

INCH-POUND
MIL-S-27626E (USAF)
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SUPERSEDING
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MILITARY SPECIFICATION

SAMPLER, CRYOGENIC LIQUID

Inactive for new design
after 24 April 1981

This specification is approved for use by the Department of the Air Force and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers a cryogenic liquid sampler consisting of a sampling assembly, shipping cylinder and accessories.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

Comments, suggestions, or questions on this document should be addressed to:
WR-ALC/GRVEA, Robins AFB GA 31098-1813. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.daps.dla.mil>.

AMSC N/A

FSC 6695

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DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-PRF-27210

Oxygen, Aviator's Breathing, Liquid and Gas

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-129

Military Marking for Shipment and Storage

MIL-STD-130

Identification Marking of U.S. Military Property

(Copies of these documents are available online at <https://assist.daps.dla.mil/quicksearch/> or from the standardization document order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

AIR FORCE

7545352

Requirements for Finishes, Protective, and Codes for San Antonio ALC Ground and Ground Support Equipment

(Copies of these drawings required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

Transportable Pressure Equipment Directive (TPED)

TPED marks required by the European Union

Department of Transportation (DOT)

49 CFR 178.69

Responsibilities and requirements for manufacturers of UN pressure receptacles.

49 CFR 178.70

Approval of UN pressure receptacles.

(Copies of the Code of Federal Regulations (CFR) may be obtained at <http://www.gpoaccess.gov/cfr/> or from the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402.)

Society of Automotive Engineering

SAE-ARP1176 Oxygen System and Component Cleaning and Packaging

2.4 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein (except for related specification sheets), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Components. The sampler shall consist of the following major components:

Liquid Sampling Assembly
Detachable Shipping Cylinder
Carrying Case
Hoses
Adapters

3.2 Materials. All metallic and nonmetallic materials utilized in the sampler shall be safe for use with oxygen. All metals used shall be of the corrosion resistant type or treated to resist corrosion.

3.2.1 Recycled, virgin, and reclaimed materials. Provided that all other requirements of this specification are met, reclaimed materials shall be used to the maximum extent possible with no exclusion to the use of recovered materials and no requirement that an item be manufactured from virgin materials.

3.3 Design. The sampler shall include all parts and accessories for:

- a. Being connected to a cryogenic vessel and obtaining a representative sample of liquid
- b. Converting the liquid sample to gas, transferring to a cylinder and retaining it without loss of pressure for shipment to an analysis laboratory

3.3.1 Configuration. The liquid sample container shall be capable of being precooled to the atmospheric pressure boiling temperature of the liquid being sampled prior to the actual sampling operation. The detachable shipping cylinder shall be certified to DOT Specification 3A1800.

3.4 Transportable Pressure Equipment Directive approval. The sampler shall be constructed and certified in accordance with the Transportable Pressure Equipment Directive applicable to equipment of this type that will be shipped interstate by public carrier required by the European Union. However, a UN pressure receptacle acceptable for transport to, from, or within the United States must be marked with "USA" as a country of approval in conformance with DOT Regulation 49 CFR 178.69 and 178.70.

3.5 Performance.

3.5.1 Sample volume. The sampler shall be capable of providing a gaseous sample with a minimum volume of 100 standard liters (at 70°F and 760 mm Hg.)

3.5.2 Leak test pressure. The sampler shall be capable of being pressurized to 1600 psig with gaseous oxygen without exhibiting leakage.

3.6 Weight. The weight of the sampler and its accessories shall not exceed 40 pounds.

3.7 Finishes and protective coatings.

3.7.1 Surfaces contacting oxygen. All surfaces, parts, fittings, etcetera, of the sampler that will be in contact with high-purity oxygen shall be thoroughly cleaned in accordance with procedures in SAE-ARP1176. No other cleaning, priming, or painting with organic materials shall be performed on these surfaces.

3.7.2 Exposed parts and surfaces. All exposed metal parts and surfaces, except parts and surfaces that contact high-purity oxygen, shall be cleaned, treated, and finished per Air Force San Antonio ALC Drawing 7545352, with the exception that no paint or primer is to be applied to components other than the carrying case.

3.8 Operational markings.

3.8.1 Inlet and outlet fittings. The inlet and outlet fittings shall be clearly identified by markings either etched or stenciled directly on the sample bottle.

3.8.2 Instructions. Operating instructions shall be provided on a plate of sheet aluminum or zinc of not less than 0.050 inch thickness, anodized or etched to produce raised markings with a black or other dark color background, and with a border of not less than ¼ inch. The plate shall be attached to the top half of the case by rivets. The plate shall be located on the side of the sampler case so that the instructions can be read when the case is in an upright position.

3.9 Identification of product. Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130.

3.10 Workmanship. All parts of the sampler shall be fabricated and finished in a workmanlike manner. Particular attention shall be given to the following:

- a. Freedom from blemishes, defects, burrs, and sharp edges.
- b. Accuracy of dimensions, radii of fillets, and marking of parts and assemblies.
- c. Thoroughness of soldering, welding, brazing, painting, and riveting.

- d. Thorough removal of rust, slag, scale, flux, and other foreign materials from inside of the sampler and all other surfaces that contact the oxygen in either liquid or gaseous form.
- e. Alignment of parts and tightness of assembly screws, bolts, rivets, etcetera.
- f. That rivets are tight and properly headed.

3.11 General cleaning instructions. Following completion of fabrication and assembly operations, the sampler shall be thoroughly cleaned and degreased to remove all contaminating materials. Particular emphasis shall be placed upon complete removal of all traces of cleaning fluids utilized. The adequacy of the cleaning operation shall be verified by pressurizing the sampler to 1600 psig with gaseous oxygen which has been analyzed for trace constituents by use of an infrared spectrophotometer. The gas from the cleaned sampler shall be introduced into an infrared spectrophotometer and analyzed to determine if trace constituents were introduced from the sampler. The sampler shall be considered to be clean when no increase in contaminants is detected.

3.11.1 Cleaning. The sampler shall be thoroughly cleaned to remove excess and spilled lubrication materials, loose or chipped paint, spilled chemicals, and other foreign materials. All cleaning solvents shall be removed from the sampler components prior to delivery.

3.11.1.1 Degreasing. Sampler surfaces, parts, fittings, etcetera, that will be degreased in accordance with procedures in SAE-ARP1176.

3.11.1.1.1 Flammable solvents. Petroleum and other flammable solvents shall not be used on such surfaces.

3.11.2 Final cleaning and pressurizing. Following assembly and completion of all testing, the sampler shall be emptied and placed in an oven with a minimum temperature of 250°F. While in the oven, the sampler shall be purged with 100 cfm of aviator's breathing oxygen or dry, oil-free nitrogen at 250°F. Upon completion of the purging operations, the unit shall be evacuated to an absolute pressure of 100 microns Hg while still in the oven. The sampler shall then be removed from the oven, the vacuum broken and the sampler pressurized with dry, oil-free gaseous aviator's breathing oxygen to a pressure of 25 psig and all openings closed. Tag, stating that the sampler is clean and pressurized with clean, dry, oil-free, aviator's breathing oxygen shall be securely attached to the sampler valve handle.

4. VERIFICATION

4.1 Classification of tests. The inspection and testing of the sampler shall be classified as follows:

- a. Individual tests (see 4.3)

4.2 Test conditions

4.2.1 Apparatus. Insofar as practicable, apparatus used in conjunction with the testing specified herein shall be of laboratory precision type and shall be calibrated at intervals properly spaced to insure continued laboratory accuracy.

4.2.2 Pressure gage accuracy. Data on gage pressure shall be accurate to within 10 percent.

4.3 Individual tests. Each sampler shall be subjected to the following test as described under 4.5:

- a. Examination of product (see 4.4.1)
- b. Mechanical inspection (see 4.4.2)
- c. Functional check (see 4.4.3)
- d. Pressure test (see 4.4.4)
- e. Individual operational test (see 4.4.5)

4.4 Test methods

4.4.1 Examination of product. The sampler shall be examined to determine compliance with this specification with respect to materials, workmanship, and marking and as specified herein.

4.4.2. Mechanical inspection. A mechanical inspection of all components and parts shall be conducted. All pertinent data concerning conditions, defects of manufacture, damage in transit, and damage through use prior to test shall be recorded.

4.4.3 Functional check. All mechanical parts shall be checked for free and proper functioning.

4.4.4 Pressure test. The sampler shall be pressure-tested and certified in accordance with Transportable Pressure Equipment Directive and with DOT Regulation 49 CFR 178.69 and 178.70.

4.4.5 Individual operational test. Each sampler shall be connected to a source of liquid oxygen. The sampler shall be used in accordance with the operational instructions to obtain a liquid sample. The sampler shall then be disconnected from the liquid source and the sample allowed to vaporize. A resulting cylinder pressure of less than 1600 psig within 20 minutes from the time the sample was taken shall be cause for rejection. The cylinder shall then be left pressurized for at least 24 hours. Any loss of pressure attributable to leakage shall be cause for rejection.

4.4.6 Cleaning effectiveness test. One unit from each lot of 25 or fraction thereof shall be selected at random from the completed and cleaned samplers ready for shipment. The sampler shall be pressurized to 1600 psig with gaseous oxygen or nitrogen which has been analyzed for trace constituents by use of an instrument or instruments capable of determining trace constituents at the level specified in MIL-PRF-27210. The gas from the sampler shall then be

introduced into the same analytical equipment to determine if any trace constituents were introduced from the sampler. If any additional trace constituents or an increase in the level of any of the original contaminants is detected, the sampler shall be rejected and recleaned. Any rejected samplers shall be individually checked after recleaning and will be accepted only upon being proven clean. In the event that a sampler from a given lot fails to meet the cleanliness requirements, three additional samplers shall be selected at random from the same lot and tested for cleanliness in the same manner. If any of the three additional samplers is rejected, the complete lot shall be rejected, recleaned, and subjected to the test again. Any lots which have been rejected shall have five samplers selected at random and subjected to the cleanliness test. If any of the five additional samplers selected fails to meet the requirements of 3.11, each sampler in the lot shall be subjected to the test and accepted only upon satisfactory completion of the test.

4.5 Inspection of preparation for delivery. Preservation, packaging, packing, and marking shall be inspected to determine compliance with the requirements of section 5, or the documents specified therein.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended use. The sampler is intended for obtaining representative samples of liquid oxygen or liquid nitrogen to permit close quality control of the liquid oxygen or nitrogen.

6.2 Acquisition Requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification.
- b. Level of protection.

6.3 Subject term (key word) listing.

Liquid nitrogen
Liquid oxygen
Sampling assembly

6.4 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

Custodians:
Air Force – 84

Preparing Activity:
Air Force – 84

Reviewers:
Air Force – 99

Agent:
Air Force – 99

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NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <https://assist.daps.dla.mil/online/>.