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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Specification for Uranium Hexafluoride for Enrichment¹

This standard is issued under the fixed designation C 787; 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 specification covers uranium hexafluoride (UF₆) intended for feeding to an enrichment plant. Included are specifications for UF₆ derived from unirradiated natural uranium and UF₆ derived from irradiated uranium that has been reprocessed and converted to UF₆ for enrichment and subsequent reuse. The objectives of this specification are twofold: (1) To define the impurity and uranium isotope limits for Commercial Natural UF₆ feedstock so that the corresponding enriched uranium is essentially equivalent to enriched uranium made entirely from virgin natural UF₆; and (2) To define additional limits for Reprocessed UF₆ (or any mixture of Reprocessed UF₆ and Commercial Natural UF₆). For such UF₆, special provisions may be needed to ensure that no extra hazard arises to the work force, process equipment, or the environment.

1.2 The scope of this specification does not comprehensively cover all provisions for preventing criticality accidents or requirements for health and safety or for shipping. Observance of this specification does not relieve the user of the obligation to conform to all international, federal, state, and local regulations for processing, shipping, or in any other way using UF₆ (see, for example, TID-7016, DP-532, ORNL-NUREG-CSD-6, and DOE 5633.3B).

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 ASTM Standards:

- C 761 Test Methods for Chemical, Mass Spectrometric, Spectrochemical, Nuclear, and Radiochemical Analysis of Uranium Hexafluoride²
- C 859 Terminology Relating to Nuclear Materials²
- C 1052 Practice for Bulk Sampling of Liquid Uranium Hexafluoride²
- C 1219 Test Methods for Arsenic in Uranium Hexafluoride²
- C 1295 Test Method for Gamma Energy Emission from Fission Products in Uranium Hexafluoride²

2.2 ANSI Standard:

N14.1 Packaging of Uranium Hexafluoride for Transport³

2.3 U.S. Government Documents:

Inspection, Weighing, and Sampling of Uranium Hexafluoride Cylinders, Procedures for Handling and Analysis of Uranium Hexafluoride, Vol. 1, DOE Report ORO-671-1, latest revision⁴

Uranium Hexafluoride: A Manual of Good Handling Practices, United States Enrichment Corporation Report USEC-651, latest revision⁵

Nuclear Safety Guide, U.S. Nuclear Regulatory Commission Report TID-7016, Rev. 2, 1978, and ORNL-NUREG-CSD-6⁴

Clarke, H. K., Handbook of Nuclear Safety, DOE Report DP-532⁴

Control and Accountability of Nuclear Materials, Basic Principles, U.S. DOE Order 5633.3⁴

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*—Terms shall be defined in accordance with Terminology C 859, except for the following:

3.1.1 *Commercial Natural UF₆*—UF₆ from natural unirradiated uranium (containing 0.711 ± 0.004 g ²³⁵U per 100 g U).

3.1.1.1 *Discussion*—It is recognized that some contamination with reprocessed uranium may occur during routine processing. This is acceptable provided that the UF₆ meets the requirements for Commercial Natural UF₆.

3.1.2 *Reprocessed UF₆*—any UF₆ made from uranium that has been exposed in a neutron irradiation facility and subsequently chemically separated from the fission products and transuranic isotopes so generated.

3.1.2.1 *Discussion*—The requirements for Reprocessed UF₆ given in this specification are intended to be typical of reprocessed spent fuel that has achieved burnup levels of up to 50 000 MW days per tonne of uranium in light water reactors and has been cooled for ten years after discharge. It is recognized that different limits would be necessary to accommodate different fuel histories.

¹ This specification 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.

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² Annual Book of ASTM Standards, Vol 12.01.

³ Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

⁴ Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

⁵ Available from United States Enrichment Corporation, 6903 Rockledge Drive, Bethesda, MD 20817.