
**Radiation protection — Apparatus for
industrial gamma radiography —
Specifications for performance, design
and tests**

*Radioprotection — Appareils pour radiographie gamma industrielle —
Spécifications de performance, de conception et d'essais*



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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 3999 was prepared by Technical Committee ISO/TC 85, *Nuclear energy*, Subcommittee SC 2, *Radiation protection*.

This second edition cancels and replaces ISO 3999-1:2000, of which it constitutes a minor revision.

Radiation protection — Apparatus for industrial gamma radiography — Specifications for performance, design and tests

1 Scope

This International Standard specifies the performance, design and test requirements of apparatus for gamma radiography with portable, mobile and fixed exposure containers of the various categories defined in Clause 4.

It applies to apparatus designed to allow the controlled use of gamma radiation emitted by a sealed radioactive source for industrial radiography purposes, in order that persons will be safeguarded when the apparatus is used in conformity with the regulations in force regarding radiation protection.

It is emphasised, however, that so far as transport of apparatus and sealed radioactive source is concerned, compliance with this International Standard is no substitute for satisfying the requirements of relevant international transport regulations (IAEA Regulations for the safe transport of radioactive materials: IAEA-STI-PUB 998, Safety Standards Series No. ST-1 and No. ST-2, and/or the relevant national transport regulations).

The operational use of apparatus for industrial gamma radiography is not covered by this International Standard. Users of this equipment shall comply with national regulations and codes of practice.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendment) applies.

ISO 361, *Basic ionizing radiation symbol*

ISO 2919:1999, *Radiation protection — Sealed radioactive sources — General requirements and classification*

ISO 7503-1, *Evaluation of surface contamination — Part 1: Beta-emitters (maximum beta energy greater than 0,15 MeV) and alpha-emitters*

IAEA-STI-PUB 998 (Safety Standards Series No. ST-1):1996, *Regulations for the safe transport of radioactive material*

IAEA-STI-PUB 998 (Safety Standards Series No. ST-2):1996, *Advisory Material for the IAEA Regulations for the safe Transport of Radioactive Material Safety Guide*

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

IEC 60068-2-47, *Environmental testing — Part 2-47: Test methods — Mounting of components, equipment and other articles for vibration, impact and similar dynamic tests*

IEC 60846, *Radiation protection instrumentation — Ambient and/or directional dose equivalent (rate) meters and/or monitors for beta, X and gamma radiation*

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

IEC 61000-6-2, *Electromagnetic compatibility (EMC) — Part 6: Generic standards — Section 2: Immunity for industrial environments*

IEC 61000-6-4, *Electromagnetic compatibility (EMC) — Part 6: Generic standards — Section 4: Emission standard for industrial environments*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply. Certain terms are illustrated in Figures 1 to 5 which, however, do not purport to illustrate typical or preferred designs.

3.1

ambient equivalent dose rate

dose rate measured as an average over the sensitive volume of the detector

NOTE 1 Measurements of the ambient equivalent dose rate shall be made at 1 m from the surface and additionally at the surface of the exposure container or at 50 mm from the surface.

NOTE 2 The limits are given in 5.3. The maximum cross-sectional areas of the detectors to be used are given in 6.4.1.2.

cf. ICRU 51.

3.2

apparatus for industrial gamma radiography

apparatus including an exposure container, a source assembly, and as applicable, a remote control, a projection sheath, an exposure head, and accessories designed to enable radiation emitted by a sealed radioactive source to be used for industrial radiography purposes

NOTE In the following text, an “apparatus for industrial gamma radiography” can be used for any means of non-destructive testing using gamma radiation.

3.3

automatic securing mechanism

automatically activated mechanical device designed to restrict the source assembly to the secured position

3.4

beam limiter

shielding device located at the working position designed to reduce the radiation dose rate in directions other than the directions intended for use

NOTE The beam limiter may be designed to be used in conjunction with an exposure head or may incorporate an exposure head as an integral part of the device.

3.5

control cable

cable or other mechanical means used to project and retract the source assembly out from and into the exposure container by means of remote control

NOTE The control cable includes the means of attachment to the source holder.

3.6

control-cable sheath

rigid or flexible tube for guiding the control cable from the remote control to the exposure container and for providing physical protection to the control cable