SAE Aerospace
An SAE International Group

AEROSPACE INFORMATION REPORT

SAE AIR5742

Issued 2010-08

Packaging and Transportation of Oxygen Equipment

TABLE OF CONTENTS

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AIR5742

1. SCOPE

The scope of this document is related to the particular needs of oxygen equipment with regards to packaging and transportation. The document provides guidance for handling chemical, gaseous and liquid oxygen equipment. It summarizes national and international regulations to be taken into account for transportation on land, sea and air and provides information on classification of hazardous material.

The aim of this document is to summarize information on packaging and transportation of oxygen equipment. Statements and references to regulations cited herein are for information only and should not be considered as interpretation of a law.

Processes to maintain cleanliness of components and subassemblies during processing and assembly or storage of work-in-progress are outside the scope of this document.

2. REFERENCES

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of the other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

ARP1176 Oxygen System and Component Cleaning and Packaging

2.2 EASA Publications

Available from European Aviation safety Agency, Postfach 10 12 53, D-50452 Koeln, Germany, Tel: +49-221-8999-000, www.easa.eu.int.

JAR-OPS 1 Subpart R Transport of Dangerous Goods By Air

2.3 FAA Publications

Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591, Tel: 866-835-5322, www.faa.gov.

DGAB-96-01 Prohibition of Oxygen Generators (Chemical) Aboard Passenger Aircraft.

DGAB-07-02 Chemical Oxygen Generators (COGs) and Chemical Oxygen Generators Installed in Equipment.

DGAB-00-01 Passenger Personal Liquid Oxygen Canister

2.4 IATA Publications

Available from International Air Transport Association, Publications Assistant, 800 Place Victoria, P.O. Box 113, Montreal, Quebec H4Z 1M1, Canada, Tel: 1-514-874-0202, www.iata.org.

IATA Dangerous Goods Regulations Edition 49, effective January 1, 2008.

2.5 ICAO Publications

Available from ICAO, Document sales Unit, 999 University Street, Montreal, Quebec H3C 5H7 Canada, Tel: +1-514-954-8022, http://icaodsu.openface.ca/mainpage.ch2.
The Safe Transport of Dangerous Goods by Air – Annex 18 to the Convention on International Civil Aviation.

ADR – The European Agreement concerning the International Carriage of Dangerous Goods

2.6 U.S. Government Publications

Available from the United States Government Printing Office, 732 North Capitol Street, NW, Washington, DC 20401, Tel: 202-512-0000, ecfr.gpoaccess.gov/.

Department of Transportation: Title 49 CFR of the Code of Federal Regulations (CFR) Parts 171, 172, 173, 175 and 178, in particular Appendix D and E.

3. DEFINITIONS

Associate Administrator - means the Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Materials Safety Administration.

Chemical Oxygen Generator - means a device containing a compound with chemically bonded oxygen which, when properly activated, will provide a supply of gaseous oxygen at a purity, rate, and quantity suitable for breathing.

Cylinder - means a pressure vessel designed for pressures higher than 40 psia and having a circular cross section.

Dangerous Goods - means articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in the Technical Instructions or which are classified according to those instructions.

Hazardous Material - means a substance or material that may pose an unreasonable risk to health, safety, or property when transported in commerce.

Packaging - means a receptacle and any other components or materials necessary for the receptacle to perform its containment function.

Special Permit - means a document issued by the Associate Administrator permitting a person to perform a function that is not otherwise permitted.

UN Number - is the four-digit number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods to identify a substance or a particular group of substances.

4. GUIDANCE ON PACKAGING AND TRANSPORTATION

After cleaning components including the assembly parts and tubing, they must be taken from the work area and kept clean. Once cleaned parts are assembled into a clean component, all openings should be plugged or capped. Boxing the component is considered suitable. An example of this could be a breathing Regulator or tubing. If the parts are not assembled, but must be taken from the controlled work area for shipment, then special precautions must be taken for packaging to keep the components clean.

Any equipment that is shipped containing compressed, chemical or liquid oxygen must be treated as hazardous material.

4.1 General Packaging Issues

Store all packaging components in a clean dry area. Protect them from contamination by grease, oil, dirt, flammable liquids, flammable dusts or other flammable contaminants during storage and during packaging. The packaging area must be clean and completely free of grease, oil, other flammable contaminants, smoking or open flames. Only those persons trained in the inherent hazards of Aviation Oxygen in its various forms and trained in the handling of hazardous materials should attempt to package or offer for transport oxygen equipment.

After completion of the final drying, all openings (where configuration permits) should be sealed using clean aluminum or plastic caps or plugs.

Oxygen components, such as regulators, gauges, and valves shall have all open ports sealed with oxygen clean and non-shredding polyethylene plugs or caps.

Green caps and plugs should be used in order to avoid any confusion with the red caps and plugs used on oily equipment in the same assembly line and in case the equipment is to be capped again.

Masking or other self-sealing tapes shall not be used on oxygen equipment.

Paper, pressure sensitive materials, hot dip coatings, rubber, or soft plastic closures that may introduce moisture, adhesives, or particles should not be used.

High-density clean plastic closures such as Teflon or polyethylene are acceptable.

Where a cap or plug cannot be used, the opening should be sealed in a manner that insures protection from contamination.

The part or assembly should then be packaged, if required, in accordance with the part or assembly process control.

In addition to regulatory packaging and transportation requirements there may be specific customer requirements to be taken into account.

NOTE: Preservatives, primarily oils shall not be applied to the oxygen equipment part or assembly.

NOTE: After the openings are closed, the components should be sealed in a polyethylene bag or equivalent dated and identified as being cleaned for oxygen service.

If the cleaned components are to be shipped by air, the bags must be evacuated before sealing to prevent air expansion from breaking the bags at altitude.

Clean plastic wrap or bags made preferably of polyethylene material should be used.

Plastic material of not less than 0.004 in thickness is recommended.

Zip lock bags are not desirable.

The recommended practice is to use two separate bags, heat sealing the first bag, and then heat-sealing this bag in a second outer bag.

Multi-folding the outer bag and stapling it is an acceptable alternative method of packaging oxygen clean parts.

The packaging material should be of such cleanliness that items would not be contaminated again.

Items that will be reassembled after the final cleaning and drying need not be packaged if they remain in the clean “work area” and are assembled as soon as possible.

4.1.1 Packaging for Shipment

Adequate acceptable containers appropriate for the size and weight of the component should be used for shipping. Cushioning material and durable containers are desired for packaging for shipment. Usually, it is best to place plastic wrapped parts and assemblies in containers like cardboard boxes with appropriate cushioning material in “work areas” outside the clean room(s). These materials tend to leave excess contaminants on the work surface and in the surrounding air. Best commercial practices may be found in the process control document and should be followed.

Procedures should ensure that each item is packed for transit and storage in strict accordance with ATA 300 specification for delivery to the aircraft operator or with the purchaser’s instructions for delivery to the purchaser (OEM). Alternative packaging may be agreed to with the purchaser. Handling requirements specified by the equipment manufacturer should be taken into account and are usually included in the Manufacturer’s component maintenance manual (CMM)

4.1.2 Marking

Nomenclature tags should be inserted in each bag or securely attached to the package

and shipping container, showing title, part number or other data as required, so that the contents can be readily identified without breaking the label. In addition, labels should be attached to the unit package and shipping container and should include the following or similar information:

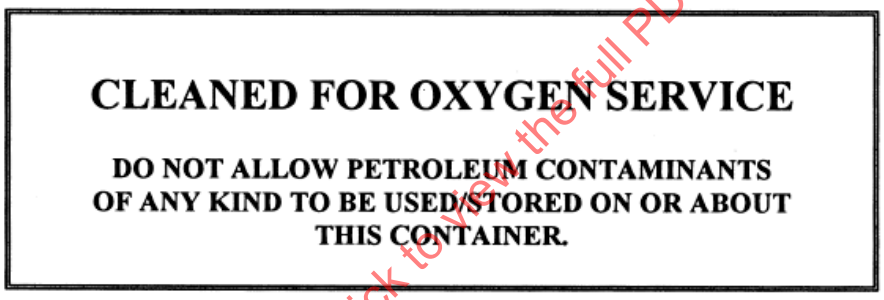

FIGURE 1 - LABEL EXAMPLE FOR CONTENT IDENTIFICATION

4.2 Chemical Oxygen Equipment

The term chemical oxygen equipment, as used in this document, includes chemical oxygen generators and associated equipment e.g. passenger service units (PSU), portable breathing equipment (PBE) etc.

According to Hazardous Material Regulations, ref. 49 CFR Part 173-Shippers-General Requirements for Shipment And Packaging, in “§ 173.168 Chemical Oxygen Generators”, requirements can be summarized as following:

- Chemical Oxygen Generator must be approved in accordance with procedure specified in §173.56
- Chemical Oxygen Generator must be capable of withstanding a 1,8m drop on concrete.
- Inadvertent activation must be avoided by redundant means, e.g. mechanically actuated devices need two pins, each independently preventing actuation.
- Chemical Oxygen Generator including those installed in equipment (e.g. PBE, PSU) must be placed in rigid packaging to conform with §173.168 (d) – (e).
- Packaging must meet the flame penetration resistance as required for cargo compartment sidewalls and ceiling panels according Part III of Appendix F to 14 CFR Part 25, 1700 °F / 926 °C for 5 minutes.
- Transportation is forbidden on board a passenger-carrying aircraft.