AEROSPACE STANDARD

AS1304	REV. B

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Superseding AS1304A

Continuous Flow Chemical Oxygen Generators

RATIONALE

This document has been determined to contain basic and stable technology which is not dynamic in nature.

STABILIZED NOTICE

This document has been declared "Stabilized" by the SAE A-10 Aircraft Oxygen Equipment Committee and will no longer be subjected to periodic reviews for currency. Users are responsible for verifying references and continued suitability of technical requirements. Newer technology may exist.

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1. SCOPE:

This SAE Aerospace Standard (AS) applies to performance and testing of solid chemical oxygen generators which produce oxygen at essentially ambient pressure for use aboard aircraft whose cabin pressure altitude does not exceed 40,000 ft (about 12,200 m). Portable chemical oxygen devices are covered by AS1303.

2. REFERENCES:

2.1 Applicable Documents:

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 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.

2.1.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AS1303	Portable Chemical Oxygen
ARP1894	Useful Life Determination for Chemical Oxygen Generators
AS8010	Aviators Breathing Oxygen Purity Standard

2.1.2 RTCA Documents: Available from Radio Technical Commission for Aeronautics Secretariat, Suite 500, 1425 K Street, N.W., Washington, DC 20005. The latest issue of applicable RTCA documents shall apply.

RTCA/DO-160	Environmental Conditions and Test Procedures for Airborne Equipment

2.1.3 EUROCAE Documents: Available from EUROCAE - 11, rue Hamelin - 75783 PARIS CEDEX 16, France.

ED-14 Environmental Conditions and Test Procedures for Airborne Electronic/Electrical Equipment and Instruments

NOTE: EUROCAE ED-14C and RTCA/DO-160C are equivalent documents. It is anticipated this equivalency will be maintained in future revisions. However, in the event of differences between future versions of these documents, the requirements stated in RTCA/DO-160 shall take precedence.

2.2 Related Publications:

2.2.1 NATO Publications: Available from North Atlantic Treaty Organization, Military Agency for Standardization (MAS), 1110 Brussels, Belgium. Also available from Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

STANAG 3688 GGS Characteristics Of Breathable Oxygen Supplied By Chemical Solid Generators

2.3 Definitions:

CHEMICAL CORE: An object, composed of sodium chlorate or an analogous alkali metal chlorate or perchlorate, formulated with fuels, catalysts, and other modifiers and additives as required by the particular design, which evolves oxygen by a controlled chemical decomposition reaction, when actuated. Also sometimes called a chlorate candle.

CHEMICAL OXYGEN GENERATOR: A device comprising a chemical core and its surrounding mechanical enclosure, insulating material, actuation means for the chemical core, pressure relief means, and any necessary filtering means. A means of conveying evolved oxygen to the masks is also frequently included, although that function can also be fulfilled by an external manifold.

CHLORATE CANDLE: An alternate term sometimes applied to a chemical core, possibly because the progress of the organized decomposition reaction along the length of the core can be likened to the burning of a candle. This term is also sometimes loosely applied to the entire chemical oxygen generator.

DESCENT PROFILE: A curve relating altitude to elapsed time following a decompression, which can be utilized in determining the flow rate of oxygen which should be supplied by a chemical oxygen generator at each point in time following initiation of an emergency descent. This curve is established by the aircraft designers, based on the performance features of the aircraft under various operating conditions. It sometimes is modified to reflect assumptions about height of local terrain which might be encountered in operating the aircraft over a given route.

2.3 (Continued):

NTPD: Normal Temperature and Pressure, Dry. Conditions comprising a temperature of 21.1 °C (70 °F) and an absolute pressure of 101.3 kPa (760 mm of Hg) on a dry basis (partial pressure of water vapor equals zero).

OXYGEN MODULE: A structure or assembly, frequently in the form of a box or container, in which an oxygen generator is installed. Such containers typically contain the oxygen mask assemblies and a solenoid latch which is employed to deploy the masks in the event they are needed. In some cases, oxygen generator installations do not include a distinct, separate oxygen module, but rather the generator and other components are installed directly into an integrated Passenger Service Unit.

3. REQUIREMENTS:

3.1 Generator Assembly Characteristics:

3.1.1 The chemical oxygen generator shall consist of a securely housed chemical core that will, upon activation, produce oxygen at a programmed rate and quantity according to a procurement document requirement which reflects the intended emergency descent profile or other conditions of use.

3.1.2 An over pressure relief means shall be provided to prevent rupture of the housing in the event of malfunction or accidental blockage of the flow lines.

3.1.3 Means shall be provided for connecting one or more masks or other oxygen dispensing devices to the generator outlet. The connection may be directly between the generator and the individual dispensing devices, or may employ an intermediate connecting and distributing means such as a line assembly or manifold. Configuration of the connection shall be defined in the procurement document.

3.1.4 Means shall be provided for determining whether the generator is expended.

3.1.5 Consideration should be given to methods of reducing the probability that generators of similar shape or appearance but different performance characteristics can be inadvertently interchanged. Such methods would serve to reduce the chance that (for example) a generator designed to serve two persons could be installed by error into a location where installation of a three person generator is intended.

3.2 Generator Assembly Performance:

3.2.1 Functional Characteristics: The assembly shall provide breathing oxygen in one or more of the following applications or classes. (1) Emergency supplemental oxygen for aircraft occupants in the event of loss of cabin pressurization. (2) Oxygen for occupants of unpressurized aircraft operating at altitudes at which supplemental oxygen is needed. (3) Fixed first aid oxygen. (4) Oxygen for use during emergency egress from a disabled aircraft. (Portable chemical oxygen is covered by AS1303.)

3.2.1.1 Oxygen Flow: The required start of flow, rate of flow, and duration of flow are unique to a given application, and shall be specified in the procurement document.

3.2.1.2 Oxygen Purity: The oxygen delivered to the dispensing device shall be free of objectionable odor and smoke, and shall satisfy the applicable purity requirements defined in AS8010.

3.2.1.3 Gas Temperature: The gas delivered to the oronasal tract of the user shall not be hot enough to cause injury or discomfort to the user. The temperature of gas delivered to the user's oronasal tract shall not exceed the ambient temperature of the immediate surroundings by more than 5 °C (9 °F).

3.2.1.4 Generator Assembly Pressure: The internal operating pressure of the generator should be kept at the lowest practical level consistent with design performance requirements.

3.2.1.5 Generator Housing Temperature: The maximum generator housing temperature which is acceptable depends on installation details of the specific application, and shall be specified in the procurement document.

3.2.1.6 Generator Assembly Orientation: The assembly shall be designed to operate properly under the range of conditions specified herein when mounted in the aircraft in all intended installation orientations. The intended orientations shall be specified in the procurement document.

3.2.1.7 Generator Assembly Leakage: Allowable leakage from the assembly shall not exceed 25 ml/min NTPD during normal operation. Flow through the oxygen outlets, and through the relief means when such flow is in accordance with the intended functioning of the design, shall not be considered leakage within the meaning of this paragraph. Operation of the relief means shall not be considered a malfunction, if performance requirements are met in spite of such operation.

3.3 Generator Environmental Performance:

3.3.1 The assembly shall operate as specified herein when actuated, across the full range of operating conditions anticipated to be encountered in the intended application. In addition, the generator shall not experience premature actuation or performance degradation as a result of exposure to operating and storage conditions anticipated to be encountered in the intended application.

3.3.2 Unless otherwise specified in the procurement document, the assembly shall operate over the range of environmental operating conditions applicable to the category of installation as specified in RTCA/DO-160. At a minimum, environmental operating conditions which must be satisfied include: operating low temperature, operating high temperature, altitude (including decompression and overpressure), operational shock, and operational vibration.

3.3.2.1 Short time operating high temperature condition as described in RTCA/DO-160 is not applicable to equipment intended for hypoxia protection, as this test condition is intended to evaluate operation at ground level, immediately after an aircraft is opened up following extended storage outdoors.

3.3.2.2 In specifying environmental operating conditions such as temperatures within the procurement document, due consideration should be given to circumstances surrounding intended use, such as the time required for the aircraft to climb to an altitude where hypoxia protection is required.

3.3.3 The assembly shall not experience premature actuation or performance degradation as a result of exposure to operating and storage conditions applicable to the category of installation as specified in RTCA/DO-160. At a minimum, conditions which must be satisfied include ground survival low temperature, ground survival high temperature, altitude, humidity, and operational shock and vibration. In addition, special conditions may include fluids, sand and dust, fungus, salt spray, and others as required by the application.

3.4 Generator Safety Performance:

3.4.1 The design of the assembly shall be such that failure or any malfunction causing performance degradation below the minimum specified level shall not create a hazardous condition by reason of its mode of failure or by the direct effect of such failure on the aircraft, related equipment, or personnel.

3.4.1.1 No hazardous condition shall result from actuation of the generator in its installed location with the door of the mask deployment container closed.

3.4.2 In all intended installation conditions, the design of the generator shall satisfy the crash safety shock requirements of RTCA/DO-160.

3.4.2.1 In the event the generator is operating at the time of exposure to crash shock conditions, continued operation is not required, but no release of molten or burning core material shall occur. In the event the generator is not operating, exposure to crash shock conditions shall not cause self actuation.

3.5 Generator Reliability Performance:

3.5.1 The design shall be capable of maintaining an appropriate degree of reliability throughout the useful life of the device. The predicted reliability shall be stated by the manufacturer.

3.5.2 The predicted useful life shall be stated by the manufacturer. ARP1894 offers guidance regarding useful life determination.