AEROSPACE RECOMMENDED PRACTICE

ARP1894 REV. A

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Superseding ARP1894

(R) Useful Life Determination for Chemical Oxygen Generators

RATIONALE

ARP1894A has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

The scope of this document is to provide a guideline for the preparation of a plan for testing of in-service chemical oxygen generators to confirm their design useful life. The test program should also allow determination with a sufficient level of confidence, whether generators are suitable for further use (i.e., life extension, or if the useful life limit has been reached).

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
AS1304	Continuous Flow Chemical Oxygen Generators
ARP1320	Determination of Chlorine in Oxygen from Solid Chemical Oxygen Generators
AS8010	Aviator's Breathing Oxygen (ABO) Purity Standard

2.1.2 FAR Publications: Available from Federal Aviation Administration, 800 Independence Avenue, SW, Washington, DC 20591.

FAR PART 23	Airworthiness Standards, Normal, Utility, Acrobatic and Commuter
FAR PART 25	Airworthiness Standards, Transport Category Aircraft

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/ARP1894A

2.1.3 U.S. Government Publications: Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

49 CFR 172.102 (c)(i) Special Provision 60

49 CFR Chapter 1, Subchapter C - Hazardous Material Regulations

2.1.4 ATA Publications: Available from Air Transport Association of America, 1301 Pennsylvania Avenue, NW, Washington, DC 20004-1707.

ATA 300 Packaging of Airline Supplies

2.1.5 Airframe Manufacturer's Documents, or Supplier's Document, as applicable:

Item Specification Control Document

Quality Assurance Acceptance Test Procedures

Qualification Test Procedures

2.2 Definitions:

2.2.1 USEFUL LIFE: The useful life of a generator is defined as the sum of the shelf life and the service life from the time of manufacture.

2.2.2 FAMILY: A group of chemical oxygen generators having different part numbers, whose designs are sufficiently similar that factors affecting the useful life of one member of the group would reasonably be expected to affect all members in an analogous manner.

3. TECHNICAL REQUIREMENTS:

3.1 General Requirements:

3.1.1 Program: A test program shall be prepared using an appropriate methodology which evaluates the current performance of the generator against its original lot acceptance test data to determine any changes in performance that would constitute a trend that might affect the intended purpose.

3.1.2 Test Units: Specific part numbers shall be included in the test program (test articles). The test units shall be supplied by aircraft operators from in-service airplanes. If possible, generators should be identified as to what type of aircraft and where generator was installed.

Test articles should be packaged for shipment in a manner which adequately protects them from shipping damage and complies with relevant regulations.

3.1.3 Representative Sampling: The number of units in the test sample should be no less than the original lot acceptance test quantities for all types of a typical lot size. The program should also include testing of generators of a representative sampling of a given year's production of a particular part number, to provide a level of confidence sufficient to permit the units to be used for an additional specified time period.

4. TEST PLAN:

4.1 Pre-Test Inspection:

4.1.1 Visual: Each generator shall be initially inspected for visual evidence of corrosion, damage, degradation, contamination and evidence of improper handling.

4.1.2 Radiographic: The internal condition of each generator shall be examined and recorded radiographically. It shall be done in at least 2 planes, 90° apart. Penetrations shall be done accordingly to best depict internal conditions.

4.1.3 Electrical: If applicable, electrical and continuity checks shall be performed on each generator. Caution shall be exercised to not exceed the trigger current of the generator.

4.2 Test Requirements:

The units submitted for testing shall be tested in accordance with the following program. Refer to the appropriate Acceptance Test Procedure for the actual values and methodology.

4.2.1 Flow Performance Tests: One half of the sample size shall be divided as listed following and tested for (but not limited to):

a. Generator ignition and flow start
b. Flow rate and duration (profile)
c. Outlet manifold surface temperature (if applicable)
d. Housing temperature(s) (if applicable)
e. Weight change
f. Release pin pull force (as applicable)

4.2.1.1 Ambient Testing: 2/3 of the flow performance sample shall be subjected to the tests of 4.2.1 under ambient conditions.

4.2.1.2 Cold Conditions: 1/6 of the flow performance sample shall be subjected to the tests of 4.2.1 under the specification cold temperature requirement.

4.2.1.3 Hot Conditions: 1/6 of the flow performance sample shall be subjected to the tests of 4.2.1 under the specification hot temperature requirement.

4.2.2 Gas Purity: The remaining portion of the sample (1/2) shall be tested for:

a. Oxygen purity
b. Chlorine and chlorine dioxide
c. Carbon dioxide
d. Carbon monoxide
e. Water vapor
f. Solids/particulate

5. TEST RESULTS:

After all units of a given sample have been tested, the results shall be reviewed for disposition.

Variances from specification requirements shall be evaluated and the results shall be compared with previous test data from generators of the same production lot(s) by the generator manufacturer. Anomalies judged to be age-related such as a failure to meet original performance requirements or a trend that indicates a significant degradation[1] from those original performance requirements shall be cause for establishing a useful life limit for the family of generators tested.

More than one anomaly of a given kind, such as a misfire, in a test sample shall be cause for examination of all previous test data from generators of the same production lot(s) by the generator manufacturer. Anomalies judged not to be age related by the airframe manufacturer shall be analyzed for cause and appropriate corrective action[2] shall be taken.

NOTE: Upon completion of a given test program a report and recommendation shall be submitted to the appropriate regulatory agency for concurrence.

1. A significant degradation is a statistically validated shift in performance of a type and magnitude which would materially reduce the suitability of the generators for their intended purpose.

2. Appropriate corrective action could include but not be limited to:
. establishment of a useful life limit
. a design change
. testing of additional units
. no additional testing if results are related to mishandling, abuse or improper installation or removal of generators