INTERNATIONAL STANDARD 1758

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Direct-reading electroscope-type pocket exposure meters

Exposimètres de poche à lecture directe du type électroscope

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the technical committees were published as ISO Recommendations; these documents are in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 85, *Nuclear energy*, has reviewed ISO Recommendation R 1758-1971 and found it technically suitable for transformation. International Standard ISO 1758 therefore replaces ISO Recommendation R 1758-1971, to which it is technically identical.

ISO Recommendation R 1758 had been approved by the member bodies of the following countries :

Australia	Israel	Sweden
Belgium	Italy	Switzerland
Brazil	Netherlands	Thailand
Colombia	Peru	Turkey
Egypt, Arab Rep. of	Poland	United Kingdom
Germany	Portugal	U.S.A.
Greece	Romania	U.S.S.R.
Hungary	South Africa, Rep. of	Yugoslavia
Iran	Spain	

The member body of the following country had expressed disapproval of the Recommendation on technical grounds :

France

The member bodies of the following countries disapproved the transformation of the Recommendation into an International Standard :

Brazil
France
Hungary
U.S.A.

Printed in Switzerland

Direct-reading electroscope-type pocket exposure meters

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the requirements for direct-reading electroscope-type pocket exposure meters for X- and/or gamma radiation, having an airtight sensitive volume, working in the range, or part of the range, from 30 keV up to 3 MeV, excluding use in mixed fields of ionizing radiation, for instance gamma-neutron fields.

NOTES

1 In order to verify whether the exposure meters are in accordance with the specifications set down in clauses 8 and 9 of this International Standard, clearly defined methods of test shall be used. These methods will be dealt with in a future International Standard.

2 This International Standard does not cover the dimensions of the terminals, as this subject is considered to belong to the scope of the International Electrotechnical Commission (Technical Committee 45).

2 DEFINITION

For the purpose of this International Standard, the following definition applies.

direct-reading pocket exposure meter : An instrument to be carried on the person and from which the exposure can be read directly; the meter operates on the principle described in clause 3.

3 PRINCIPLE

A direct-reading exposure meter consists essentially of an electroscope connected to a capacitor. This capacitor is charged by a charging device, which may or may not be built-in, thus giving the indicator a deflection which can be read against a calibrated scale by means of an optical system.

If the exposure metter is exposed to X- and/or gamma radiation, ionization of the gas between the electrodes occurs. As a result, the position of the movable electrode changes; the change in the deflection on the calibrated scale is a measure of the exposure at the location of the exposure meter.

4 MARKINGS

4.1 The scale shall be marked in röntgens (R) or milliröntgens (mR). The scale shall indicate the unit used. The scale shall be divided into at least 10 and not more than 25 divisions. At least every 5th scale line shall be larger and numbered.

4.2 An indication shall be provided on the meter of the energy range for which it is intended. The energy range shall be indicated in kilo-electronvolts (keV) or in mega-electronvolts (MeV) (see also 9.1 and 10.6).

4.3 Each meter shall be provided with an individual indelible identification mark, for recording purposes.

4.4 The proper reading position shall be given in the directions for use and if possible on the instrument, unless the reading of the instrument is independent of the orientation (see also 9.6).

5 ADJUSTMENT AND SEALING

If the sensitivity of the exposure meter is adjustable, the instrument shall be sealed in such a way that the adjustment cannot be changed without breaking the seal.

6 CLEANING

All exterior surfaces of the instrument shall be hard and smooth, with as few joints as practicable, to ensure easy cleaning in case of radioactive contamination.

7 MECHANICAL STRENGTH

The construction shall be sufficiently rugged so that if the exposure meter is dropped in any orientation onto a wooden floor from a height of 1 m, the change in indication of the instrument will not be more than 10 % of the measuring range. In addition, the accuracy shall remain within all the limits specified in clause 9.

8 EFFECT OF AMBIENT CONDITIONS

8.1 All the specifications concerning accuracy given in clause 9 shall be determined under the following standard test conditions :

- temperature : 20 ± 5 °C
- relative humidity : 65 ± 5 %

8.2 The sensitivity to variations of temperature between − 10 °C and + 50 °C shall be such that the deviation compared with the response at + 20 °C is less than 10 % of the reading.

8.3 An exposure meter shall stay within the limits of accuracy as specified in clause 9, if the pressure of the outer air changes from the normal atsmopheric pressure (1 013 mbar*) to 0,6 or 1,2 times this pressure.

8.4 If the instrument is equipped with a lens, the instrument shall be so constructed that it is not damaged by exposure to direct sunlight. The instrument should be readable at a luminance of 0,03 cd/cm² at the inlet surface.

9 ACCURACY

9.1 For the energy range indicated on the exposure meter, the sensitivity shall not deviate by more than 10 % of its nominal value.

9.2 In the range between 20 and 100 % of full-scale deflection, the response of the exposure meter to a reference radiation, chosen within the limits specified in 9.1, shall not, after correction for the energy dependance, deviate by more than 10 % from the true exposure, provided that the exposure rates do not exceed the permissible maximum indicated in the directions for use.

9.3 The repeatability of any indication, under the same ambient conditions and using the same radiation source, should not deviate from the average reading by more than 5 %.

9.4 The leak of charge of an exposure meter with a measuring range of 100 mR or more shall not exceed 2 % of its maximum scale reading in 24 h, if it is placed in surroundings where the exposure rate amounts to a maximum of 0,02 mR/h and where the atmospheric conditions are as defined in 8.1.

9.5 When the instrument is disconnected from the charging source, the movement of the pointer shall not exceed 5 % of the measuring range for 200 mR range exposure meters, and not exceed 2 % if the range exceeds 200 mR. The movement shall be completed within 10 s.

9.6 The indication shall not vary by more than 5 % of the maximum scale value due to any change in position of the exposure meter. If this condition cannot be fulfilled, the directions for use shall give the proper position of the exposure meter during the reading (see also 4.4).

9.7 The response of the instrument at any angle not exceeding 50° from the direction of maximum response of the instrument shall be not less than 70 % of this maximum response.

10 CERTIFICATE

A certificate shall accompany each exposure meter and shall include the following information :

10.1 The manufacturer's name or registered trade-mark.

10.2 The type of the instrument.

10.3 The exposure range, in milliröntgens or röntgens.

10.4 The location and dimensions of the sensitive volume.

10.5 The sensitivity as a function of the quantum energy and radiation quality, including the lowest energy at which the response is 50 % of its nominal value.

10.6 The energy range of the instrument.

10.7 The reference radiations adopted for the calibration of the exposure meter.

10.8 The maximum permissible exposure rate for the instrument (see also 9.2).

10.9 The material of the wall surrounding the sensitive volume, and its mass per unit area, in milligrams per square centimetre (mg/cm²).

10.10 The variation of the sensitivity with the angle of incidence of radiation, referred to a well-defined axis of the instrument.

10.11 The voltage required to charge the instrument.

10.12 A warning regarding reliability limitations in mixed fields.

* 1 mbar = 100 Pa