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Nuclear criticality safety — Geometrical dimensions for subcriticality control — Equipment and layout (ISO 21391:2019)

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Nuclear criticality safety — Geometrical dimensions for subcriticality control — Equipment and layout

Sûreté-criticité — Dimensions géométriques pour garantir la sous-criticité — Dimensions d'équipements et cotes d'implantation

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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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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.

This document was prepared by Technical Committee ISO/TC 085, *Nuclear energy, nuclear technologies and radiological protection*, Subcommittee SC 05, *Nuclear installations, processes and technologies*.

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.

Introduction

Nuclear criticality safety is achieved by methods of control in accordance with ISO 1709. The application of some of these methods of control (such as geometry, interaction…) can lead to requirement(s) on geometrical dimension limits. This document covers subcriticality control based on geometrical dimensions, called subcriticality dimensions, related to equipment and layout.

Stages presented in this document are summarized in the flow diagram in Annex A and an example of this standard application is presented in Annex B.

INTERNATIONAL STANDARD ISO 21391:2019(E)

Nuclear criticality safety — Geometrical dimensions for subcriticality control — Equipment and layout

1 Scope

This document provides guidance, requirements and recommendations related to determination of limits on subcriticality dimensions and to their compliance with:

— geometrical dimensions specified in the design (design dimensions), or,

— actual dimensions.

This document is applicable to nuclear facilities containing fissile materials, except nuclear power reactor cores. This document can also be applied to the transport of fissile materials outside the boundaries of nuclear establishments. Subcriticality dimension control based on dimensions and layout of fuel assembly, fuel rods and fuel pellets are not covered by this document.

This document does not specify requirements related to the control of fissile and non-fissile material compositions.

The Quality Assurance associated with the fabrication and layout of the unit based on specifications (e.g. drawings elaborated during design) is a prerequisite of this document. The Quality Assurance is important to ensure the consistency between the unit geometry, its general purpose and its intended function.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 11311, *Nuclear criticality safety — Critical values for homogeneous plutonium-uranium oxide fuel mixtures outside of reactors*

ISO 12749-3, *Nuclear energy, nuclear technologies, and radiological protection — Vocabulary — Part 3: Nuclear fuel cycle*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12749-3 and the following apply.

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

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

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

3.1
actual dimension
actual value of subcriticality dimension, obtained by direct or indirect measurement (e.g. a mould of set dimension used for the fabrication or a template) or guaranteed by the manufacturing process previously qualified, including estimated measurement uncertainties

Note 1 to entry: Actual dimensions are usually called as-built dimensions after procurement and before commissioning.