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Method for the justification of fire partitioning in water cooled nuclear power plants (NPP)

Méthode de justification de l'efficacité de la sectorisation incendie des centrales nucléaires utilisant l'eau comme fluide caloporteur

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

For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 85, *Nuclear energy, nuclear technologies, and radiological protection*, Subcommittee SC 6, *Reactor Technology*.

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.

This corrected version of ISO 18195:2019 incorporates the following corrections:

— In 5.4.5.4, a few formatting corrections were made;

— In 6.4.7, Figure 13 has been corrected and the key modified accordingly.

Introduction

This document is intended to provide a technical specification to verify the adequacy of the performance of fire partitions in nuclear power plants. The intended audience of this document are fire safety engineers and project designers. Nuclear authorities are also concerned considering that this method is to be used in the process of fire hazard nuclear safety demonstration. The method presented herein includes a combination of standardized testing and ad hoc testing with numerical and empirical calculations. Users of this document are expected to be appropriately qualified and competent in the fields of fire safety engineering, risk assessment and fire resistance standardization.

This document specifies a new methodology to Nuclear Power Plant (NPP) designers, fire safety professionals and nuclear safety authorities. This methodology aims to verify the adequacy of the performance of fire barriers in nuclear power plants in order to avoid fire propagation. This method is a potential tool for risk-informed, performance-based assessment.

NOTE This method is based on the EPRESSI method developed by EDF in collaboration with Efectis France fire safety laboratory in France for EPR reactors[39].

Method for the justification of fire partitioning in water cooled nuclear power plants (NPP)

1 Scope

The document provides:

— guidelines for determining the thermal effects to consider on fire barriers inside a given room;

— guidelines for determining the global performance of the fire barriers based on standard test characterization;

— guidelines for assessing the need for additional tests to verify the robustness of the solution.

Requirements of applicable standards, numerical tools validation and verification (V&V), and the expected qualification of fire resistance laboratories are detailed.

The limitations of the method's applicability and scope are discussed.

The purpose and justification of this document is to describe a new methodology for the verification of the efficiency of fire barriers, which is initially based on a standardized fire resistance test.

The significance of this work relates to the fact that the present methodology will enhance the level of safety by providing more realism to hazards analysis in combination with standardized test data. It completes the standard ISO-fire rating required for justifying the performance.

The most relevant benefit of this method concerns the determination of the global performance of a barrier in a fire of extended duration compared to the classification given by the ISO-fire rating.

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 12749-2, *Nuclear energy, nuclear technologies, and radiological protection — Vocabulary — Part 2: Radiological protection*

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

ISO 12749-4, *Nuclear energy, nuclear technologies, and radiological protection — Vocabulary — Part 4: Dosimetry for radiation processing*

ISO 12749-5, *Nuclear energy, nuclear technologies, and radiological protection — Vocabulary — Part 5: Nuclear reactors*

ISO 13943, *Fire safety — Vocabulary*

ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories*

3 Terms, definitions, symbols and abbreviated terms

For the purposes of this document, the terms and definitions given in ISO 13943, ISO 12749-2, ISO 12749-3, ISO 12749-4, and ISO 12749-5 and the following apply.