Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

AEROSPACE STANDARD

AS 1303

Issued May 1973
Revised

PORTABLE CHEMICAL OXYGEN

REAFFIRMED
NOV. 1983

1. SCOPE

This specification applies to a chemical oxygen generator assembly for the following uses:

a. First aid treatment of passenger cabin occupants after emergency descent in a turbine engine powered airplane with pressurized cabin, as specified in FAR 121.333, Para. e (3).

b. By cabin attendants to maintain their mobility after cabin decompression.

2. REFERENCE DOCUMENTS

FAR 25 - Airworthiness Standards: Normal, Utility and Acrobatic category airplanes

FAR 121 - Certification and Operations: Air Carriers & Commercial operators of large aircraft

TSO-C64 - Oxygen Mask Assembly, Continuous Flow, Passenger (for air carrier aircraft)

MIL-STD-810 - Environmental Test Methods

MIL-O-23678A - Oxygen Systems, Portable

AS 1046 - Portable Oxygen Equipment

AIR 1176 - Oxygen System Cleaning and Component Packaging (Proposed)

AS 1224 - Continuous Flow General Aviation Oxygen Masks

AS 1304 - Continuous Flow Chemical Oxygen Generators

3. GENERAL REQUIREMENTS

3.1 Performance: The assembly must provide a minimum flow rate of four liters of oxygen per minute, Standard Temperature, Standard Pressure, Dry (STPD) (4 dm^3/min), from one or more generator cartridges, as specified in FAR 25.1443, Para. d, for a minimum time specified in procurement document when operating at an ambient temperature of 80° F (26.7° C).

3.2 Components: The generator assembly shall be comprised of the following components:

a. Outer Case to house the remainder of the components and to protect the user from the hot interior components during operation.

b. Adjustable Carrying Strap, sufficiently large to stretch across an aircraft seatback.

c. At least one Oxygen Mask and flexible tubing.

d. One or more replaceable Oxygen Generator Cartridges, which generate the oxygen supply.

e. Relief Valve(s) on each cartridge, preferably on opposite end from oxygen outlet.

Printed in U.S.A.

f. Actuating mechanisms to be part of each generator assembly.

g. One or more initiators, to be part of each generator cartridge.

h. Manifold to connect multiple cartridge outlets to the Mask tubing. May be part of Outer Case or may come with replacement cartridge, as a "throw-away" item.

i. Brackets, as necessary, for mounting the generator assembly to the aircraft.

3.3 Materials and Workmanship:

3.3.1 Materials: The materials used in the Portable Oxygen Generator Assembly shall:

a. Not contaminate the oxygen supply beyond the ability of the filters to bring oxygen within prescribed purity requirements.

b. Not impart objectionable odors to the oxygen supply.

c. Meet the fire resistance requirements of FAR Part 25.

d. Not suffer rapid deterioration from exposure to ultra-violet light.

e. Be cleanable without harm by methods recommended by the supplier. If halogenated hydrocarbons are permitted in the cleaning procedures a requirement should be included to subsequently heat all metallic parts to remove cleaning agent residues.

f. Not be susceptible to breakage, malfunction, or undue degradation of appearance from casual handling.

g. Not be susceptible to degradation as a result of the operation of the Generator, except for those materials actually consumed and expended during Generator's operation.

3.3.2 Workmanship: Projections, sharp edges, corners, etc. which might cause personal injury shall not be permitted.

4. PERFORMANCE REQUIREMENTS

4.1 Oxygen Flow Rate and Duration: The Assembly must supply a minimum flow rate of four cubic decimeters of oxygen per minute, Standard Temperature, Standard Pressure, Dry (STPD), as specified in FAR 25.1443, Para. d, when activated after 24 hours soak at -40° F (-40° C) and stabilization at 0° F (-17.8° C). At least ninety liters Standard Temperature, Standard Pressure, Dry (STDP) total oxygen should be supplied. This may be accomplished by having multiple cartridges.

4.2 Oxygen Purity: The oxygen delivered to the outlet tube shall be free of objectionable odor and smoke and shall not contain moisture, impurities, or particles in excess of the following values:

4.2.1 Water Vapor: Water vapor shall not exceed 15 milligrams of water per liter (15g of water/m^3) of oxygen at 70° F (21.1° C) and 760 mm of Hg. This corresponds to a dew point of 64° F (+17.8° C).

4.2.2 Chlorine: Chlorine contamination shall not exceed 0.2 ppm by volume. (Note: Odor, rather than toxicity, is the limiting factor in the establishment of this value.)

4.2.3 Carbon Monoxide: Carbon monoxide shall not exceed 50 ppm by volume for any sample taken before one minute and 15 ppm by volume average for all subsequent samples.

4.2.4 Carbon Dioxide: Carbon dioxide content shall not exceed 5000 ppm by volume for any sample taken before one minute and 2000 ppm by volume average for all subsequent samples.

4.2.5 Total Impurities: Total impurities excluding moisture shall not exceed one half of one percent (0.5%) by volume. This percentage may contain traces of gases other than those listed above if sufficient proof is presented to insure that their presence will not be a physiological hazard.

4.2.6 Solid Particles: Solid particles shall not exceed 500 microns (μ m) in size.

4.2.7 Fibers: Fibers shall not exceed 0.12 in. (3 mm) in length.

4.2.8 Total Solids: Total solids shall not exceed 0.1 milligrams per cubic decimeter of oxygen.

4.3 Gas Temperature: The temperature of the oxygen at the mask shall not be more than 95° F (35° C) when the assembly is operating at 80° F (26.7° C) ambient temperature.

4.4 Generator Assembly Outer Case Temperature: The outer case temperature shall not exceed 140° F (60° C) when the ambient temperature is 80° F (26.7° C) at sea level ambient pressure. Type and texture of material will determine the value. Highly conductive materials will require a lower value.

4.5 Generator Assembly Leakage: During operation, leakage of oxygen from the assembly shall not exceed 10 cc/min. Flow through the oxygen outlet manifold or through the relief valve when internal pressure exceeds cracking pressure shall not be considered leakage.

4.6 Relief Valve: The Relief Valve shall protect the generators from any harmful over-pressurization.

5. ENVIRONMENTAL REQUIREMENTS

The assembly shall operate without degradation of performance as specified, during or after exposure to the following environmental conditions:

5.1 Temperature: The assembly shall operate at all ambient temperatures within the range of 0° F (-17.8° C) through 120° F (48.9° C). The assembly shall withstand storage-transportation temperatures within the range of -65° F (-53.9° C) through +165° F (+73.9° C) in the non-operating condition, without damage or degradation of performance.

5.2 Ambient Pressure: The assembly shall withstand, without degradation of performance exposure to atmosphere pressures between 8.28 psig (57.1 KN/m^2 gauge) and that equivalent to an altitude of 40,000 feet (12,192 m).

5.3 Humidity: The assembly shall not be adversely affected and shall function as specified herein after exposure to humidity, as specified in MIL-STD-810, Method 507, Procedure I. The unit shall be completely assembled with cover closed during exposure to humidity.

5.4 Salt Fog: The assembly shall not be adversely affected and shall function as specified herein, after exposure to salt fog, as specified in MIL-STD-810, Method 509, Procedure I. The unit shall be completely assembled with cover closed during exposure to the salt fog.

5.5 Sand and Dust: The assembly shall function as specified herein after exposure to sand and dust per MIL-STD-810, Method 510, Procedure I. The unit shall be completely assembled with cover closed during the test.

5.6 Acceleration: The unit shall be subjected to a 9g (88.3 m/s^2) acceleration force in both directions along each of the principal axes for a minimum duration of one minute in each direction. The unit shall be securely mounted directly to the acceleration test machine attached during this test, and the unit must function after the test is completed as specified herein.

5.7 Vibration:

5.7.1 Vibration Test I: The generator assembly shall be firmly clamped directly to a vibration source and shall be subjected to a sinusoidal vibration with one logarithmic sweep, equal in time to the generator flow duration specified herein, from 5 to 1000 to 5 Hz, at the following levels:

5 - 31 Hz at .005 inch (.127 mm) double amplitude.
31 - 1000 Hz at .25 g peak acceleration.

At the start of the sweep, flow shall be initiated from the unit and performance shall be as specified herein.

5.7.2 Vibration Test II: The generator assembly shall be subjected to the following cycling and resonance tests. At the completion of the testing, flow shall be initiated and performance shall be as specified herein. The generator assembly shall be firmly clamped directly to a vibration source. The generator assembly shall be vibrated in its three principal axes by the procedure described herein. The minimum vibration exposure time for a complete vibration test shall be nine hours. The minimum vibration exposure time per axis shall be three hours.

5.7.2.1 Resonance Tests: The presence of resonant modes in each principal axis of the generator assembly shall be determined by slowly varying the applied frequency through the frequency range, and at the test levels shown in Table 1. The generator assembly shall then be subjected to dwell testing at the frequencies of resonance up to a maximum of four resonances in each axis by the schedule of Figure 1. If more than four resonances are present in one axis, resonance dwell tests at the four most predominent resonances are required. Upon completion of resonance dwell tests in each axis, the generator shall be visually inspected for any undue deterioration which could prevent the generator from conforming to operational or structural requirements.

TABLE I
VIBRATION CRITERIA

Frequency Range (Hz)	Double Amplitude (Inches)	Acceleration ± g
5-20	--	0.20
20 - 77	0.10	--
77 - 1000	--	3.0

5.7.2.2 Cycling Tests: The generator shall be subjected to frequency cycling in each principal axis at the test levels and frequency range shown in Table 1. The frequency shall vary logarithmically such that 30 minutes is required to sweep from the lower to the higher to the lower limits of the frequency range. The total time spent at cycling in each axis shall be the greater of: (1) three hours minus the time spent at resonant dwells, or (2) one hour. Thus, the time spent at cycling in each axis shall be between one and three hours, depending upon the time spent at resonant dwells. At the completion of testing in each axis, the generator shall be visually inspected for undue deterioration which could prevent the generator from conforming to operational or structural requirements.

5.8 Shock: The generator assembly shall be fastened directly to the shock test machine for this test. The applied shock shall be monitored at a location on the shock test machine such that it measures as nearly as possible the input to the generator. The input pulse shall be filtered using a band-width from 5 to 200 Hz, and the filtered pulse shall have a peak value of 10g (98.1 m/s^2) and a duration of 11 milliseconds, within ± 10%. This pulse shall be applied three times in the positive and negative direction of each principal axis for a total of 18 shocks. Upon completion of the test, the unit shall be inspected for exterior physical damage. No deformation is permissible. Flow shall be initiated from the generator and performance shall be as specified herein.

5.9 Orientation: The assembly shall operate as specified herein when operated in any orientation.

5.10 Pillow Test: The assembly shall be operated for its full duration while completely covered with one layer of pillows having cotton pillow cases. There shall be no evidence of burning or scorching of the pillows. The generator may perform at an accelerated rate, but must not exhibit any dangerous malfunctioning.