International Standard

ISO 16795

Nuclear energy — Determination of Gd_2O_3 content in pellets containing uranium oxide by X-ray fluorescence spectrometry

Énergie nucléaire — Détermination de la teneur de Gd_2O_3 par spectrométrie à fluorescence X dans des pastilles combustibles contenant de l'oxyde d'uranium

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 5, *Nuclear installations, processes and technologies*

This second edition cancels and replaces the first edition (ISO 16795:2004), which has been technically revised.

The main changes are as follows:

— the title of this document has been modified;

— requirements for the standard pellet has been added in Clause 7;

— range of Gd_2O_3 content covered by calibration curve has been added in Clause 10;

A list of all parts in the ISO 16795 series can be found on the ISO website.

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Nuclear energy — Determination of Gd_2O_3 content in pellets containing uranium oxide by X-ray fluorescence spectrometry

1 Scope

This document specifies a method which covers the determination of Gd_2O_3 content in UO_2 fuel pellets, by X-ray fluorescence spectrometry.

Either wave dispersion X-ray fluorescence (WD-XRF) or energy dispersion X-ray fluorescence (ED-XRF) is applicable, however, this document states a method by using WD-XRF using Gd Lα-line.

This method has been tested for mass fractions of from 2 % to 10 % Gd_2O_3.

2 Normative references

ISO 17034, *General requirements for the competence of reference material producers*

ASTM C1128, *Standard Guide for Preparation of Working Reference Materials for Use in Analysis of Nuclear Fuel Cycle Materials*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Principle

The fuel pellets are polished before X-ray examination.

After excitation by the primary X-ray beam, the sample emits characteristic radiation from all of its components.

The appropriate 2θ angle (2-theta) for gadolinium is selected, for example 61,115 (2θ in degrees).

The digitized signal intensity (in terms of counts) of the selected L X-ray line is proportional to the concentration of gadolinium in the sample.

The process is fully automatic.

5 Apparatus

5.1 Sequential X-ray spectrometer, including the following:

5.1.1 Compact microprocessor-controlled spectrometer.

5.1.2 Precision-engineered goniometer.

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