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BSI Standards Publication

Evaluating the performance of continuous air monitors

Part 2: Air monitors based on flow-through sampling techniques without accumulation

bsi.

National foreword

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Ermittlung der Leistungsfähigkeit kontinuierlicher Luftmonitore - Teil 2: Luftmonitore basierend auf Durchfluss-Sammeltechnik ohne Anreicherung (ISO/TR 22930-2:2020)

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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Foreword

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Introduction

Sampling and monitoring of airborne activity concentration in workplaces are critically important for maintaining worker safety at facilities where dispersible radioactive substances are used.

The first indication of a radioactive substance dispersion event comes, in general, from a continuous air monitor (CAM) and its associated alarm levels. In general, the response of a CAM is delayed in time compared to the actual situation of release.

The knowledge of a few factors is needed to interpret the response of a CAM and to select the appropriate CAM type and its operating parameters.

The role of the radiation protection officer is to select the appropriate CAM, to determine when effective release of radioactive substances occurs, to interpret measurement results and to take corrective action appropriate to the severity of the release.

The objective of ISO/TR 22930 series is to assist radiation protection officer in evaluating the performance of a CAM.

ISO/TR 22930 series describes the factors and operating parameters and how they influence the response of a CAM.

This document deals with monitoring systems based on flow-through sampling techniques without accumulation.

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TECHNICAL REPORT **ISO/TR 22930-2:2020(E)**

Evaluating the performance of continuous air monitors —

Part 2:
Air monitors based on flow-through sampling techniques without accumulation

1 Scope

The use of a continuous air monitor (CAM) is mainly motivated by the need to be alerted quickly and in the most accurate way possible with an acceptable false alarm rate when significant activity concentration value is exceeded, in order to take appropriate measures to reduce exposure of those involved.

The performance of this CAM does not only depend on the metrological aspect characterized by the decision threshold, the limit of detection and the measurement uncertainties but also on its dynamic capacity characterized by its response time as well as on the minimum detectable activity concentration corresponding to an acceptable false alarm rate.

The ideal performance is to have a minimum detectable activity concentration as low as possible associated with a very short response time, but unfortunately these two criteria are in opposition. It is therefore important that the CAM and the choice of the adjustment parameters and the alarm levels be in line with the radiation protection objectives.

This document describes

— the dynamic behaviour and the determination of the response time,

— the determination of the characteristic limits (decision threshold, detection limit, limits of the coverage interval), and

— a possible way to determine the minimum detectable activity concentration and the alarms setup.

Finally the annexes of this document show actual examples of CAM data which illustrate how to quantify the CAM performance by determining the response time, the characteristics limits, the minimum detectable activity concentration and the alarms setup.

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 11929-1, *Determination of the characteristic limits (decision threshold, detection limit and limits of the coverage interval) for measurements of ionizing radiation — Fundamentals and application — Part 1: Elementary applications*

ISO 16639, *Surveillance of the activity concentrations of airborne radioactive substances in the workplace of nuclear facilities*

IEC 60761-1, *Equipment for continuous monitoring of radioactivity in gaseous effluents — Part 1: General requirements*

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