



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

**TSO-C99a**

Effective  
Date: mm/dd/08

# Technical Standard Order

## Proposed

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**Subject: Flight Deck (Sedentary) Crewmember Protective Breathing Equipment**

1. **PURPOSE.** This technical standard order (TSO) is for manufacturers applying for a TSO authorization (TSOA) or letter of design approval (LODA). In it, we (the Federal Aviation Administration, or FAA) tell you what minimum performance standards (MPS) your flight deck (sedentary) crewmember protective breathing equipment (PBE) must first meet for approval and identification with the applicable TSO marking.
2. **APPLICABILITY.** This TSO affects new applications submitted after its effective date.
  - a. All prior revisions to this TSO are no longer effective. Generally we will not accept applications after the effective date of this TSO. However, we may do so up to six months after it, if we know that you were working against the earlier MPS before the new change became effective.
  - b. Flight deck (sedentary) crewmember PBE approved under a previous TSOA may still be manufactured under the provisions of their original approval.
  - c. Major design changes to flight deck (sedentary) crewmember PBE approved under this TSO will require a new authorization. See Title 14 of the Code of Federal Regulations (14 CFR) § 21.611(b).
3. **REQUIREMENTS.** New models of flight deck (sedentary) crewmember PBE identified and manufactured on or after the effective date of this TSO must meet the MPS qualification and documentation requirements in SAE International's (SAE) Aerospace Standard (AS) 8031A, *Personal Protective Devices for Toxic and Irritating Atmospheres Air Transport Flight Deck (Sedentary) Crewmembers*, dated March 1999, as modified by appendix 1 of this TSO.
  - a. **Functionality.** This TSO's standards apply to flight deck (sedentary) crewmember PBE to be used on transport category aircraft to provide eye and respiratory protection during in-flight emergencies. This equipment is intended to be used only while the flight deck crewmember remains seated at their flight deck stations.

**b. Environmental Qualifications.** Test the equipment according to procedures in AS8026A, *Crewmember Demand Oxygen Mask for Transport Category Aircraft*, dated July 1996, paragraph 4.5.

**c. Deviations.** We have provisions for using alternate or equivalent means of compliance to the criteria in the MPS of this TSO. If you invoke these provisions, you must show that your equipment maintains an equivalent level of safety. Apply for a deviation under 14 CFR § 21.609 before submitting your data package.

#### **4. MARKING.**

**a.** Mark at least one major component (mask assembly) permanently and legibly with all the information in 14 CFR § 21.607(d), except for the following:

(1) 14 CFR § 21.607(d)(2). Use the name, type, and part number. Do not use the optional model number; and

(2) 14 CFR § 21.607(d)(3). Use the date of manufacture. Do not use the optional serial number.

**b.** In addition, mark the mask assembly with the following:

(1) Size (if more than one size is manufactured)

(2) Type (as specified in TSO-C89a, paragraph 3), and

(3) “Beards will not seal,” if applicable.

**c.** Also, mark the following permanently and legibly, with at least the manufacturer’s name, subassembly part number, and the TSO number:

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

(2) Each interchangeable element, and

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

**d.** Identify deviations granted to the article by marking “Deviation. See installation/instruction manual (IM)” after the TSO number. You can abbreviate the marking to “(Dev. See IM).”

e. Optional marking is permitted to allow aircraft-specific or operational-specific installation limitations, such as: **“FOR USE ON {insert aircraft type or serial number} ONLY,”** **“FOR USE ON AIRCRAFT USED IN PART {insert number} OPERATIONS ONLY,”** or **“SEE DRAWING NO. {insert number} FOR INSTALLATION LIMITATIONS.”**

**5. APPLICATION DATA REQUIREMENTS.** As a TSO manufacturer-applicant, you must give the FAA aircraft certification office (ACO) manager responsible for your facilities a statement of conformance, as specified 14 CFR § 21.605(a)(1) and one copy each of the following technical data to support your design and production approval. (Under 14 CFR § 21.617(a)(2), LODA applicants submit the same data through their civil aviation authority:)

a. Operating instructions and equipment limitations in an IM, sufficient to describe the equipment’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 flight deck (sedentary) crewmember PBE, when installed according to the installation procedures, still meets this TSO’s requirements. Limitations must identify any unique aspects of the installation. Finally, the limitations must include a note with the following statement:

The conditions and tests for TSO approval of this article are minimum performance standards. Those installing this article, on or in a specific type or class of aircraft, must 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 according to 14 CFR part 43 or the applicable airworthiness requirements.

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 flight deck (sedentary) crewmember PBE complying with the standards prescribed under this TSO. 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 flight deck (sedentary) crewmember PBE. Instructions should include recommended cleaning and sterilization procedures, inspection intervals, and service life. Describe the details of deviations granted, as noted in paragraph **5.a** of this TSO.

g. Material and process specifications list.

**h.** The quality control system (QCS) description required by 14 CFR §§ 21.143 and 21.605(a)(3), including functional test specifications. The QCS should ensure that you will detect any change to the equipment that could adversely affect compliance with the TSO MPS, and reject the item accordingly. (Not required for LODA applicants.)

**i.** Manufacturer's TSO qualification test report.

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

**k.** List of all drawings and processes (including revision level) that define the article's design. For a minor change, follow the directions in 14 CFR § 21.611(a). Show any revisions to the drawing list only on our request.

**6. MANUFACTURER DATA REQUIREMENTS.** Besides the data given directly to us, have the following technical data available for review by the responsible ACO or civil aviation authority:

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

**b.** Equipment calibration procedures.

**c.** Corrective maintenance procedures within 12 months after TSOA or LODA.

**d.** Schematic drawings.

**e.** Wiring diagrams.

**f.** Material and process specifications.

**g.** Results of the environmental tests conducted per paragraph 3.b of this TSO.

**7. FURNISHED DATA REQUIREMENTS.** If furnishing one or more articles manufactured under this TSO to one entity (such as an operator or repair station), provide one copy of the data in paragraphs 5.a through 5.f of this TSO. Add any other data needed for the proper installation, certification, use, or for continued airworthiness, of the flight deck (sedentary) crewmember PBE. .

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

**a.** Order SAE documents from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001. Telephone (724) 776-4970, fax (724) 776-0790. You can also order copies online at [www.sae.org](http://www.sae.org).

**b.** Order copies of 14 CFR part 21, Subpart O and part 25, from the Superintendent of Documents, Government Printing Office, P.O. Box 37154, Pittsburgh PA 15250-7954.

Telephone (202) 512-1800, fax (202) 512-2250. You can also order copies online at [www.access.gpo.gov](http://www.access.gpo.gov). Select "Access," then "Online Bookstore." Select "Aviation," then "Code of Federal Regulations."

c. You can find a current list of technical standard orders and advisory circulars on the FAA Internet website Regulatory and Guidance Library at <http://rgl.faa.gov>. You will also find the TSO Index of Articles at the same site.

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**APPENDIX 1.  
MPS FOR FLIGHT DECK (SEDENTARY) CREWMEMBER PROTECTIVE  
BREATHING EQUIPMENT**

The applicable standard is SAE AS8031A, *Personal Protective Devices for Toxic and Irritating Atmospheres Air Transport Flight Deck (Sedentary) Crewmembers*, dated March 1999. We modified it as follows

<b><i>SAE AS8031A citation:</i></b>	<b><i>FAA modification:</i></b>
Section 1, SCOPE	Disregard.
Paragraph 7.1 a. Resistance to Flammability	Revise to read: “Construct the device, including packaging, (except small parts like knobs, triggers, fasteners, seals, and electrical parts) of materials that don’t contribute significantly to the propagation of a fire, and that comply with 14 CFR § 25.853(a) specifically Appendix F, Part I(a)(1)(iv) in effect on October 27, 2004.”
Paragraph 8.1	Revise to read: “Cleaning and Sterilizing: Except for non reusable or disposable systems, ensure that cleaning and sterilizing the device is possible without major disassembly and without adverse effects on operation and performance. The cleaning method must be either manufacturer-recommended, or according to SAE ARP 1176, <i>Oxygen System Component Cleaning and Packaging</i> . Include cleaning and sterilizing procedures in the CMM, per paragraph 5.f of this TSO.”
Section 8, IDENTIFICATION	Disregard all except for paragraph 8h. Find marking requirements in paragraph 4 of this TSO and include paragraph 8h.
Paragraph 9.1	Use the following values for X=.05, Y=.10 and Z=.05.