



Designation: F 310 – 04

Standard Practice for Sampling Cryogenic Aerospace Fluids¹

This standard is issued under the fixed designation F 310; 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 approval. 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 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 and health practices and determine the applicability of regulatory requirements prior to use.* For hazard statement, see Section 5.

2. Referenced Documents

2.1 ASTM Standards:²

F 311 Practice for Processing Aerospace Liquid Samples for Particulate Contamination Analysis Using Membrane Filters

2.2 Military Standards:

MIL-PRF-25508 Performance Specification, Oxygen

MIL-S-27626 Sampler, Cryogenic Liquid

3. Summary of Practice

3.1 A clean container 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. The sampling container is chilled down by the exiting cold gas and liquid until it will contain only liquid to be used for analysis.

4. Apparatus and Materials

4.1 *Dewar Flask*, 1-L capacity.

4.2 *Dewar Cover*, with provisions for venting.

4.3 *Protective Clothing*, such as an apron, face shield, and gloves.

4.4 *Stainless Steel Catch Bucket* (hydrocarbon clean if used for liquid oxygen sampling).

4.5 *Liquid Cryogenic Sampler*³, as described in MIL-S-27626 and MIL-PRF-25508.

4.6 *Miscellaneous Fittings*, for adapting to the sample point.

4.7 *Fluorocarbon Wash Bottle*, 1-L capacity, filled with an azeotropic mixture of ethyl acetate and cyclohexane, filtered in the manner described in Practice F 311.

4.8 *Solvents*:

4.8.1 Ethyl acetate shall have no more than 1 $\mu\text{g}/\text{mL}$ residue after evaporation.

4.8.2 Cyclohexane shall have no more than 1 $\mu\text{g}/\text{mL}$ residue after evaporation.

4.8.3 The mole fraction azeotropic mixture is 0.5286 ethyl acetate and 0.4714 cyclohexane.

4.9 *Flexible Hose*, pressure-rated at 3500 kPa (500 psig) gage suitable for the minimum temperature to be encountered and made of materials compatible with the fluid being sampled.

4.10 *Polychlorotrifluoroethylene Bag*.

5. Hazards

5.1 When sampling cryogenic fluids, care should always be exercised to avoid contact with fluid or cold gas to prevent painful frostbite. During the chill-down process, caution should also be exercised as gas exiting from the sampling point is under high pressure.

6. Dewar Flask Procedure

6.1 Clean all equipment to meet oxygen system cleanliness standards.

6.2 Clean the outlet of the sampling port with fluid from the wash bottle in 4.7.

6.3 Open the sampling valve and allow the chill-down to occur until liquid is flowing into the catch bucket.

6.4 Remove the cover from the Dewar flask.

6.5 Hold the flask in a stream of liquid and fill to approximately one-half full. Dump the liquid in the catch bucket.

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.

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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.

³ The sole sources of supply of the cryogenic samplers known to the committee at this time are Type TTU-131/E from Cosmodyne, LLC, 3010 Old Ranch Parkway, Ste. 300, Seal Beach, CA 90740 and Model FCS 2001 from Cv International, Inc., 2730 Monterey St., #108, Torrance, CA 90503. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,³ which you may attend.