International Standard

ISO 27468

Nuclear criticality safety — Evaluation of systems containing PWR uranium oxide fuels — Burnup credit

Sûreté-criticité — Évaluation des systèmes mettant en oeuvre des combustibles REP d'oxyde d'uranium — Crédit burnup

Second edition
2026-11

Sample Document
get full document from standards.iteh.ai

Reference number
ISO 27468:2026(en)

© ISO 2026

ISO 27468:2026 • https://standards.iteh.ai/catalog/standards/iso/6e51c933-b238-4db6-9dce-fec8a893b77d/iso-27468-2026

Sample Document

get full document from standards.iteh.ai



COPYRIGHT PROTECTED DOCUMENT

© ISO 2026

All rights reserved.

This ISO publication is protected by copyright and is owned by ISO and/or its licensors.

The content of this ISO publication is provided under licence, not sold. Use is subject to the applicable licence terms issued by ISO, an ISO member body, or an authorized third-party distributor.

Except as required for implementation or expressly permitted by a separate licence, no part of this ISO publication may be reproduced, distributed, modified, used, or made available in any form or by any means – electronic or mechanical, including photocopying, scanning, recording, or posting on internal or external digital platforms.

Any use beyond the scope of the granted rights is prohibited and may result in legal action.

ISO copyright office
CP 401 • CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

ISO 27468:2026 • https://standards.iteh.ai/catalog/standards/iso/6e51c933-b238-4db6-9dce-fec8a893b77d/iso-27468-2026

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Methodology for criticality safety evaluations considering burnup of the fuel **3**
4.1 General 3
4.1.1 Identify subsets of fuel assemblies 3
4.1.2 Perform the criticality evaluation for each subset 3
4.2 Distribution of burnup 4
4.3 Nuclide concentration calculation 5
4.4 Nuclide selection 6
4.5 Criticality safety calculations 6
5 Implementation of criticality safety evaluations considering burnup of the fuel **7**
Annex A (informative) **Validation of the depletion codes** **8**
Annex B (informative) **Operational implementation of a burnup credit application** **10**
Bibliography **11**

Sample Document
get full document from standards.iteh.ai

© ISO 2026 – All rights reserved

ISO 27468:2026 • https://standards.iteh.ai/catalog/standards/iso/6e51c933-b238-4db6-9dce-fec8a893b77d/iso-27468-2026

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).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

Sample Document

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*.

get full document from standards.iteh.ai

This second edition cancels and replaces the first edition (ISO 27468:2011), which has been technically revised.

The main changes are as follows:

— a practical (less conservative) approach is added to the bounding approach used in the previous version;

— a number of editorial changes were made.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

© ISO 2026 – All rights reserved

ISO 27468:2026 • https://standards.iteh.ai/catalog/standards/iso/6e51c933-b238-4db6-9dce-fec8a893b77d/iso-27468-2026

Introduction

For many years, criticality evaluations involving irradiated uranium oxide (UOX) fuels in a pressurized water reactor (PWR) considered the fuel as un-irradiated. Information on and consideration of the fuel properties after irradiation could usually have resulted in considerable criticality safety margins.

The use of PWR UOX fuel with increased enrichment of ^{235}U motivates evaluation of burnup credit in existing and new applications for storage, reprocessing or transport of irradiated fuel. A more realistic estimation of the actual effective neutron multiplication factor, k_{eff}, of a system involving irradiated fuel is possible with methods available to nuclear criticality safety specialists. Thus, the maximum estimated k_{eff} value during normal conditions and incidents can be reduced compared with the assumption of un-irradiated fuel.

Moreover, the safe use of burnup credit can reduce the overall risk (fewer cask moves, etc.).

Therefore, for the safe use of the burnup credit, this document highlights the need to consider new parameters in addition to those that need evaluation for un-irradiated fuel. It presents the various issues that should be addressed to support evaluations of burnup credit for systems with PWR fuels that are initially containing uranium oxides and then irradiated in a PWR.

This document identifies both a bounding approach and a more realistic practical approach in terms of k_{eff} calculation. Other approaches may be used where applicable (e.g. calculation of the average configuration with k_{eff} criteria covering credible variations/bias/uncertainties) especially if there are additional mechanisms to control the degree of sub-criticality (e.g. use of boron, gadolinium or dry transport).

Overall criticality safety evaluation and eventual implementation of burnup credit are not covered by this document. However, the burnup credit evaluation in this document should support use of burnup credit in the overall criticality safety evaluation and an eventual implementation of burnup credit.

Sample Document

get full document from standards.iteh.ai

© ISO 2026 – All rights reserved

ISO 27468:2026 • https://standards.iteh.ai/catalog/standards/iso/6e51c933-b238-4db6-9dce-fec8a893b77d/iso-27468-2026