

This is a preview of "ISO 11311:2011". [Click here to purchase the full version from the ANSI store.](#)

First edition
2011-07-01

Nuclear criticality safety — Critical values for homogeneous plutonium-uranium oxide fuel mixtures outside of reactors

*Sûreté-criticité — Valeurs critiques pour oxydes mixtes homogènes de
plutonium et d'uranium hors réacteurs*



Reference number
ISO 11311:2011(E)

© ISO 2011

This is a preview of "ISO 11311:2011". [Click here to purchase the full version from the ANSI store.](#)



COPYRIGHT PROTECTED DOCUMENT

© ISO 2011

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

This is a preview of "ISO 11311:2011". [Click here to purchase the full version from the ANSI store.](#)

Contents

Page

Foreword	iv
Introduction.....	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Reference systems concerned by this International Standard	1
4.1 Reference fissile media.....	1
4.2 Moderation conditions	3
4.3 Geometrical models	4
4.4 Reflecting conditions	4
5 Critical values	4
5.1 Presentation of the results	4
5.2 Requirements.....	4
6 Subcritical limits and margin of safety	5
Annex A (informative) Reference fissile media.....	6
Annex B (informative) Criticality schemes used for the calculations	7
Annex C (normative) Critical dimensions for a water reflection of 30 cm	9
Annex D (normative) Critical dimensions for a water reflection of 2,5 cm	10
Annex E (normative) Critical parameters for a water reflection of 30 cm	11
Annex F (normative) Critical parameters for a water reflection of 2,5 cm	12
Bibliography.....	13

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 11311 was prepared by Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 5, *Nuclear fuel cycle*.

This is a preview of "ISO 11311:2011". [Click here to purchase the full version from the ANSI store.](#)

Introduction

This International Standard provides specifications to establish process and equipment limits for controlling the nuclear criticality hazard (e.g. choice of process monitoring modes, choice of equipment geometry) in facilities (outside of nuclear reactors) involving mixed uranium-plutonium oxide (MOX) fuel.

The criticality risk for this type of fuel results from the presence of the fissile nuclides ^{239}Pu , ^{241}Pu and ^{235}U , and from other fissionable nuclides, such as ^{242}Pu , ^{240}Pu and ^{238}U , more or less neutron absorbing.

The systems considered are uniform and homogeneous mixtures, moderated and reflected by water. The geometries concerned are single units of spheres, cylinders and slabs. A limited number of important safety parameter values are then selected.

Actually, regarding the field of MOX fuel, there are insufficient directly representative experiments of damp powders for establishing the bias between calculations and measurements. Therefore, an inter-code comparison is done to conservatively estimate critical values for different fissile material specifications.

Because the use of calculation codes can be associated with different nuclear libraries, the preceding comparison is extended to the results obtained with the most common nuclear data libraries.

Consequently, this International Standard provides reference critical values for the safety parameters selected. These values are determined by inter-code comparisons with an acceptable accuracy and are defined as the lowest calculated critical values of the selected safety parameters. These values will help nuclear criticality safety assessors during their analysis to make technical prescriptions for criticality risk prevention and for production purposes.