IEC 62957-1

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# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

colour inside

## Radiation protection instrumentation – Semi-empirical method for performance evaluation of detection and radionuclide identification – Part 1: Performance evaluation of the instruments, featuring radionuclide identification in static mode

## Instrumentation pour la radioprotection - Méthode semi-empirique pour l'évaluation des performances de détection et d'identification de radionucléides – Partie 1: Evaluation de la performance des instruments avec l'identification des radionucléides en mode statique

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# RADIATION PROTECTION INSTRUMENTATION – SEMI-EMPIRICAL METHOD FOR PERFORMANCE EVALUATION OF DETECTION AND RADIONUCLIDE IDENTIFICATION –

## Part 1: Performance evaluation of the instruments, featuring radionuclide identification in static mode

## FOREWORD

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The text of this International Standard is based on the following documents:

| FDIS | Report on voting |
|---|---|
| 45B/876/FDIS | 45B/880/RVD |

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62957 series, published under the general title *Radiation protection instrumentation – Semi-empirical method for performance evaluation of detection and radionuclide identification*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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# INTRODUCTION

There are known challenges associated with the application of traditional methods[1] for the performance evaluation of instruments used for the detection and identification of radionuclides. These challenges mainly originate from test logistics and the resources required for qualification type pass/fail tests.

As an alternative approach, a semi-empirical performance evaluation method has been developed [1][2]. The concept of this technique, also known as injection study, is based on computerized interpretation of detection or identification reports, obtained by injection of processed data into instrument–specific replay software for detection or radionuclide identification. The method does not prohibit the use of synthetic data if experimental data is not available.

While remaining reasonably accurate, semi-empirical methods do not require significant resources for performance evaluation. In some applications, where full scope performance testing is not feasible or practical, the use of semi-empirical methods can provide reasonable confidence in the instrument performance. By no means are semi-empirical methods meant to fully replace traditional tests, but rather to complement them.

It is envisioned that this standard will comprise three parts. Part 1 of the standard is specific to the performance evaluation of radionuclide identification in static mode, i.e. when measurement geometry does not change.

Future parts of the standard will address detection and radionuclide identification in dynamic scenarios.



1 Instrumental tests.

2 Numbers in square brackets refer to the Bibliography.

# RADIATION PROTECTION INSTRUMENTATION – SEMI-EMPIRICAL METHOD FOR PERFORMANCE EVALUATION OF DETECTION AND RADIONUCLIDE IDENTIFICATION –

## Part 1: Performance evaluation of the instruments, featuring radionuclide identification in static mode

## 1 Scope

This part of IEC 62957 specifies requirements for data preparation and data injection when using the semi-empirical method for performance evaluation of detection and radionuclide identification. This document recommends approaches for results interpretation and consolidation and establishes a method to share data and analysis results.

This part 1 of the standard is specific to the performance evaluation of radionuclide identification in static mode, i.e. when measurement geometry does not change (e.g. radionuclide identification devices in start-stop mode).

## 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.

IEC 60050-395:2014, *International Electrotechnical Vocabulary (IEV) – Part 395: Nuclear instrumentation: Physical phenomena, basic concepts, instruments, systems, equipment and detectors*

IEC 62755:2012, *Radiation protection instrumentation – Data format for radiation instruments used in the detection of illicit trafficking of radioactive materials*

ISO 8601:2004, *Date and time format*

## 3 Terms, definitions and abbreviated terms

### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-395 apply, as well as the following.

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**3.1.1**
**acceptable response table**
list of expected radionuclide identification result(s) reported by the instrument or its replay software