

# PRE-RELEASE VERSION (FDIS)



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**Radiation protection instrumentation – System of spectral identification of liquids in transparent and semitransparent containers (Raman systems)**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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**Radiation protection instrumentation – System of spectral identification of liquids in transparent and semitransparent containers (Raman systems)**

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NOTE FROM TC/SC OFFICERS:

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

# RADIATION PROTECTION INSTRUMENTATION – SYSTEM OF SPECTRAL IDENTIFICATION OF LIQUIDS IN TRANSPARENT AND SEMITRANSSPARENT CONTAINERS (RAMAN SYSTEMS)

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

| FDIS        | Report on voting |
|-------------|------------------|
| 45B/XX/FDIS | 45B/XX/RVD       |

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at [www.iec.ch/members\\_experts/refdocs](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

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## INTRODUCTION

This document establishes standard test methods and objects for evaluating the capabilities of Raman systems used for the spectral identification of liquids. The main focus is made on testing the functionality of the equipment (Raman analyzer); the reliability of identification result for liquids in containers with different light transmittance properties and stability of the equipment performance under various environmental conditions. The design of the optical scheme of the Raman analyzer, geometric and mass characteristics are not discussed and left to the discretion of the manufacturer. This document does not specify the circumstances and purposes of the inspection of liquids, the methods of detection of the container, and also the safety techniques for handling unknown liquids. Hence, the imposed requirements for the functionality of the Raman analyzer are equally suitable for its use in the fields of security, analysis of pharmaceutical solutions and other liquid chemicals. Annex A provides Raman scattering spectra of test samples, referred to in the test methods.

# **RADIATION PROTECTION INSTRUMENTATION – SYSTEM OF SPECTRAL IDENTIFICATION OF LIQUIDS IN TRANSPARENT AND SEMITRANSSPARENT CONTAINERS (RAMAN SYSTEMS)**

## **1 Scope**

This document provides technical performance requirements, testing methods, requirements for operational performance and accompanying documents, packaging, transportation and storage conditions for the system of spectral identification of liquids in transparent and semitransparent containers (hereinafter referred to as “system”), based on the method of inelastic (Raman) light scattering by molecules.

This document applies both to stationary and hand-held systems; geometric and mass parameters are not concerned in the tests. This document is applicable to substance identification testing criteria as well as verification, approval and operating criteria of the system. Since this document considers only the functionality of Raman analyzers and their ability to identify single- or multicomponent fluids, it is equally suitable for verifying the Raman analyzers assigned to security screening of threats, inspection of medical solutions, liquid chemicals, etc.

## **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 60038:2009, *Standard voltages*

IEC 60068-2-1:2007, *Environmental testing – Part 2-1: Tests – Test A: Cold*

IEC 60068-2-2:2007, *Environmental testing – Part 2-2: Tests – Test B: Dry heat*

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-78:2012, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60825-4:2006, *Safety of laser products – Part 4: Laser guards*

IEC 60825-4:2006/AMD1:2008

IEC 60825-4:2006/AMD2:2011

IEC 61000-6-1:2016, *Electromagnetic compatibility (EMC) – Part 6-1: Generic standards – Immunity standard for residential, commercial and light-industrial environments*

IEC 61000-6-3:2020, *Electromagnetic compatibility (EMC) – Part 6-3: Generic standards – Emission standard for equipment in residential environments*

ISO 3696:1987, *Water for analytical laboratory use – Specification and test methods*

ISO 9058:2008, *Glass containers – Standard tolerances for bottles*

ASTM D3695 – 95:2013, *Standard Test Method for Volatile Alcohols in Water by Direct Aqueous-Injection Gas Chromatography*

ASTM D5309 – 16, *Standard Specification for Cyclohexane 999*

ASTM E1094 – 04:2015, *Standard Specification for Pharmaceutical Glass Graduates*

ASTM E1840 – 96:2014, *Standard Guide for Raman Shift Standards for Spectrometer Calibration*

European Pharmacopoeia 8.7:2016, 2.2.48, *Raman spectroscopy*, pp.5464-5466