. Environmental Qualification.

Demonstrate the required performance under the test conditions specified in RTCA Inc. document RTCA/DO-160E, titled Environmental Conditions and Test Procedures for Airborne Equipment, dated December 9, 2004. Apply the sections listed in appendix 1 of this CTSO.

d. Software Qualification.

If the carbon monoxide detector instrument includes software, develop the software according to RTCA/DO-178B, Software

Considerations in Airborne Systems and Equipment Certification, dated December 1, 1992. The software design assurance level should be consistent with the failure condition classification identified in paragraph 3.b of this CTSO.

e. Electronic Hardware Qualification.

If the carbon monoxide detector instrument includes complex custom airborne electronic hardware, develop the component according to RTCA/ DO-254, Design Assurance Guidance for Airborne Electronic Hardware, dated April 19, 2000. The hardware design assurance level should be consistent with the failure condition classification defined in paragraph 3.b of this CTSO.

f. 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 21.368(a) in CCAR-21R4.

**4. Marking.**

a. Disregard AS412B, Paragraph 3.2 and mark at least one major component permanently and legibly with all the information in 21.423(b) of CCAR-21R4.

b. If the component includes software and/or airborne electronic

hardware, then the part number must include hardware and software identification. A separate part number for hardware and software can be used. Either way, a means to show the modification status must be included.

**NOTE:** Similar software versions, approved to different software levels, must be differentiated by part number.

c. If applicable, identify deviations granted to the article by marking “Deviation. See installation/instruction manual (IM)” after the CTSO number.

**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 21.353(a)(1) in CCAR-21R4 and one copy each of the following technical data:

a. Operating instructions and equipment limitations in an IM, sufficient to describe the article’s operational capability. Describe any deviations in detail. If needed, identify equipment by part number, version, revision, and criticality level of software/hardware, classification for use, and environmental categories.

b. Installation procedures and limitations in an IM, sufficient to

ensure that the article, when installed according to the installation procedures, still meets this CTSO's requirements. Limitations must identify any unique aspects of the installation. Finally, the limitations must include a note with the following statement:

"The article meets the minimum performance standards and quality control standards specified in CTSO. Installation of this article requires separate approval."

c. Schematic drawings of the installation procedures.

d. Wiring diagrams of the installation procedures.

e. List of components, by part number, that make up the carbon monoxide detector instrument. Include vendor part number cross references, when applicable.

f. A component maintenance manual (CMM), covering periodic maintenance, calibration, and repair, for the continued airworthiness of installed carbon monoxide detector instrument. Instructions should include recommended inspection intervals and service life. Describe the details of deviations granted, as noted in paragraph 5.a of this CTSO.

g. Material and process specifications list.

h. The quality system description required by section 21.358 of CCAR-21R4, 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.

i. Manufacturer’s CTSO qualification test report.

j. Nameplate drawing with the information required by paragraph 4 of this CTSO.

k. List of all drawings and processes (including revision level) that define the article’s design. For a minor change, follow the directions in CCAR-21R4 21.369. Any revisions to the drawing list should be approved by authority.

l. An environmental qualification form as described in RTCA/DO-160E, or the most current revision.

m. If the article includes software: a plan for software aspects of certification (PSAC), software configuration index, and software accomplishment summary. We recommend that applicant submit the PSAC early in the software development process. Early submittal allows us to quickly resolve issues, such as partitioning and determining software levels.

n. If the article includes complex custom airborne electronic hardware: plan for hardware aspects of certification (PHAC), hardware verification plan, top-level drawing， and hardware accomplishment summary. We recommend that applicant submit the PHAC early in the software development process. Early submittal allows us to quickly resolve issues.

**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. Equipment calibration procedures.

c. Continued airworthiness document within 3 months after CTSOA

d. Schematic drawings.

e. Wiring diagrams.

f. Material and process specifications.

g. Results of the environmental qualification tests conducted according to paragraph 3.c of this CTSO.

h. If the instrument includes software, the appropriate documentation defined in RTCA/DO-178B, including all data supporting the applicable objectives in Annex A, Process Objectives and Outputs by Software Level.

i. If the instrument includes complex custom airborne electronic hardware, the appropriate hardware life cycle data combined with design assurance level, as defined in RTCA/DO-254, Appendix A.

**7. Furnished Data Requirements.**

If furnishing one or more articles manufactured under this CTSO to

one entity (such as an operator or repair station), provide one copy of information of 5.a to 5.f and 5.l of this CTSO. Add any other data needed for the proper installation, certification, use, or for continued airworthiness of the detector instrument.

**8. Availability of Referenced Documents.**

a. Order RTCA documents from:

Radio Technical Commission for Aeronautics, Inc.

1150 18th Street NW, Suite 910, Washington D.C. 20036

You may also order them online from the RTCA Internet website at: www.rtca.org.

b. Order SAE document from:

Society of Automotive Engineers, Inc.

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

You may also order them online from the SAE Internet website at: www.sae.org.

APPENDIX 1. APPLICABLE ENVIRONMENTAL QUALIFICATIONS TESTS

| *RTCA/DO-160E Section* | *Title* | *Test Category* |
|---|---|---|
| 4.0 | Temperature and Altitude | Not required -Covered under AS412B |
| 5.0 | Temperature Variation | Not required |
| 6.0 | Humidity | Not required -Covered under AS412B |
| 7.0 | Operational Shocks and Crash Safety | Category B |
| 8.0 | Vibration | Not required -Covered under AS412B |
| 9.0 | Explosion Proofness | Not required |
| 10.0 | Waterproofness | Not required |
| 11.0 | Fluids Susceptibility | Not required |
| 12.0 | Sand and Dust | Category S |
| 13.0 | Fungus Resistance | Not required |
| 14.0 | Salt Spray | Not required |
| 15.0 | Magnetic Effect | Test and report category |
| 16.0 | Power Input | Not required -Covered under AS412B |
| 17.0 | Voltage Spike | Not required -Covered under AS412B |
| 18.0 | Audio Frequency Conducted Susceptibility — Power Inputs | Not required |
| 19.0 | Induced Signal Susceptibility | Not required |
| 20.0 | Radio Frequency Susceptibility (Radiated & Conducted) | Not required |
| 21.0 | Emission of Radio Frequency Energy | Category M |
| 22.0 | Lightning Induced Transient Susceptibility | Not required |
| 23.0 | Lightning Direct Effects | Not required |
| 24.0 | Icing | Not required |
| 25.0 | Electrostatic Discharge | Not required |
| 26.0 | Fire, Flammability | Category C |