



Designation: C 888 – 03

## Standard Specification for Nuclear-Grade Gadolinium Oxide ( $Gd_2O_3$ ) Powder<sup>1</sup>

This standard is issued under the fixed designation C 888; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This specification provides the chemical and physical requirements for nuclear-grade gadolinium oxide powder intended for subsequent processing and use in nuclear fuel applications, for example, as an addition to uranium dioxide.

1.2 This specification does not include requirements for health and safety. Observance of this specification does not relieve the user of the obligation to be aware of and comply with all federal, state, and local regulations pertaining to possessing, shipping, processing, or using this material.

### 2. Referenced Documents

#### 2.1 ASTM Standards:

B 329 Test Method for Apparent Density of Powders of Refractory Metals and Compounds by the Scott Volumeter<sup>2</sup>

C 493 Test Method for Bulk Density and Porosity of Granular Refractory Materials by Mercury Displacement<sup>3</sup>

C 859 Terminology Relating to Nuclear Materials<sup>4</sup>

C 889 Test Methods for Chemical and Mass Spectrographic Analysis of Nuclear-Grade Gadolinium Oxide ( $Gd_2O_3$ ) Powder<sup>4</sup>

E 11 Specification for Wire-Cloth Sieves for Testing Purposes<sup>5</sup>

E 105 Practice for Probability Sampling of Materials<sup>5</sup>

#### 2.2 ANSI Standard:

ANSI/ASME NQA-1 Quality Assurance Requirements for Nuclear Facility Applications<sup>6</sup>

#### 2.3 U.S. Government Document:

Code of Federal Regulations, Title 10, Part 50—Energy (10

CFR 50), Domestic Licensing of Production and Utilization Facilities<sup>7</sup>

### 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 as defined herein.

3.1.1.1 *buyer*—the organization issuing the purchase order.

3.1.1.2 *powder lot*—a quantity of gadolinium oxide powder that has been processed in a manner such that samples taken in accordance with the procedures of 8.1 can be considered as representative of the entire powder lot.

3.1.1.3 *seller*—the gadolinium oxide powder supplier.

### 4. Ordering Information

4.1 The buyer shall specify the following information for all orders where this specification applies:

4.1.1 Powder lot size (allowable range),

4.1.2 Quantity (weight of delivered product),

4.1.3 Nominal particle size range and applicable tolerances in accordance with Specification E 11,

4.1.4 Density (optional), Scott Volumeter (Test Method B 329) and Mercury Displacement (Test Method C 493) are referenced as guides to density measurement techniques,

4.1.5 Shape factor and method of determination (optional),

4.1.6 Sampling requirements,

4.1.7 Crystal structure (optional), and

4.1.8 Quality requirements.

### 5. Chemical Composition

5.1 *Loss-on-Ignition*—The loss-on-ignition as determined after ignition for 2 h at a minimum temperature of 900°C shall not exceed 1.5 weight %.

5.2 *Gadolinium Oxide Concentration*—The minimum  $Gd_2O_3$  concentration shall be 99.8 weight % exclusive of the constituents lost on ignition as determined by Test Methods C 889.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C26 on Nuclear Fuel Cycle and is the direct responsibility of Subcommittee C26.03 on Neutron Absorber Materials Specifications.

Current edition approved Feb.10, 2003. Published February 2003. Originally approved in 1978. Last previous edition approved in 1997 as C 888 – 97.

<sup>2</sup> *Annual Book of ASTM Standards*, Vol 02.05.

<sup>3</sup> *Annual Book of ASTM Standards*, Vol 15.01.

<sup>4</sup> *Annual Book of ASTM Standards*, Vol 12.01.

<sup>5</sup> *Annual Book of ASTM Standards*, Vol 14.02.

<sup>6</sup> Available from the American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

<sup>7</sup> Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.