INTERNATIONAL STANDARD

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Ventilation systems for nuclear facilities — In-situ efficiency test methods for iodine traps with solid sorbent —

Part 1: General requirements

Systèmes de ventilation pour les installations nucléaires — Méthodes d'essai in-situ de l'efficacité des pièges à iode à sorbant solide —

Partie 1: Exigences générales

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Contents

Page

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 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 2, *Radiological protection*.

A list of all parts in the ISO 16659 series can be found on the ISO website.

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

In nuclear facilities, iodine traps are usually used on ventilation systems to limit radioactive iodine effluent releases into the environment, to reduce iodine concentration in the air of facilities by recycling or to prevent radioactive iodine from entering into protected areas (such as control room for example). Some examples of the iodine trapping systems are shown in Annex B. The knowledge or the warranty of the capacity of these devices to trap iodine could be necessary, particularly when they are valued in the safety demonstration.

The IAEA recommends in the Safety Guide SSG-53[21] to test periodically the efficiency of confinement systems used to limit gaseous radioactive effluents releases into the environment. This recommendation is transcribed in some national rules by requirements about testing the efficiency of filtration or scrubbing devices of facilities' ventilation systems but, no international standard exists for the methods to be used for testing them in situ. ISO 17873 and ISO 26802 recommend periodic testing after their installation as well. Some design recommendations may also be found in national standards (e.g. ASTM standard[8]).

This document is the general part of a set of standards on the different current methods of tests. It describes common provisions to use to test in situ the iodine trap scrubbing efficiency of ventilation systems of nuclear facilities. These provisions deal with the methods used according to the expected role of this iodine trap, requirements about workers protections, and requirements for environment protection to take into account during these tests. Specific methods will be presented in the different parts of ISO 16659, using radioactive nuclides (e.g. $^{131}ICH_3$ in order to determine the filters efficiency or gases such as cyclohexane in order to perform integrity tests).

Ventilation systems for nuclear facilities — In-situ efficiency test methods for iodine traps with solid sorbent —

Part 1: General requirements

1 Scope

The scope of ISO 16659 series is to provide different test methods aiming at assessing the efficiency of radioactive iodine traps in ventilation systems of nuclear facilities. The ISO 16659 series deals with iodine traps containing a solid sorbent — mainly activated and impregnated charcoal, the most common solid iodine sorbents used in the ventilation systems of nuclear facilities — as well as other sorbents for special conditions (e.g. high temperature zeolites).

The scope of this document is to provide general and common requirements for the different test methods for industrial nuclear facilities. The different methods will be described in other specific parts of ISO 16659 series. Nuclear medicine applications are excluded from the scope of ISO 16659 series.

In principle, ISO 16659 series is used mainly for filtering radioactive iodine, but other radioactive gases can also be trapped together with iodine. In such a case, some specificity may have to be adapted for these other radioactive gases in specific parts of ISO 16659 series.

This document describes the main general requirements in order to check in situ the efficiency of the iodine traps, according to test conditions that are proposed to be as reproducible as possible.

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 2889:2021, *Sampling airborne radioactive materials from the stacks and ducts of nuclear facilities*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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 https://www.electropedia.org/

3.1
activated and impregnated charcoal
carbon fiber filter
charcoal or carbon fiber filters often obtained from biomass or synthetic fiber precursors and for which its specific surface is drastically increased by physical or chemical activation during a high temperature thermal treatment

Note 1 to entry: Its specific surface area is so high and so its adsorption capacity, that it is largely used in iodine trap in nuclear installations or mask for workers.