



Designation: C 788 – 03

Standard Specification for Nuclear-Grade Uranyl Nitrate Solution or Crystals¹

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1. Scope

1.1 This specification applies to nuclear-grade aqueous uranyl nitrate solution or crystals not exceeding 5% ²³⁵U intended for subsequent manufacture into either UF₆ (for feed to an enrichment plant) or direct conversion to uranium oxide (for use in reactors).

1.2 This specification is intended to provide the nuclear industry with a general standard for aqueous uranyl nitrate solution or crystals. It recognizes the diversity of manufacturing methods and the processes to which it is subsequently to be subjected. It is therefore anticipated that it may be necessary to include supplementary specification limits by agreement between purchaser and manufacturer. Different limits are appropriate depending on whether or not the uranyl nitrate is to be converted to UF₆ for subsequent processing.

1.3 The purpose of this specification is: (a) to define the impurity and uranium isotope limits for commercial standard uranyl nitrate, and (b) to define additional limits for reprocessed uranyl nitrate (or any mixture of reprocessed and commercial standard uranyl nitrate). For such uranyl nitrates, special provisions may need to be made to ensure that no extra hazard arises to the employees, the process equipment, or the environment.

1.4 The scope of this specification does not comprehensively cover all provisions for preventing criticality accidents, for health and safety, or for shipping. Observance of this standard does not relieve the user of the obligation to conform to all international, federal, state and local regulations for processing, shipping, or any other way of using the uranyl nitrate. An example of a U.S. Government Document is the Code of Federal Regulations (latest edition), Title 10, Part 50.²

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.*

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

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² Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

2. Referenced Documents

2.1 ASTM Standards:

C 787 Specification for Uranium Hexafluoride for Enrichment³

C 799 Test Methods for Chemical, Mass Spectrometric, Spectrochemical, Nuclear, and Radiochemical Analysis of Nuclear-Grade Uranyl Nitrate Solutions³

C 859 Terminology Relating to Nuclear Materials³

C 996 Specification for Uranium Hexafluoride Enriched to Less Than 5% ²³⁵U³

C 1233 Practice for Determining Equivalent Boron Contents of Nuclear Materials³

C 1295 Test Method for Gamma Energy Emission from Fission Products in Uranium Hexafluoride and Uranyl Nitrate Solution³

2.2 ANSI Standard:⁴

ANSI/ASME NQA-1 Quality Assurance, Requirements for Nuclear Facility Applications

2.3 U.S. Government Document:

Code of Federal Regulations, Title 10, (Energy), Part 50, Domestic Licensing of Production and Utilization Facilities

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 Terms shall be defined in accordance with Terminology C 859, except for the following:

3.1.1.1 *commercial standard uranyl nitrate*—refers to uranyl nitrate made from unirradiated uranium. However, it is recognized that some contamination with reprocessed uranium may occur during routine processing; this is acceptable, provided that the product meets the specification for commercial standard uranyl nitrate as defined in 4.2.

3.1.1.2 *reprocessed uranyl nitrate*—refers to any uranyl nitrate 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. The limits given in this specification are intended to be typical of reprocessed spent fuel having achieved burn-up levels of up to

³ Annual Book of ASTM Standards, Vol 12.01.

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