The Engineering Resource For Advancing Mobility®

400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE RECOMMENDED PRACTICE

SAE ARP 1532

Issued 12-85

Submitted for recognition as an American National Standard

AIRCRAFT OXYGEN SYSTEM LINES, FABRICATION, TEST AND INSTALLATION

1. PURPOSE: The purpose of this recommended practice is to establish and/or outline the methods for fabricating, handling, and testing of oxygen lines and their installation into an aircraft oxygen system. Compliance with this practice should enhance satisfactory operation of the oxygen system.

2. SCOPE: This ARP covers procedures or methods to be used for fabricating, handling, testing, and installation of oxygen lines in an aircraft oxygen system.

2.1 Definition: Lines, as used herein, shall refer to tubes, hoses, fittings, and seals used in a breathing oxygen system.

3. REFERENCE MATERIAL:

MIL-G-27617 - Grease, Aircraft, Fuel and Oil Resistant
MIL-O-27210 - Aviator Breathing Oxygen, Gas and Liquid
MIL-T-27730 - Tape, Antiseize, Tetrafluoroethylene, with Dispenser
MIL-L-25567 - Leak Test Compound, Oxygen Systems
BB-N-411 - Nitrogen, Technical
AIR 1176 - Oxygen System and Component Cleaning, Packaging

4. GENERAL REQUIREMENTS:

4.1 All components used in the oxygen system shall be clean and dry and free of all contamination whether solid, liquid or gas.

4.2 Fabrication, packaging, testing, installation, inspection, servicing, maintenance, and repair of oxygen system components shall be done by trained and qualified personnel using approved procedures.

4.3 Purging, drying, and pressure testing after cleaning prior to installation shall be done with nitrogen per BB-N-411, Type I, Class I, Grade B, oxygen per MIL-O-27210, or dry and oil-free air conforming to the following purity requirements:

a) Maximum hydrocarbon by volume (as methane): 25 ppm.
b) No particles over 100 microns.
c) Moisture content: 0.00002 grams of water vapor per liter of air at 21.1°C and 101.3 kPa (corresponding to a dew point of -55.6°C at 101.3 kPa).

4.4 Tools which contact the exterior of system components (including fittings, tubing, and B-nuts) shall be visually inspected and be free of dirt, oil, and grease when used for tightening or loosening of oxygen fittings. They may be washed or wiped with clean, oxygen-compatible solvents provided the method is not detrimental to the tools. All residual solvent shall be removed prior to use.

4.5 Test equipment, including pressure gages, which directly or indirectly contact internal passages of the oxygen systems or components, during testing or maintenance, shall have been cleaned to the same level of cleanliness as the equipment being installed.

4.6 Personnel shall maintain clean hands and wear clean, lint-free, and static-free clothing while working on oxygen components or systems.

4.7 Use of titanium is prohibited in any component surface in contact with oxygen.

4.8 Oxygen lines pressurized at all times while on the ground or in the air shall be metallic.

5. FABRICATION OF TUBING ASSEMBLIES: Tube ends shall be fabricated (including bending, cutting, deburring, flaring, beading, presetting, or swaging) in accordance with the specific tube and type specification requirements.

The seal area shall have no scratches, die marks, or similar flaws, and this area, as well as adjacent component openings, shall be free of any visible loose particles, lubricants, or other contaminants.

6. CLEANING OF TUBING ASSEMBLIES: All tubing shall be cleaned per AIR 1176 after fabrication and again after installation of fittings and pressure testing.

All fittings, sleeves, and nuts used on tube ends, shall be cleaned per AIR 1176 prior to installation.

Protective metal caps or plugs used on tubing assemblies and component open ports shall be cleaned per AIR 1176 prior to installation. All molded polyvinylchloride protective closures shall be new and clean and of non-shedding/non-shredding design/construction.

7. PROTECTIVE CLOSURE AND PACKAGING: All openings of tubing assemblies and system components, other than fittings or caps, shall be protected with new polyvinylchloride (PVC) protective closures or clean protective metal caps or plugs, then sealed with new, clean polyethylene bags or sleeves. Sealing by double-folded stapling is preferred, however, other sealing methods may be used if precautions are taken to exclude dust and moisture from the package. Self-sealing polyethylene bags with .002 minimum thickness are acceptable for onetime use.

Each bag or sleeve shall be labeled with clear, legible marking to identify its contents as breathing oxygen components. Permanent markings shall be applied to the bag or sleeves, or to a label placed within it before sealing.

8. INSTALLATION OF TUBING, FITTINGS, AND COMPONENTS - GENERAL:

a) Components shall be checked for damaged or loose protection closures, missing part number or other deficiencies. Any dust or other contaminant on polyethylene bags or on unpackaged free tube or hose lengths shall be wiped clean with clean and oil free, water-dampened cheesecloth or equivalent, prior to removal of the bag.

b) Installation work shall be done only with clean hands and tools, and when there is no dirt, dust, or chip-generating work being done in the surrounding area.

c) After the protective closures have been removed, the fittings, components, and tube or hose lines shall be hand assembled immediately.

d) Open ports of the system shall remain capped.

e) Whenever removal of installed lines or components is required, open ports shall be recapped immediately. Metal caps and fittings used during installation shall be from clean, individual packages. Non-metallic closures shall be clean and new. Once used, metal caps and fittings shall not be reused without recleaning and repackaging. Non-metallic closures shall be scrapped.

Closures shall be installed by hand threading onto/into fittings.

8.1 Installation of Tubing Lines with Flared and Flareless Ends:

a) Lines and components shall be handled, installed, and tightened in accordance with the applicable drawings and specifications.

b) Lubricants and thread compounds shall not be used in installation.

8.2 Installation and Pipe Thread Fittings:

a) Pipe thread fittings shall be installed immediately after opening of the polyethylene bag and application of the sealing tape.

8.2 (Continued):

b) MIL-T-27730 polytetrafluoroethylene thread sealing tape shall be used on male pipe thread fittings. The edge of the tape shall be placed so that a minimum of 1-1/2 threads remain uncovered at the starting end of the fitting and shall be wound in same direction as the threads. The tape shall be stretched in wrapping around the threads to conform with the thread contour and shall begin beyond the middle of the second thread. Apply 1-1/2 turns of tape on fittings up to 1-1/2 in. (38.1 mm) in diameter and 2 to 4 turns of tape on fittings 1-1/2 in. (38.1 mm) in diameter and greater. Use narrow tape (1/4 in. (6.35 mm) width preferred) so extrusion of tape beyond the end of female fitting is minimum. No tape shall be applied to the thread run-out or the fitting face. MIL-T-27730 tape functions as a lubricant, anti-seize compound, and sealant. Where this is used, no other compound shall be applied. When joints using MIL-T-27730 tape are disassembled, take particular care to avoid contamination of the system by shreds of tape. After disassembly, remove tape, carefully clean and protect the tube ends and fittings.

c) Tightening shall be performed by hand until the fitting stops in the thread, after a minimum of two turns. The fitting shall then be tightened to the torque value specified in the applicable specification or drawing. A back-up wrench shall be used when feasible.

d) Pipe thread fittings shall not be backed off for alignment.

8.3 Installation of Hose End Fittings:

a) Hose end fittings shall be installed to at least a hand-tightened position in the connecting fitting immediately after removal of the polyethylene bags, caps, or plugs. No lubricant or thread compound shall be used.

b) Hose ends with flared or flareless fittings shall be tightened in the same manner as fittings. The hose shall not be twisted; a back-up wrench shall be used.

8.4 Installation of Fittings in Bosses:

a) The protective closure shall be removed from the boss, and the gasket and fitting shall be removed from their protective bags.

b) The gasket shall be slipped onto the gasket recess of the fitting with a clean tool. Lubricants approved for oxygen service per MIL-G-27617 such as KRYTOX may be used.

c) The fitting shall then be tightened until the gasket touches the boss. At this point the gasket may be coated sparingly with an approved lubricant and the fitting tightened (torqued) to the value in accordance with the applicable specifications or drawings. The fitting shall be capped or have a connection made to it immediately. The connection shall be made using a back-up wrench.