



Technical Standard Order

Subject: Crewmember Oxygen Regulators, Demand

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 crewmember oxygen regulators, demand, 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. Crewmember oxygen regulators, demand, approved under a previous TSOA may still be manufactured under the provisions of their original approval.

c. Major design changes to crewmember oxygen regulators, demand, 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.**

a. New models of crewmember oxygen regulators, demand, identified and manufactured on or after the effective date of this TSO must meet the MPS qualification and documentation requirements in SAE International's Aerospace Standard (AS) 8027, *Crew Member Oxygen Regulators, Demand*, dated June 2004, as modified by appendix 1 of this TSO. Crew member oxygen regulators are separated into four *types*:

- Type I: Remote mounted, panel or portable
- Type II: Man mounted, not mask mounted
- Type III: Mask mounted, less valving, and
- Type IV: Mask mounted, with integral valving.

b. The four types of oxygen regulators are further separated into five *classes*:

Class A: Straight demand

Class B: Diluter demand

Class C: Straight demand, pressure breathing

Class D: Diluter demand, pressure breathing to 40,000 ft and

Class E: Diluter demand, pressure breathing to 45,000 ft.

c. **Functionality.** This TSO's standards apply to crewmember oxygen regulators that supply gaseous oxygen at breathing pressures to meet physiological requirements.

d. **Environmental Qualification.** Test the equipment according to AS8027, paragraph 4.5.

e. **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 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 regulator assembly with the following:

(1) Type and class (see paragraph 3 above)

(2) Maximum altitude (per AS8027, paragraph 1.2.3).

(3) Inlet supply pressure range (per AS8027, paragraph 3.1.7).

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 any 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).”

f. 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 crewmember oxygen regulators, demand, 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 crewmember oxygen regulators, demand, 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 crewmember oxygen regulators, demand. Include recommended 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.d 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 crewmember oxygen regulators, demand.

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.

b. Order copies of 14 CFR parts 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. 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 CREWMEMBER OXYGEN GENERATORS, DEMAND

The applicable standard is SAE AS8027, *Crewmember Oxygen Regulators, Demand*, dated October 2004. We modified it as follows

<i>SAE AS 8027 citation:</i>	<i>FAA modification:</i>
Paragraph 1.1, Scope	Disregard.
Paragraph 3.1.1	Revise to read: Use materials of a type, grade and quality that experience and/or tests have shown suitable for the purpose. Do not use materials that contaminate oxygen or are adversely affected by continuous service with oxygen. Except for small parts like knobs, triggers, fasteners, seals, and electrical parts that don't contribute significantly to fire propagation, materials including packaging must comply with 14 CFR § 25.853(a) specifically Appendix F, Part I(a)(1)(iv) in effect on October 27, 2004.
Paragraph 3.1.2	Revise to read: Ensure that oxygen inlet ports have filters to prevent entrance of particulates, which may be hazardous to the user or impair the function of the device. Filters must be equivalent to that of a 200 mesh screen.
Paragraph 3.1.3	Revise to read: For Class B, D, and E devices (diluter demand) provide an air inlet port. Construct the port to prevent the entrance of particles, which may impair performance of the device. Use a 100 mesh screen or the equivalent filter.
Paragraph 3.2.1.2	Revise to read: Outlet Proof Pressure (Class A and B except Type IV):
Paragraph 3.2.1.3	Revise to read: Outlet Proof Pressure (Class C, D and E except Type IV):

SAE AS 8027 citation:**FAA modification:**

Paragraph 3.4, Applicability Matrix, Table 7

Revise to read:

3.2.1.2 Outlet Proof Pressure (Except Type IV)

3.2.1.3 Outlet Proof Pressure (Except Type IV)

3.2.8 Relief Valve (Except Type IV)

Paragraph 4.5.1

Revise to read: High Temperature Exposure: Soak the device for 12 hours at not less than 160° F (71.1° C). Then transfer the device to 70° F (21.1° C), ambient temperature. Within 30 minutes of doing this, test the device to the requirements of paragraphs 4.4.3 through 4.4.9.

Paragraph 4.5.2

Revise to read: Low Temperature Exposure: Soak the device for 2 hours at not less than -65° F (-54° C). Then transfer the device to 0° F (-17.8° C) for 2 hours to stabilize it. After this, transfer the device to 70° F (21.1° C), ambient temperature. Within 30 minutes of doing this, test the device to the requirements of paragraphs 4.4.3 through 4.4.9.

Paragraph 5.1, Identification

Disregard. Find marking requirements in paragraph 4 of this TSO.
