Objectives:

The following list is intended to give a survey of all standards relevant to work within the scope of dosimetry of external radiation. The standards are arranged according to their objectives (not according to numbers or the publishing organization) to allow all standards relevant to a specific question to be found quickly. The list was made up of the list contained in PTB Report PTB-Dos-45.

Selection:

The following documents shall be included: IEC, ISO, EN and DIN standards as well as collective standards of the bodies mentioned. In addition: PTB Requirements.
The following documents will not be included: loose leafs or measuring instructions; standards on radon, activity measuring instruments, source-finding devices, etc.

Up-dating:

Requests for changes or supplements shall be sent to the author by e-mail (*rolf.behrens@ptb.de*).
The latest version can be found at PTB's webpage:
www.ptb.de/cms/fileadmin/internet/fachabteilungen/abteilung_6/6.3/information/norm_lst.pdf.
The author will not assume responsibility for incorrect information.

Nomenclature for standards:

IEC	International electrotechnical standard (International Electrotechnical Commission)
ISO	International standard (International Organization for Standardization)
EN	European standard adopted by the European Standards Organizations CEN (Comité Européen de Normalisation), CENELEC (Comité Européen de Normalisation Elektrotechnique) or ETSI (European Telecommunication Institute) which are identical Europe-wide and must be included without any changes in the standards of the respective country. It is not essential that these EN have been established on the European level, they may also relate to ISO or IEC standards and declare them a European standard (possibly with common European changes).
prEN	Draft of European standard
DIN	Standard developed in Germany which has been published by the Deutsches Institut für Normung e.V.
DIN EN	DIN standard containing a European standard (EN) and the German text version of the EN in question.
DIN IEC	DIN standard which adopts a standard established by the IEC without any changes and which have not been declared a European standard (EN) by CENELEC.
DIN ISO	DIN standard which adopts a standard established by the ISO without any changes and which have not been declared a European standard (EN).
TS	Technical specification
TR	Technical report

Note: Other combinations than those explained are possible in addition. This will be explained by the example of standard DIN EN ISO/IEC 17025 which is identical in all fields mentioned. When quotations to standards are made, the supplements must not be omitted as there may be both a DIN standard and a DIN IEC standard with the same number. For clarification: DIN IEC 61577 deals with radon measuring instruments while the title of DIN 61577 is "Lengths of stitches for fastening two hole and four hole buttons".

Identification for draft standards:

IEC standards:

- NP (New project)
- WD (Working draft)
- CD (Committee draft)
- CDV (Committee draft for vote)
- FDIS (Final draft international standard)
- IS (International standard)

Notes:
WD and CD are only commented;
CDV and DIS require approval, technical comments can be accepted;
FDIS require approval, technical comments are not accepted;

ISO standards:

- NP
- WD
- CD
- DIS (draft international standard)
- FDIS
- IS (International standard)

Table 1: Terminology standards

DIN 6802-1	Neutronendosimetrie - Spezielle Begriffe und Benennungen; 1991-11
DIN 6814-2	Begriffe in der radiologischen Technik – Teil 2: Strahlungsphysik; 2000-07
DIN 6814-3	Begriffe in der radiologischen Technik – Teil 3: Dosisgrößen und Dosiseinheiten; 2016-08
DIN 6814-4	Begriffe in der radiologischen Technik – Teil 4: Radioaktivität; 2006-10
DIN 6814-5	Begriffe in der radiologischen Technik - Teil 5: Strahlenschutz; 2008-12
DIN 25401	Begriffe der Kerntechnik – nur auf CD-ROM; 2015-04
DIN 25430	Sicherheitskennzeichnung im Strahlenschutz; 2016-10
VIM: ISO/IEC Guide 99	International vocabulary of metrology -- Basic and general concepts and associated terms (VIM); ISO/IEC Guide 99:2007-12 equivalent to JCGM 200:2008 available at *www.bipm.org/utils/common/documents/jcgm/JCGM_200_2008.pdf*

Table 2: Standards for the realization of reference radiation fields

ISO 29661	Reference radiation fields for radiation protection - Definitions and fundamental concepts; 2012-08 + Amendmend 1 to ISO 29661:2015-12
ISO 4037-1	X and gamma reference radiation for calibrating dosemeters and doserate meters and for determining their response as a function of photon energy - Part 1: Radiation characteristics and production methods; 2019-01
ISO 4037-2	X and gamma reference radiation for calibrating dosemeters and doserate meters and for determining their response as a function of photon energy - Part 2: Dosimetry for radiation protection over the energy ranges from 8 keV to 1,3 MeV and 4 MeV to 9 MeV; 2019-01
ISO 4037-3	X and gamma reference radiation for calibrating dosemeters and doserate meters and for determining their response as a function of photon energy - Part 3: Calibration of area and personal dosemeters and the measurement of their response as a function of energy and angle of incidence; 2019-01
ISO 4037-4	X and gamma reference radiation for calibrating dosemeters and doserate meters and for determining their response as a function of photon energy - Part 4: Calibration of area and personal dosemeters in low energy X reference radiation fields; 2019-01
ISO 6980-1	Reference beta particle radiations - part 1:Methods of production; 2006-08; *UNDER REVISION*
ISO 6980-2	Reference beta particle radiations - part 2: Calibration fundamentals related to basic quantities characterising the radiation field; 2004-10; *UNDER REVISION*
ISO 6980-3	Reference beta particle radiations - part 3: Calibration of area and personal dosemeters and determination of their response as a function of energy and angle of incidence; 2006-10; *UNDER REVISION*
ISO 8529-1	Reference neutron radiations -- Part 1: Characteristics and methods of production; 2001-02 ISO 8529-1:2001/Corrigendum 1:2008; *UNDER REVISION*
ISO 8529-2	Reference neutron radiations -- Part 2: Calibration fundamentals of radiation protection devices related to the basic quantities characterizing the radiation field; 2000-08
ISO 8529-3	Reference neutron radiations -- Part 3: Calibration of area and personal dosimeters and determination of response as a function of energy and angle of incidence; 1998-11
ISO 12789-1	Reference neutron radiations -- Simulated workplace neutron fields -- Part 1: Characteristics and methods of production; 2008-03
ISO 12789-2	Reference neutron radiations -- Simulated workplace neutron fields -- Part 2: Calibration fundamentals related to the basic quantities; 2008-03

Table 3: Standards with conversions factors

DIN 6802-2	Neutronendosimetrie – Teil 2: Konversionsfaktoren zur Berechnung der Orts- und Personendosis aus der Neutronenfluenz und Korrektionsfaktoren für Strahlenschutzdosimeter; 1999-11
DIN 6818-1	Strahlenschutz-Dosimeter – Teil 1: Allgemeine Regeln; 2004-08
The ISO-Standards of the series 4037, 6980, and 8529 (parts 3) contain conversion factors as well, see Table 2	

Table 4: Standards on regular comparison measurements for quality assurance

ISO 14146	Radiation protection - Criteria and performance limits for the periodic evaluation of processors of personal dosimeters for X and gamma radiation; 2018-07

Table 5: Standards on uncertainties and detection limits and decision thresholds

GUM: ISO/IEC Guide 98-1	Uncertainty of measurement - Part 1: Introduction to the expression of uncertainty in measurement 2009-08 *www.bipm.org/utils/common/documents/jcgm/JCGM_104_2009_E.pdf*
GUM: ISO/IEC Guide 98-3	Uncertainty of measurement - Part 3: Guide to the expression of uncertainty in measurement (GUM:1995); 2008-09 *www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf* *UNDER REVISION*
GUM S 1: ISO/IEC Guide 98-3/ S 1	Supplement 1 to the GUM — Propagation of distributions using a Monte Carlo method; 2008 *www.bipm.org/utils/common/documents/jcgm/JCGM_101_2008_E.pdf* ISO/IEC Guide 98-3:2008/Suppl 1:2008/Corrigendum 1:2009
GUM S 2: ISO/IEC Guide 98-3/ S 2	Supplement 2 to the GUM — Extension to any number of output quantities; 2011 *www.bipm.org/utils/common/documents/jcgm/JCGM_102_2011_E.pdf*
GUM: ISO/IEC Guide 98-4	Uncertainty of measurement - Part 4: Role of measurement uncertainty in conformity assessment; 2012-10 *www.bipm.org/utils/common/documents/jcgm/JCGM_106_2012_E.pdf*
DIN V ENV 13005	Leitfaden zur Angabe der Unsicherheit beim Messen; Deutsche Fassung 1999-06 (Translation of the GUM; European Pre-norm, that means: no official EN up to now)
DIN 1319-3	Grundlagen der Meßtechnik - Teil 3: Auswertung von Messungen einer einzelnen Meßgröße, Messunsicherheit; 1996-05
DIN 1319-4	Grundlagen der Meßtechnik - Teil 4: Auswertung von Messungen; Messunsicherheit 1999-02
DIN 1333	Zahlenangaben; 1992-02
IEC TR 62461	Radiation protection instrumentation - Determination of uncertainty; 2015-01 and EN and DIN
ISO 11929-1 ISO 11929-2 ISO 11929-3 ISO 11929-4	Determination of the characteristic limits (decision threshold, detection limit and limits of the confidence interval) for measurements of ionizing radiation -- Fundamentals and application; Part 1:2019-02: Elementary applications; Part 2:2019-02: Advanced applications; Part 3:2019-02: Applications to unfolding methods; Part 4: Guidelines to applications: DIS
IAEA TecDoc 1401	Quantifying uncertainty in nuclear analytical measurements; 2004-07 *www-pub.iaea.org/MTCD/publications/PDF/te_1401_web.pdf*

Table 6: General standards applicable to devices or procedures

DIN 6818-1	Strahlenschutz-Dosimeter - Teil 1: Allgemeine Regeln; 2004-08
ISO 15690	Radiological protection — Recommendations for dealing with discrepancies between personal dosimeter systems used in parallel; 2013-06
IEC 62463	Radiation protection instrumentation - X-ray systems for the screening of persons for security and the carrying of illicit items; 2010-06
ISO 15382	Nuclear energy - Radiological protection - Procedures for monitoring the dose to the lens of the eye, the skin and the extremities; 2015-11
IAEA TecDoc 1731	Implications for Occupational Radiation Protection of the New Dose Limit for the Lens of the Eye; 2013 *www-pub.iaea.org/MTCD/publications/PDF/TE-1731_web.pdf*

Table 7: Standards for flight dosimetry

ISO 20785-1	Dosimetry for exposures to cosmic radiation in civilian aircraft -- Part 1: Conceptual basis for measurements; 2012-12
ISO 20785-2	Dosimetry for exposures to cosmic radiation in civilian aircraft -- Part 2: Characterisation of instrument response; 2011-05
ISO 20785-3	Dosimetry for exposures to cosmic radiation in civilian aircraft -- Part 3: Measurements at aviation altitudes; 2015-11
ISO 20785-4	Dosimetry for exposures to cosmic radiation in civilian aircraft -- Part 4: Validation of codes; 2019-05

Table 8: Standards related to pulsed radiation

IEC TS 62743	Radiation protection instrumentation - Electronic counting dosemeters for pulsed fields of ionizing radiation; 2012-09
IEC TS 63050	Radiation protection instrumentation - Dosemeters for pulsed fields of ionizing radiation; 2019-10
ISO TS 18090-1	Radiological protection — Characteristics of reference pulsed radiation -- Part 1: Photon radiation; 2015-07

Table 9: Standards applicable to devices

Type of radia-tion	Area dosemeters		Personal dosemeters	
	Active	passive	active	passive
Photon	PTB-A 23.3, 2018 IEC 61017, 2016-02 (environmental dosem.) IEC 60532, 2010 (fixed installed in nuclear facilities) IEC 60846-1, 2009 (portable dosem.) IEC 60846-2, 2015 (emergency dosem.)	DIN 25483, 2000 (TLD, only env.) IEC 62387, 2020 (all passive dosemeters)	PTB-A 23.2, 2018 IEC 61526, 2010 (all active dosemeters)	IEC 62387, 2020 (all passive dosemeters)
Beta				
Neu-tron	IEC 61005, 2014 IEC 61322, 2020 (fixed installed)	---		ISO 21909-1, 2015 (all passive neutron detectors) ISO 21909-2, 20xx (Abbedo) DIN 6802-4, 1998 (Albedo)

Title, status and year of publication of the standards in Table 9:

IEC 60846-1	Radiation protection instrumentation - Ambient and/or directional dose equivalent (rate) meters and/or monitors for beta, X and gamma radiation - Part 1: Portable workplace and environmental meters and monitors; 2009-04 EN 680846-1:2014; DIN EN 60846-1:2015 (VDE 0492-2-1)
IEC 60846-2	Radiation protection instrumentation - Ambient and/or directional dose equivalent (rate) meters and/or monitors for beta, X and gamma radiation – Part 2: High range beta and photon dose and dose rate portable instruments for emergency radiation protection purposes; 2015-12 EN 680846-2:2018; DIN EN 60846-2:2018 (VDE 0492-2-3)
IEC 60532	Radiation protection instrumentation - Installed dose ratemeters, warning assemblies and monitors - X and gamma radiation of energy between 50 keV and 7 MeV; 2010-08
PTB-A 23.3	Strahlenschutzmessgeräte - Ortsdosimeter zur Messung der Umgebungs- und Richtungs-Äquivalentdosis und der Umgebungs- und Richtungs-Äquivalentdosisleistung, 2018-1
IEC 61005	Radiation protection instrumentation - Neutron ambient dose equivalent (rate) meters; 2014-07; EN 61005:2004; DIN EN 61005:2005 (VDE 0492-2-2)
IEC 61017	Radiation protection instrumentation – Transportable, mobile or installed equipment to measure photon radiation for environmental monitoring; 2016-02
IEC 61322	Radiation protection instrumentation - Installed dose equivalent rate meters, warning assemblies and monitors for neutron radiation of energy from thermal to 15 MeV; 2020-01
IEC 62387	Radiation protection instrumentation - Passive integrating dosimetry systems for environmental and personal monitoring of photon and beta radiation; 2020-01; EN 62387:2012 (IEC 62387:2012, modified); DIN EN 62387:2016 (VDE 0492-3)
DIN 25483	Verfahren zur Umgebungsüberwachung mit integrierenden Festkörperdosimetern; 2000-09; *UNDER REVISION*
IEC 61526	Radiation protection instrumentation –Measurement of personal dose equivalents $H_p(10)$ and $H_p(0,07)$ for X, gamma, neutron and beta radiations – Direct reading personal dose equivalent meters and monitors; 2010-07; *UNDER REVISION*; EN 61526:2013 (IEC 61526:2010, modified); DIN EN 61526:2013 (VDE 0492-1)
PTB-A 23.2	Strahlenschutzmessgeräte - Personendosimeter zur Messung der Tiefen- und Oberflächen-Personendosis, 2018-11
ISO 21909-1	Passive neutron dosimetry systems - Part 1: Performance and test requirements for personal dosimetry; 2015-11; *UNDER REVISION*
ISO 21909-2	Passive neutron dosimetry systems - Part 2: Methodology and criteria for the qualification of personal dosimetry systems in workplaces; DIS
DIN 6802-4	Neutronendosimetrie - Teil 4: Verfahren zur Personendosimetrie mit Albedodosimetern; 1998-04; *UNDER REVISION*