



Standard Practice for Bulk Sampling of Liquid Uranium Hexafluoride¹

This standard is issued under the fixed designation C 1052; 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.

1. Scope

1.1 This practice covers methods for withdrawing representative samples of liquid uranium hexafluoride (UF₆) from bulk quantities of the material. Such samples are used for determining compliance with the applicable commercial specification, for example Specification C 787 and Specification C 996.

1.2 It is assumed that the bulk liquid UF₆ being sampled comprises a single quality and quantity of material. This practice does not address any special additional arrangements that might be required for taking proportional or composite samples, or when the sampled bulk material is being added to UF₆ residues already in a container (“heels recycle”).

1.3 The number of samples to be taken, their nominal sample weight, and their disposition shall be agreed upon between the parties.

1.4 The scope of this practice does not include provisions for preventing criticality incidents.

1.5 *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 limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

C 787 Specification for Uranium Hexafluoride for Enrichment²

C 996 Specification for Uranium Hexafluoride Enriched to Less Than 5 % ²³⁵U²

2.2 Other Documents:

USEC-651 Uranium Hexafluoride: A Manual of Good Handling Practices³

ANSI N14.1 Uranium Hexafluoride: Packaging for Transport⁴

ISO/DIS 7195 Packaging of Uranium Hexafluoride (UF₆) for Transport⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *container*—the bulk vessel either holding or receiving by transfer, the UF₆ to be sampled; it may consist of, for example, a fixed vessel in a UF₆ handling plant or a cylinder to be used for the transport of UF₆.

3.1.2 *sample bottle*—the small vessel into which the sample of UF₆ is withdrawn for transfer to the laboratory for characterization.

4. Summary of Practice

4.1 Two methods of withdrawing a sample are described, namely: (1) direct withdrawal from a filled container and (2) withdrawal from the inlet-line during the filling of a container by liquid transfer. The first method involves tilting or turning the container in such a way that its valve is below the surface of the liquefied UF₆, and dependent on the equipment, this requires that the container holds more than a specified minimum quantity of UF₆. Liquid UF₆ is withdrawn into a graduated volume and then transferred to the respective sample bottle(s). In the second method, a small proportion of the UF₆ flowing from one container to another is withdrawn into a graduated volume and then transferred to the respective sample bottle(s).

4.2 For both methods of sampling, the presence of residues may have significant implications for the quality of the UF₆. For safety and quality reasons, containers and bottles shall be clean, dry, and empty before filling.

4.3 Various types of sample bottles are in use and are described in detail in the applicable national and international standards, for example, ANSI N14.1 and ISO/DIS 7195. For a given type of sample bottle, the detailed configuration, for example, valve orientation, terminal fittings, and the like, may vary. Hence, the type and configuration of bottles to be used for the withdrawal of samples shall be agreed upon between the parties.

5. Significance and Use

5.1 Uranium hexafluoride is normally produced and handled in large (typically 1- to 14-ton) quantities and must, therefore, be characterized by reference to representative samples. The quantities involved, physical properties, chemical reactivity, and hazardous nature of UF₆ are such that for representative sampling, specially designed equipment must be used and operated in accordance with the most carefully controlled and

¹ This practice is under the jurisdiction of ASTM Committee C-26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.02 on Fuel and Fertile Material Specifications.

Current edition approved July 10, 1996. Published September 1996. Originally published as C 1052 – 85. Last previous edition C 1052 – 92.

² *Annual Book of ASTM Standards*, Vol 12.01.

³ Available from United States Enrichment Corp., 6903 Rockledge Dr., Bethesda, MD 20817.

⁴ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.