Nuclear energy - Determination of nitrogen content in UO2, (U,Gd)O2 and (U,Pu)O2 sintered pellets - Inert gas extraction and conductivity detection method (ISO 12799:2015)

EESTI STANDARDIKESKUS
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NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 12799:2019 sisaldab Euroopa standardi EN ISO 12799:2019 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 12799:2019 consists of the English text of the European standard EN ISO 12799:2019.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 12.06.2019.	Date of Availability of the European standard is 12.06.2019.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile standardiosakond@evs.ee.

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English Version

Nuclear energy - Determination of nitrogen content in UO2, (U,Gd)O2 and (U,Pu)O2 sintered pellets - Inert gas extraction and conductivity detection method (ISO 12799:2015)

Énergie nucléaire - Dosage de la teneur en azote des pastilles frittées d'UO2, (U,Gd)O2 et (U,Pu)O2 - Méthode d'extraction par gaz inerte et méthode de mesurage de la conductivité (ISO 12799:2015)

Kernenergie - Bestimmung des Stickstoffgehalts in UO2-, (U,Gd)O2- und (U,Pu)O2-gesinterten Pellets - Schutzgasextraktion und Leitfähigkeitsbestimmungsverfahren (ISO 12799:2015)

This European Standard was approved by CEN on 8 March 2019.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

The text of ISO 12799:2015 has been prepared by Technical Committee ISO/TC 85 "Nuclear energy, nuclear technologies, and radiological protection" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 12799:2019 by Technical Committee CEN/TC 430 "Nuclear energy, nuclear technologies, and radiological protection" the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2019, and conflicting national standards shall be withdrawn at the latest by December 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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Endorsement notice

The text of ISO 12799:2015 has been approved by CEN as EN ISO 12799:2019 without any modification.

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 documents 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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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 85, *Nuclear Energy*, Subcommittee SC 5, *Fuel Technology*.

Nuclear energy — Determination of nitrogen content in UO_2, $(U,Gd)O_2$ and $(U,Pu)O_2$ sintered pellets — Inert gas extraction and conductivity detection method

1 Scope

This International Standard describes a procedure for measuring the nitrogen content of UO_2, $(U,Gd)O_2$, and $(U,Pu)O_2$ pellets. Nitrogen in nuclear fuel may be present either as elemental nitrogen or chemically combined in the form of nitrogenous compounds. The technique described herein serves to determine the total content of nitrogen excluding those compounds whose decomposition temperature is above 2 200 °C (most notably Pu and U nitrides).

2 Principle

For determining the nitrogen content of UO_2, $(U,Gd)O_2$, or $(U,Pu)O_2$ pellets, an analyser is employed which operates according to the carrier gas principle, using helium as the carrier gas, the nitrogen content being determined in a thermal conductivity cell.

The weighed samples to be analysed are heated in a degassed high purity graphite crucible at a temperature of more than 1 770 °C in a helium atmosphere. This high temperature destroys the majority of the nitrogen bearing compounds and causes nitrogen to be released along with other gaseous components like CO, CO_2, and H_2. The released gases are then swept by the carrier gas through oxidation and absorption columns to trap interfering species. The nitrogen passes through without being retained, and its quantity is subsequently measured in the thermal conductivity cell.

3 Interferences

The samples will not be heated to temperatures above 2 200 °C since this would cause a reaction to take place between the UO_2, $(U,Pu)O_2$, or $(U,Gd)O_2$ pellet and the graphite, resulting in large quantities of CO_2 gas being released. These large quantities of gas can be not completely trapped and would lead to errors in conductivity measurement.

4 Reagents and materials

During the analysis, unless otherwise stated, use only reagents of recognized analytical grade. The reagents and materials below serve as examples to be used according to manufacturer's recommendation.

4.1 Helium.

Use helium as carrier gas with a purity of a volume fraction ≥99,995 %.

4.2 Nitrogen.

If nitrogen is used as calibration gas it will be of a purity ≥99,998 % in volume fraction.