



Designation: C 787 – 96

## Standard Specification for Uranium Hexafluoride for Enrichment<sup>1</sup>

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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 1. Scope

1.1 This specification covers uranium hexafluoride ( $UF_6$ ) intended for feeding to an enrichment plant. Included are specifications for  $UF_6$  derived from unirradiated natural uranium and  $UF_6$  derived from irradiated uranium that has been reprocessed and converted to  $UF_6$  for enrichment and subsequent reuse. The objectives of this specification are twofold: (1) To define the impurity and uranium isotope limits for Commercial Natural  $UF_6$  feedstock so that the corresponding enriched uranium is essentially equivalent to enriched uranium made entirely from virgin natural  $UF_6$ ; and (2) To define additional limits for Reprocessed  $UF_6$  (or any mixture of Reprocessed  $UF_6$  and Commercial Natural  $UF_6$ ). For such  $UF_6$ , 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  $UF_6$  (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 Hexafluoride<sup>2</sup>
- C 859 Terminology Relating to Nuclear Materials<sup>2</sup>
- C 1052 Practice for Bulk Sampling of Liquid Uranium Hexafluoride<sup>2</sup>
- C 1219 Test Methods for Arsenic in Uranium Hexafluoride<sup>2</sup>
- C 1295 Test Method for Gamma Energy Emission from

#### Fission Products in Uranium Hexafluoride<sup>2</sup>

#### 2.2 ANSI Standard:

N14.1 Packaging of Uranium Hexafluoride for Transport<sup>3</sup>

#### 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 revision<sup>4</sup>

Uranium Hexafluoride: A Manual of Good Handling Practices, United States Enrichment Corporation Report USEC-651, latest revision<sup>5</sup>

Nuclear Safety Guide, U.S. Nuclear Regulatory Commission Report TID-7016, Rev. 2, 1978, and ORNL-NUREG-CSD-6<sup>4</sup>

Clarke, H. K., Handbook of Nuclear Safety, DOE Report DP-532<sup>4</sup>

Control and Accountability of Nuclear Materials, Basic Principles, U.S. DOE Order 5633.3<sup>4</sup>

### 3. Terminology

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

3.1.1 *Commercial Natural  $UF_6$* — $UF_6$  from natural unirradiated uranium (containing  $0.711 \pm 0.004$  g <sup>235</sup>U 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  $UF_6$  meets the requirements for Commercial Natural  $UF_6$ .

3.1.2 *Reprocessed  $UF_6$* —any  $UF_6$  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  $UF_6$  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

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<sup>2</sup> Annual Book of ASTM Standards, Vol 12.01.

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

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

<sup>5</sup> Available from United States Enrichment Corporation, 6903 Rockledge Drive, Bethesda, MD 20817.