BSI and International Standards

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Standards in Radiation Protection

Organisations

BSI British Standards Institution
First standard 1901

IEC International Electrotechnical Committee
Founded in London in 1906

ISO International Standards Organisation
Founded in 1946

CENELEC European Committee for Electrotechnical Standardization
BSI

Has seven standards divisions
The Nuclear Energy committees:

- NCE 2 Radiation Protection and Measurement
- NCE 8 Reactor Instrumentation
- NCE 9 Nuclear Fuel Cycle Technology
- NCE 9/01 Reactor Technology

are, with four hundred other committees, in the Engineering Division.
The Radiation Protection and Measurement committee is one of the busiest BSI committees. It shadows the work of ISO TC85 SC2 Radiation Protection, IEC TC45 Nuclear Instrumentation, IEC TC45 SC45B Radiation Protection Instrumentation and CENELEC CLC TC45B Radiation Protection Instrumentation.
BSI and BSI adopted standards published

BS 3385 Specific for direct reading pocket type electroscope exposure meters
BS 3455 Glossary of terms used in nuclear science and technology
BS 3510 Specification for a basic symbol to denote the actual or potential presence of ionising radiation
BS 3664 Specification for film badges for personnel radiation monitoring
BS 3775 Specification for counting trays (planchets) for radioactive assay
BS 3890 General recommendations for the testing, calibration and processing of radiation monitoring films
BS 4094-1 Recommendation for data on shielding from ionizing radiation. Shielding from gamma radiation
BS 4094-2 Recommendation for data on shielding from ionizing radiation. Shielding from X-radiation
BS 4247-1 Surface materials for use in radioactive areas. Methods of measuring and evaluating the decontamination factor
BS 4247-2 Surface materials for use in radioactive areas. Guide to the selection of materials
BS 4513 Specification for lead bricks for radiation shielding
BS 5243 General principles for sampling airborne radioactive materials
BS 5288 Specification. Sealed radioactive sources

BS EN 60325 Alpha, beta and alpha/beta (beta energy 60keV) contamination meters and monitors
BS EN 60405 Constructional requirements and classification of radiometric gauges
BS EN 60761-1 Equipment for continuous monitoring of radioactivity in gaseous effluents (General requirements)
BS EN 60761-2 Equipment for continuous monitoring of radioactivity in gaseous effluents (Specific requirements for radioactive aerosol monitoring including transuranic aerosols)
BS EN 60761-3 Equipment for continuous monitoring of radioactivity in gaseous effluents (Specific requirements for radioactive iodine monitors)
BS EN 60761-4 Equipment for continuous monitoring of radioactivity in gaseous effluents (Specific requirements for tritium monitors)
BS EN 60761-5 Equipment for continuous monitoring of radioactivity in gaseous effluents (Specific requirements for radioactive noble gas monitors)
BS EN 60846 Ambient and/or directional dose equivalent (rate) meters and/or monitors for beta, X and gamma radiation
BS EN 60861 Equipment for monitoring of radionuclides in liquid effluents and surface waters
BS EN 61005 Neutron ambient dose equivalent (rate) meters
BS EN 61098 Installed personnel surface contamination monitoring assemblies
BS EN 61526 Measurement of personal dose equivalent Hp(10) and Hp(0.07) for X, gamma, neutron and beta radiations. Direct reading personal dose equivalent meters and monitors
BS EN 61582 In vivo counters. Classification, general requirements and test procedures for portable, transportable and installed equipment
BS EN 62022 Installed monitors for the control and detection of gamma radiations contain in in recyclable and non-recyclable materials transported by vehicle
BS IEC 60532  Installed dose ratemeters, warning assemblies and monitors, x and gamma radiation between 50keV and 7 MeV
BS IEC 60692  Density gauges utilizing ionizing radiation. Definitions and test methods
BS IEC 61336  Thickness measurement system utilizing ionizing radiation. Definitions and test methods
BS IEC 61559-1 Radiation protection instrumentation in nuclear facilities. Centralized systems for continuous monitoring of radiation and/or levels of radioactivity. General requirements
BS IEC 61577-1 Radon and radon decay product measuring instruments. General requirements
BS IEC 61577-2 Radon and radon decay product measuring instruments. Specific requirements for radon measuring instruments
BS ISO 4037-1 X-ray and gamma reference radiation for calibrating dosemeters and doserate meters and for determining their response as a function of photon energy. Radiation characteristics and production methods
BS ISO 4037-2 X-ray and gamma reference radiation for calibrating dosemeters and doserate meters and for determining their response as a function of photon energy. Dosimetry for radiation protection over the energy ranges 9 keV to 1.3 MeV and 4 MeV to 9 MeV
BS ISO 4037-3 X-ray and gamma reference radiation for calibrating dosemeters and dosecrates and for determining their response as a function of photon energy. Calibration of area and personal dosemeters and the measurement of their response as a function of energy and angle of incidence
BS ISO 4037-4 X-ray and gamma reference radiation for calibrating dosemeters and dosecrates and for determining their response as a function of photon energy. Calibration of area and personal dosemeters in low energy X reference radiation fields
BS ISO 4037-4 X-ray and gamma reference radiation for calibrating dosemeters and dosecrates and for determining their response as a function of photon energy. Dosimetry for radiation protection over the energy ranges 9 keV to 1.3 MeV and 4 MeV to 9 MeV
BS ISO 4037-3 X-ray and gamma reference radiation for calibrating dosemeters and dosecrates and for determining their response as a function of photon energy. Dosimetry for radiation protection over the energy ranges 9 keV to 1.3 MeV and 4 MeV to 9 MeV
BS ISO 6980-1 Reference beta-particle radiation. Methods of production
BS ISO 6980-2 Reference beta-particle radiation. Calibration fundamentals related to basic quantities characterizing the radiation field
BS ISO 6980-3 Reference beta-particle radiation. Calibration of area and personal dosemeters and the determination of their response as a function of beta radiation energy and angle of incidence
BS ISO 8529-1 Reference neutron radiations. Characteristics and methods of production
BS ISO 8529-2 Reference neutron radiations. Calibration fundamentals of radiation protection devices related to the basic quantities characterizing the radiation field
BS ISO 8529-3 Reference neutron radiations. Calibration of area and personal dosimeters and personal dosimeters and determination of their response as a function of neutron energy and angle of incidence
BSI and BSI adopted standards published (cont.)

BS ISO 11929-1 Determination of the detection limit and detection threshold for ionizing radiation measurement. Fundamentals and application to counting measurements without the influence of sample treatment.

BS ISO 11929-2 Determination of the detection limit and detection threshold for ionizing radiation measurement. Fundamentals and application to counting measurements without the influence of sample treatment.

BS ISO 11929-3 Determination of the detection limit and detection threshold for ionizing radiation measurement. Fundamentals and application to measurement by high resolution gamma spectrometry without the influence of sample treatment.

BS ISO 11929-4 Determination of the detection limit and detection threshold for ionizing radiation measurement. Fundamentals and application by use of linear scale analogue ratemeters without the influence of sample treatment.

BS ISO 11929-5 Determination of the detection limit and detection threshold for ionizing radiation measurement. Fundamentals and application to counting measurements on filters during accumulation of radioactive material.

BS ISO 11929-6 Determination of the detection limit and detection threshold for ionizing radiation measurement. Fundamentals and application to counting measurements by use of transient mode.

BS ISO 11929-7 Determination of the detection limit and detection threshold for ionizing radiation measurement. Fundamentals and general applications.

BS ISO 11929-8 Determination of the detection limit and detection threshold for ionizing radiation measurement. Fundamentals and application to unfolding of spectrometric measurements without the influence of sample treatment.

BS ISO 11933-3 Components for containment enclosures. Transfer systems such as plain doors, airlock chambers, double door transfer systems leak tight connections for waste drums.


BS ISO 12789-2 Reference radiation fields. Simulated workplace neutron fields. Calibration fundamentals related to the basic quantities.

BS ISO 12794 Individual thermoluminescence dosemeters for extremities and eyes.

BS ISO 14152 Neutron radiation protection shielding. Design principles and considerations for the choice of appropriate materials.


BS ISO 19238 Performance criteria for service laboratories performing biological dosimetry by cytogenetics.

BS ISO 21243 Performance criteria for laboratories performing cytogenetic triag for assessment of mass casualties in radiological or nuclear emergencies. General principles and application to dicentric assay.

BS ISO 21439 Clinical dosimetry. Beta radiation sources for brachytherapy.

BS ISO 21482 Ionising-radiation warning. Supplementary symbol.

Work in hand is related to CENELEC, IEC and ISO standards, in the latter two cases adoption as BS is likely.
Who is represented on NCE2
The following are entitled to send representatives
   Atomic Weapons Establishment
   British Nuclear Group Sellafield Ltd
   Energy Industries Council
   Health and Safety Executive
   Health Protection Agency
   National Nuclear Laboratory
   National Physical Laboratory
   Nuvia Limited
   The Institute of Physics
Other organisations I am sure can be represented.

In fact a number of our active members have been co-opted because of their particular expertise. If you think you can contribute please let me know.

All NCE 2 meetings take place at the BSI headquarters in Chiswick

We have about four meetings a year generally scheduled for day. However most of our work is done by correspondence. All our work now relates to International Standards. Because of the enormous amount of work detailed discussion at meetings on every document is no longer possible. Discussion relates to specific problems, progress of the documents, representation at International meetings and who is to collate the comments of members for submission as the UK national comments. Most of the active members NCE 2 are also the UK experts on the working groups of the international standard organisations.
IEC TC45
Nuclear Instrumentation

This Committee deals only with electrical apparatus. It has two sub-committees
SC45A Reactor Instrumentation
SC45B Radiation Protection Instrumentation
Two working groups
WG1 Terminology
WG9 Detectors
and a project group dealing with industrial instrumentation

SC45B has at present seven working groups
WG 5 Measurement of environmental radiation
WG 8 Active electronic dose equivalent and dose equivalent rate meters and monitors
WG 9 Installed equipment for radiation and activity monitoring in nuclear facilities
WG 10 Radon and radon decay products measuring instruments
WG 13 Measurements of airborne radioactivity
WG 14 Passive integrating dosimetry systems for monitoring of external radiation
WG 15 Border control instrumentation using spectrometry, personnel electronic
dosemeter and portable dose rate instrumentation
Standards Published but not adopted by CENELEC or BSI

IEC 60860  Warning assembly for criticality accidents
IEC 61017-1 Portable, transportable or installed X or gamma radiation ratemeters for environmental monitors-Part 1 Ratemeters
IEC 61017-2 Portable, transportable or installed X or gamma radiation ratemeters for environmental monitors-Part 2 Integrating assemblies
IEC 61018  High range beta and photon dose and dose rate portable for emergency radiation protection purposes
IEC 61066  Thermoluminescence dosimetry systems for personal and environmental monitoring
IEC 61171  Monitoring equipment – atmospheric radioactive iodines in the environment
IEC 61172  Monitoring equipment- Radioactive aerosols in the environment
IEC 61256  Installed monitors for the detection of radioactive contamination of laundry
IEC 61275  Measurement of discrete radionuclides in the environment – In situ photon spectrometry system using a germanium detector
IEC 61322  Installed dose equivalent rate meters, warning assemblies and monitors for neutron radiation of energy from thermal to 15 MeV
IEC 61344  Monitoring equipment – Personal warning devices for X and gamma radiations
IEC 61560  Apparatus for non-destructive radiation tests of fur and other cloth samples
IEC 61562  Portable equipment for measuring specific activity of beta emitting radionuclides in foodstuffs
IEC 61563  Equipment for measuring specific activity of gamma emitting radionuclides in foodstuffs
IEC 62302  Equipment for noble gas monitoring in the workplace and in the environment
IEC 62303  Equipment for sampling and monitoring airborne tritium in the workplace, effluents and the environment
IEC 62327  Hand-held instruments for the detection and identification of radionuclides and additionally for the indication of ambient dose equivalent rate from photon radiation
IEC 62387-1 Passive integrating dosimetry systems for environmental and personal monitoring for external photon and beta radiation using electronic devices for the data evaluation Part 1 General characteristics and performance requirements on dosimetry systems
IEC 62438  Mobile instrumentation for measurement of gamma and neutron radiation in the environment
IEC 62461  Determination of uncertainty in measurement
Work in progress
IEC 60532  Installed dose rate meters, warning assemblies and monitors X and gamma radiation of energy between 50 keV and 7 MeV (Revision)
IEC 61526  Measurement of personal dose equivalents Hp(10) and Hp(0.07) for X, gamma, neutron and beta radiations – Direct reading personal dose equivalent meters and monitors (Revision)
IEC 61578  Effectiveness of radon compensation for radioactive aerosol monitors including transuranic aerosols (Revision)
IEC 61275  Measurement of discrete radionuclides in the environment – In situ photon spectrometry system using a germanium detector (Revision)
IEC 62438  Mobile instrumentation for measurement of gamma and neutron radiation in the environment
IEC 62463  X-ray systems for the screening of persons for security and the carrying of illicit items
IEC 62484  Spectroscopy-based portal monitors used for the detection and identification of illicit trafficking of radioactive materials
IEC 62523  Cargo/vehicle radiographic inspection systems
IEC 62533  Highly sensitive hand-held instruments for photon detection of radioactive material
IEC 62534  Highly sensitive hand-held instruments for neutron detection of radioactive material
TC 45 meets with its subcommittees and most if the working groups about every fifteen months. Working groups often have at least one interim meeting. The venue of the committee meeting is by invitation of one of the national committees. The last meeting in September was in Yokohama, Japan and the next in about a year’s time will be in Seattle, USA. The interim working group meetings are normally in the country of the convener.

Standards are initiated by a request from a national committee. If twenty five percent of the national voting members agree this becomes a new work item and the committee decides which of the existing working groups is applicable to do the work or forms an additional working group. National committees are invited to propose experts in the particular field to join the working group and a project leader is proposed usually from the nation making the original proposal or the convener (leader) of the working group. The working group prepares a draft (CD committee draft) for circulation to national committees for comments. Further CDs can be prepared if necessary otherwise the amended document goes forward as draft for voting. If two thirds of the votes approve it goes forward as Final Draft International Standard for minor editorial correction before being published as an International Standard. It takes at least three years.

UK delegates to committee and working group meetings can, if they do not work directly or indirectly for a government department, can claim for assisted travel. This is a fixed amount for a particular city and is intended to cover air fares but any over can be used for hotel bills. Only one fare for any working group or committee is paid for, unless the applicant is convener, chairman or secretary.
ISO TC85
NUCLEAR ENERGY

This committee deals with all aspects except electrical apparatus and has three subcommittees

SC2 Radiation Protection
SC5 Nuclear Fuel Technology
SC6 Reactor Technology

and two working groups one terminology and the other on dosimetry standards in radiation processing

SC2 has twelve working groups

- WG 2 Reference radiation fields
- WG 4 Apparatus for gamma radiography and irradiators
- WG 5 Materials and devices for protection against alpha, beta, X, gamma, beta and neutron radiations, and equipment for remote manipulation of radioactive materials
- WG 11 Sealed Sources
- WG 13 Monitoring and dosimetry for internal exposure
- **WG 14 Air control and monitoring**
- WG 17 Radioactivity measurements
- WG 18 Biological Dosimetry
- WG 19 Individual monitoring of external radiation
- WG 20 Illicit trafficking in radioactive material
- WG 21 Dosimetry for exposures to cosmic radiation in civilian aircraft
- WG22 Dosimetry and related protocols in medical applications of ionizing radiation
Standards not adopted by BSI

- ISO 1727 Personal photo graphic dosemeters
- ISO 2889 General principles for sampling airborne radioactive materials
- ISO 2919 Sealed radioactive sources- general requirements and classification
- ISO 3975 Unsealed radioactive substances – Identification and certification
- ISO 7025 Radionuclide gauges – Gauges designed for permanent installation
- ISO 7212 Enclosures for protection against ionizing radiation – Lead shielding used for 50 mm and 100 mm thick walls
- ISO 7503-1 Evaluation of surface contamination – Part 1 Beta-emitters (maximum beta energy greater than 0.15 MeV) and alpha-emitters
- ISO 7503-2 Evaluation of surface contamination – Part 2 Tritium surface contamination
- ISO 7503-3 Evaluation of surface contamination – Part 3 Isomeric transition and electron capture emitters
- ISO 8194 Clothing for protection against radioactive contamination – Design, selection, testing and use
- ISO 8690 Decontamination of radioactively contaminated surfaces – Method for testing and assessing the ease of decontamination
- ISO 8769 Reference sources for the calibration of surface contamination monitors – Beta-emitters (maximum beta energy greater than 0.15 MeV) and alpha emitters
- ISO 8769-2 Reference sources for the calibration of surface contamination monitors – Part 2 Electrons of energy less than 0.15 MeV and photons of energy less than 1.5 MeV
Standards not adopted by BSI (cont.)

ISO 9271 Decontamination of radioactively contaminated surfaces – Testing of decontamination agents for textiles
ISO 9404 Enclosures for protection against ionizing radiation - lead shielding units for 150mm, 200mm and 250 mm thick walls – Part 1 – Chevron units of 150mm and 200mm thickness
ISO9978 Sealed radioactive sources – Leakage test methods
ISO 10648-1 Containment enclosures – Part 1 Design principles
ISO 10648-2 Containment enclosures – Part 1 Classification according to leak tightness and associated checking methods
ISO 11933-1 Components for containment enclosures Part 1: Glove/bag ports, bungs for glove/bag ports, enclosure rings and interchangeable units
ISO 11933-2 Components for containment enclosures Part 2: Gloves, welded bags, gaiters for remote handling tongs and for manipulators
ISO 11933-4 Components for containment enclosures Part 4: Ventilation and gas-cleaning systems, such as filters, trap, safety and regulation valves, control and protection devices
ISO 11933-5 Components for containment enclosures Part 5: Penetrations for electrical and fluid circuits
ISO 12790 Performance criteria for radiobioassay – Part 1 General principles
ISO 14146 Criteria and performance limits for the periodic evaluation of processors of personal dosemeters for X and gamma radiation
ISO 15080 Ventilation penetration for shielded enclosures
ISO 15382 Procedure for radiation protection monitoring in nuclear installations for external exposure to weakly penetrating radiation, especially to beta radiation
ISO 17873 Criteria for the design and operation of ventilation systems for nuclear installations other than nuclear reactors
ISO 17874-1 Remote handling devices for radioactive materials–Part 1 General requirements
ISO 17874-2 Remote handling devices for radioactive materials–Part 2 Mechanical master-slave manipulators
ISO 17874-4 Remote handling devices for radioactive materials–Part 4 Power manipulators
ISO 17874-5 Remote handling devices for radioactive materials–Part 5 Remote handling tongs
Standards under development

ISO 2889 Sampling airborne radioactive materials from the stacks and ducts of nuclear facilities
ISO 8769 Reference sources- calibration of surface contamination monitors – alpha, beta- and photon emitters
ISO 11665-1 Measurement of radioactivity in the environment-air-Part 1 Radon-222 and its short-lived decay products in the atmospheric environment: their origins and measuring methods
ISO 11665-2 Measurement of radioactivity in the environment-air-Part 2 Radon-222 Integrated measuring methods of the potential alpha energy concentration of short lived radon decay products in the atmospheric environment
ISO 11665-3 Measurement of radioactivity in the environment-air-Part 3 Radon-222 Short-term measuring methods of the potential alpha energy concentration of short-lived radon decay products in the atmospheric environment
ISO 11665-4 Measurement of radioactivity in the environment-air-Part 4 Integrated measuring methods of the average radon activity concentration in the atmospheric environment using passive sampling and delayed analysis
ISO 11665-5 Measurement of radioactivity in the environment-air-Part 5 Radon-222 Continuous measuring methods of radioactivity concentration in the atmospheric environment
ISO 11665-6 Measurement of radioactivity in the environment-air-Part 6 Radon-222 Methods of estimating the exhalation surface rate by accumulation in the environment
ISO 11665-7 Measurement of radioactivity in the environment-air-Part 7 Radon-222 Short-term measuring methods of radon activity concentration in the atmospheric environment
ISO 11665-8 Measurement of radioactivity in the environment-air-Part 8 Radon-222 in buildings: Methodologies for screening and additional investigations
Standards under development (cont.)

ISO 11929  Determination of the characteristic limits (decision threshold, detection limit and limits of confidence interval) for measurements of ionizing radiation
ISO 17874-3 Remote handling devices for radioactive materials  Part 3 Electrical master-slave manipulators
ISO 20785-2 Dosimetry for exposures to cosmic radiation in civilian aircraft–Part 2 Characterization of instrument response
ISO 27048  Dose assessment for the monitoring of workers for internal radiation exposure
ISO 26802-2 Criteria for the design and the operation and ventilation systems for nuclear reactors
ISO 28218  Performance criteria for radiobioassay
ISO 29661  Reference radiation fields for radiation protection- Definitions and fundamental concepts

ISO TC 85  works almost identically as IEC TC 45 except that TC 85 meets with it sub-committees and most the working groups every two and half years. The sub committees meet independently with their working groups between and the working groups meet often between these meetings. In all other ways treatment is identical
CENELEC
TC45B

This committee adopts standards of the IEC SC45B by agreement of the national bodies, often with modifications. Meetings are held two or three times a year in France, Germany and the UK the only participating nations. There are no working groups at this time.

The voting for adoption is weighted according to countries population as with any other decisions of European Union.

Work in Progress

IEC 62327   Hand-held instruments for the detection and identification of radionuclides and for the indication of ambient dose equivalent rate from photon radiation
IEC 62244   Installed radiation monitors for the radioactive and special nuclear materials at national borders
IEC 62387-1 Passive integrating dosimetry systems for environmental and personal monitoring – Part 1 : General characteristics and performance requirements
IEC 62363   Portable photon contamination meters and monitors