Designation: F310 – 07 (Reapproved 2020)

Standard Practice for Sampling Cryogenic Aerospace Fluids[1]

This standard is issued under the fixed designation F310; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This practice describes procedures for taking a sample of cryogenic aerospace fluid for analysis.

1.2 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory requirements prior to use.* For hazard statement, see Section 5.

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F311 Practice for Processing Aerospace Liquid Samples for Particulate Contamination Analysis Using Membrane Filters

G93 Guide for Cleanliness Levels and Cleaning Methods for Materials and Equipment Used in Oxygen-Enriched Environments

G127 Guide for the Selection of Cleaning Agents for Oxygen-Enriched Systems

3. Summary of Practice

3.1 *Dewar Flask Procedure*—A clean Dewar Flask is used to collect a sample of cryogenic aerospace fluid either from a sampling valve, or poured from a larger Dewar flask used for storage.

3.2 *Cryogenic Sampler Procedure*—The sampler is used to withdraw a small amount of liquefied gas from a large supply. The sampler is allowed to cool until a steady stream of cryogenic liquid exists in the sampler. Once the sampling valves are closed the trapped liquid will convert to a gas and pressurize the sampling vessel.

4. Apparatus and Materials

4.1 *Apparatus and Materials Common to Both Procedures:*

4.1.1 *Protective Clothing,* such as an apron, face-shield, and thermal gloves. Coveralls meeting safety requirements for static dissipation, and flammability may be required depending on local safety regulations or operating procedures. White coveralls are recommended while working with cryogenic oxygen as they will show dirt or oil which may react violently with cryogenic oxygen.

4.1.2 *Wash Bottle,* 1–L made of a material compatible with the solvent selected for the cleaning procedure, Teflon FEP is generally acceptable with the solvents and fluids used.

4.1.3 *Solvents*—must be selected to meet the performance, safety, cleanliness, and environmental requirements based on standardized procedures, local and international environmental regulations, and local procedures.

4.1.3.1 *Cleaning Solvents for Cryogenic Oxygen Sampling Equipment*—Solvents for use on oxygen sampling equipment should be selected in accordance with 5.6. Examples of solvents currently used for this purpose include, but are not limited to:

Hydrofluorochlorocarbons, such as Asahiklin AK 225,

Hydrofluorocarbons, such as DuPont Vertrel XF or Vertrel MCA,

Hydrofluoroethers, such as 3M HFE 7100 or HFE 71DE,

Water-based solvents, such as non-ionic detergents.

4.1.3.2 *Cleaning Solvent for Sampling Equipment Used with other Cryogenic Fluids:*

Ethyl acetate shall have no more than 1 µg/mL residue after evaporation,

Cyclohexane shall have no more than 1 µg/mL residue after evaporation,

The cleaning solvent will be an azeotrope mixture of ethyl acetate and cyclohexane, filtered in accordance with Practice F311. The mole fraction axeotropic mixture is 0.5286 ethyl acetate and 0.4714 cyclohexane. This is prepared by mixing

[1] This practice is under the jurisdiction of ASTM Committee E21 on Space Simulation and Applications of Space Technology and is the direct responsibility of Subcommittee E21.05 on Contamination.

Current edition approved April 1, 2020. Published April 2020. Originally approved in 1970. Last previous edition approved in 2012 as F310 – 07(2012). DOI: 10.1520/F0310-07R20.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.