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

Part 3: Cyclohexane gas leakage rate method

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

Partie 3: Méthode du taux de fuite au cyclohexane gazeux

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Foreword

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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

The iodine trap is a key piece of equipment in a nuclear power plant to control the safe release of radioactive iodine from the gaseous effluent. Iodine traps require field performance testing during initial installation as well as during operation. The test methods are usually the radioactive methyl iodide method and the Freon method[1]to[4]. However, the test reagents used in these two methods are not suitable for use in all iodine trap systems due to environment and safety concerns, especially in spaces where people stay (e.g. main control rooms, emergency command centres, etc.). Cyclohexane is currently used in some countries as a tracer in field tests of iodine trap leakage rate due to its low toxicity, easy retention by activated carbon and ease of measurement. This iodine trap test method using cyclohexane as a tracer is suitable for determining the mechanical leakage rate of iodine traps in all ventilation systems[5].

This document provides the cyclohexane method for measuring the leakage rate of iodine traps as ISO 16659-3.

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

Part 3: Cyclohexane gas leakage rate method

1 Scope

ISO 16659 series provide different test methods aiming at assessing the performances of radioactive iodine traps in ventilation systems of nuclear facilities. This series deals with iodine traps with solid sorbent, mainly activated and impregnated charcoal, the most common solid sorbents used in ventilation systems of nuclear facilities, as well as other sorbents for special conditions (e.g. high temperature zeolites). ISO 16659-1 provides the general requirements to be applied for all methods of the series.

The scope of this document is to provide general and generic requirements for the test method using cyclohexane (C_6H_{12}) as a tracer to determine the mechanical leakage rate of iodine trap. This reproducible method can support nuclear operators to compare the result with reference values given in safety reports.

Unlike the method of radioactive methyl iodide described in ISO 16659-2, the cyclohexane field test method covered in this document does not directly give a decontamination factor for the iodine trap, but only the iodine trap performance information of an integrity test.

Due to the use of the environmentally friendly test reagent of low-toxicity in the field tests, the method is mainly suitable for ventilation systems of those habitable spaces (e.g. main control rooms of nuclear power plants), and performance test of a single iodine trap before its delivery and acceptance. In addition, the method can also be used for iodine traps with activated carbon sampling canister (e.g. deep bed iodine trap Type III and Drawer iodine trap Type II).

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 10780, *Stationary source emissions — Measurement of velocity and volume flowrate of gas streams in ducts*

ISO 16659-1, *Ventilation systems for nuclear facilities — In-situ efficiency test methods for iodine traps with solid sorbent — Part 1: General requirements*

ISO 18417, *Iodine charcoal sorbents for nuclear facilities — Method for defining sorption capacity index*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology 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/