

Deutsche Akkreditierungsstelle GmbH

Annex to the Accreditation Certificate D-PL-21039-04-00 according to DIN EN ISO/IEC 17025:2018

Valid from: 27.01.2021

Date of issue: 27.01.2021

Holder of certificate:

Framatome GmbH

“Hot cells”, “Radiochemical analysis”, “Incorporation monitoring”, “Chemical analysis”, “Irradiation facility”

Paul-Gossen-Straße 100, 91052 Erlangen

Tests in the fields:

**Mechanical-technological material testing and fracture-mechanical testing of metallic materials;
Radiochemical analysis within the framework of emission and immission monitoring, the analysis of
operational and waste samples, of fluence detectors and of the testing of sorbents for filter systems
(without sampling);**

Health care (occupational and environmental medicine);

**Physical, physical-chemical and selected chemical analysis of water (waste water, raw water,
process water, water from treatment plants), sludge and sediments;**

Analysis of metals and metal oxides ;

Analysis of operating resources;

Irradiation testing

**The testing laboratory is permitted to apply the listed standardised or equivalent test methods with
different versions of the standards without obtaining prior notification and consent from DAkkS.**

**The testing laboratory has an up-to-date list of all test methods within the flexible scope of
accreditation.**

The management system requirements of DIN EN ISO/IEC 17025 are written in the language relevant to the operations of testing laboratories. Laboratories that conform to the requirements of this standard, operate generally in accordance with the principles of DIN EN ISO 9001.

The certificate together with the annex reflects the status as indicated by the date of issue.

The current status of any given scope of accreditation may be found respectively in the database of accredited bodies of Deutsche Akkreditierungsstelle GmbH <https://www.dakks.de/en/content/accredited-bodies-dakks>.

Abbreviations used: see last page

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This document is a translation. The definitive version is the original German annex to the accreditation certificate.

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In the “Hot cells” laboratory:

1 Mechanical-technological material testing, fracture mechanical and hardness testing

1.1 Tensile tests on metallic materials

DIN EN ISO 4136 2013-02	Destructive tests on welds in metallic materials - Transverse tensile test
DIN EN ISO 6892-1 2017-02	Metallic materials - Tensile testing - Part 1: Method of test at room temperature (method B)
DIN EN ISO 6892-2 2018-09	Metallic materials - Tensile testing - Part 2: Method of test at elevated temperature (method B)
DIN EN ISO 6892-3 2015-07	Metallic materials - Tensile testing - Part 3: Method of test at low temperature (method B)
DIN EN ISO 8496 2014-03	Metallic materials - Tube - Ring tensile test
DIN EN 12797 2000-12	Brazing - Destructive tests of brazed joints
ASTM E 8/E 8M 2016-08	Standard Test Methods for Tension Testing of Metallic Materials
ASTM E 21 2009-04	Standard Test Methods for Elevated Temperature Tension Tests of Metallic Materials

1.2 Fracture mechanical tests of metallic materials

ISO 12135 2002-12	Metallic materials - Unified method of test for the determination of quasistatic fracture toughness
DIN EN ISO 12737 2011-04	Metallic materials - Determination of plane-strain fracture toughness
ASTM E 399 2012-11	Standard Test Method for Linear-Elastic Plane-Strain Fracture Toughness K_{IC} of Metallic Materials
ASTM E 561 2015-12	Standard Test Method for K-R-Curve Determination

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ASTM E 647 2015-05	Standard Test Method for Measurement of Fatigue Crack Growth Rates
ASTM E 740 /E 740M 2016-10	Standard Practice for Fracture Testing with Surface-Crack Tension Specimens
ASTM E 1221 2012-11	Standard Test Method for Determining Plane-Strain Crack-Arrest Fracture Toughness, K_{Ia} , of Ferritic Steels
ASTM E 1253 2013-01	Standard Guide for Reconstitution of Irradiated Charpy-Sized Specimens
ASTM E 1820 2016-12	Standard Test Method for Measurement of Fracture Toughness
ASTM E 1921 2016-05	Standard Test Method for Determination of Reference Temperature, T_0 , for Ferritic Steels in the Transition Range
NF A03-183 1987-06	Iron and steel, Mechanics of fracture, Determination from curve $J-\Delta a$ of the conventional characteristic values J_0 and dJ/da of the ductile tear strength

1.3 Notched bar impact testing on metallic materials

DIN EN ISO 148-1 2017-05	Metallic materials - Charpy pendulum impact test - Part 1: Test method
DIN EN ISO 14556 2017-05	Metallic materials - Charpy V-notch pendulum impact test - Instrumented test method
ASTM E 23 2018-06	Standard Test Methods for Notched Bar Impact Testing of Metallic Materials
ASTM E 604 2018-06	Standard Test Method for Dynamic Tear Testing of Metallic Materials
ASTM E 1253 2013-01	Standard Guide for Reconstitution of Irradiated Charpy-Sized Specimens
ASTM E 2298 2018-06	Standard Test Methods for Instrumented Impact Testing of Metallic Materials

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1.4 Hardness testing on metallic materials

DIN EN ISO 2639 2003-04	Steels - Determination and verification of the depth of carburized and hardened cases
DIN EN ISO 4498 2010-11	Sintered metal materials, excluding hard metals - Determination of apparent hardness and microhardness
DIN EN ISO 4507 2007-05	Sintered ferrous materials, carburized or carbonitrided - Determination and verification of case-hardening depth by a microhardness test
DIN EN ISO 4516 2002-10	Metallic and other inorganic coatings - Vickers and Knoop microhardness tests
DIN EN ISO 6507-1 2018-07	Metallic materials - Vickers hardness test - Part 1: Test method
DIN EN ISO 9015-1 2011-05	Destructive tests on welds in metallic materials - Hardness testing - Part 1: Hardness test on arc welded joints
DIN EN ISO 9015-2 2016-10	Destructive tests on welds in metallic materials - Hardness testing - Part 2: Microhardness testing of welded joints
ASTM E 140 2012-12	Standard Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness
ASTM E 384 2017-06	Standard Test Method for Microindentation Hardness of Materials

In the “Radiochemical analysis” laboratory:

2 Emission and immission monitoring and analysis of operational and waste samples from nuclear facilities

DIN 38409-1 1987-01	Determination of total dry residue, filtrate dry residue and residue on ignition (H 1) <i>(here without determination of filtrate dry residue)</i>
MB 02-025 2019-02	Determination of strontium-89 and strontium-90 on aerosol filters with gas flow proportional counter
MB 02-028 2020-11	Nuclide-specific determination of alpha-emitting radionuclides on filter and wipe test samples by direct measurement with the grid ionisation chamber (GIC)
MB 02-029 2019-02	Determination of Cl-36 in operational and waste samples after chemical separation by liquid scintillation measurement
MB 02-030 2019-02	Determination of silver-108m activity in operational and waste samples by gamma spectrometry after precipitation
MB 02-035 2019-02	Determination of iodine-129 in operational and waste samples after chemical separation by gamma spectrometry
MB 02-044 2019-02	Determination of Pu-241 by liquid scintillation after chemical separation in operational and waste samples and in samples from environmental monitoring
MB 02-052 2020-12	Determination of total gamma activity concentration in operational and waste samples using HPGe detector (High Purity Germanium)
MB 02-056 2019-02	Determination of radionuclides in operational and waste samples and in samples from environmental and incorporation monitoring by gamma spectrometry
MB 02-059 2019-02	Determination of the activity concentration of I-131 in fresh milk after concentration on anion exchange resin by gamma spectrometry
MB 02-064 2019-02	Determination of Fe-55, Ni-63 in operational and waste samples and in samples from environmental monitoring after sample preparation by liquid scintillation measurement

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MB 02-083 2019-02	Determination of Sr-89/Sr-90 in operational and waste samples and in samples from environmental and incorporation monitoring by liquid scintillation measurement
MB 02-084 2019-02	Determination of tritium in operational and waste samples and in environmental and urine samples after sample preparation by liquid scintillation
MB 02-085 2019-02	Determination of C-14 in operational and waste samples by liquid scintillation
MB 02-086 2019-02	Nuclide-specific determination of alpha emitters in operational and waste samples and in samples from environmental monitoring by alpha spectrometry after sample preparation
MB 02-087 2019-02	Determination of total alpha and total beta activity in operational and waste samples and in soil and vegetation samples using gas flow proportional counter
MB 02-089 2019-04	Determination of Ni-59 in operational and waste samples by gamma spectrometry
MB 02-091 2019-05	Determination of beta emitters Tc-99, Zr-93, Se-79, Pm-147 and Pd-107 after chemical separation by liquid scintillation measurement
MB 02-092 2019-06	Determination of nuclides Mo-93, Nb-94 and Sn-121m by gamma spectrometry
MB 10-006 2019-07	Preparation of sediment, soil and vegetation samples by drying and annealing
MB 10-010 2019-06	Preparation and digestion of operational, waste and environmental samples, metals and non-metals
MB 10-011 2019-04	Microwave sample digestion of operational and waste samples, samples from environmental monitoring as well as urine, metals, metal oxides and ceramics

3 Fluence detectors

DIN 25456-1 1999-10	Neutron fluence measurement; fast-neutron fluence determination with activation and fission detectors <i>(Activity measurement only)</i>
DIN 25456-2 1999-10	Neutron fluence measurement; fast-neutron fluence determination with iron activation detectors <i>(Activity measurement only)</i>
DIN 25456-3 1999-10	Neutron fluence measurement; fast-neutron fluence determination with nickel activation detectors <i>(Activity measurement only)</i>
DIN 25456-4 1999-10	Neutron fluence measurement; fast-neutron fluence determination with niobium activation detectors <i>(Activity measurement only)</i>
DIN 25456-5 1999-10	Neutron fluence measurement; fast-neutron fluence determination with copper activation detectors <i>(Activity measurement only)</i>
DIN 25456-6 1999-10	Neutron fluence measurement; fast-neutron fluence determination with thorium fission detectors <i>(Activity measurement only)</i>
ASTM E 263 2018-12	Standard Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Iron <i>(Activity measurement only)</i>
ASTM E 264 2019-04	Standard Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Nickel <i>(Activity measurement only)</i>
ASTM E 481 2016-10	Standard Test Method for Measuring Neutron Fluence Rates by Radioactivation of Cobalt and Silver <i>(Activity measurement only)</i>
ASTM E 523 2016-12	Standard Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Copper <i>(Activity measurement only)</i>
ASTM E 1297 2018-06	Standard Test Method for Measuring Fast-Neutron Reaction Rates by Radioactivation of Niobium <i>(Activity measurement only)</i>

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4 Testing of sorption materials
Determination of iodine retention using I-131 methyl iodide tracer

ASTM D 2854 2019-09	Standard Test Method for Apparent Density of Activated Carbon
DIN 66165-2 2016-08	Particle size analysis - Sieving analysis - Part 2: Procedure
MB 09-019 2018-11	Laboratory testing of iodine sorption on sorption media with I-131-doped methyl iodide

In the “Incorporation monitoring” laboratory:

5 Health care (occupational and environmental medicine)
Field of testing: Incorporation measurements

Type of testing: In vivo methods

Standard or In-house method with version	Analyte - Title of standard Specification for sample pretreatment / test technique	Test object
RiPhyko, Part 2 12.01.07	“Regulation on physical radiation protection control for the determination of body dose, Part 2: Determination of body dose in case of internal radiation exposure (incorporation monitoring) (Sections 40, 41 and 42 StrlSchV (German Radiation Protection Ordinance))”	Person (body dose)
MB 08-001 2018-06	Implementation of gamma spectrometric body counter measurements	Person (whole or partial body)

Type of testing: In vitro methods

Standard or In-house method with version	Analyte - Title of standard Specification for sample pretreatment / test technique	Test object
RiPhyko, Part 2 12.01.07	“Regulation on physical radiation protection control for the determination of body dose, Part 2: Determination of body dose in case of internal radiation exposure (incorporation monitoring) (Sections 40, 41 and 42 StrlSchV (German Radiation Protection Ordinance))”	Person (body dose)

Standard or In-house method with version	Analyte - Title of standard Specification for sample pretreatment / test technique	Test object
MB 02-045 2018-04	Alpha-spectrometric determination of uranium, plutonium, americium and curium in urine and stool samples	Urine, stool
DIN EN ISO 17294-2 2017-01	Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes (Only uranium as specific activity)	Urine
MB 02-083 2019-02	Determination of Sr-89/Sr-90 in operational and waste samples and in samples from environmental and incorporation monitoring by liquid scintillation measurement	Urine
MB 02-084 2019-02	Determination of tritium in operational and waste samples and in environmental and urine samples after sample preparation by liquid scintillation	Urine

In the “Chemical analysis” laboratory:

6 Physical, physical-chemical and selected chemical analysis of water (waste water, raw water, process water, water from treatment plants), sludge and sediments

6.1 Water (waste water, raw water, process water, water from treatment plants)

6.1.1 Sample pretreatment and sample preparation

MB 10-009
2019-02 High-temperature digestion for the determination of Br, Cl, F and S in solid and liquid samples

MB 10-011
2019-04 Microwave sample digestion of operational and waste samples, samples from environmental monitoring as well as urine, metals, metal oxides and ceramics
(here for sample pretreatment of water and waste water)

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6.1.2 Physical and physical-chemical parameters

DIN EN ISO 10523
2012-04 Water quality - Determination of pH

DIN EN 27888
1993-11 Water quality - Determination of electrical conductivity

6.1.3 Anions

DIN EN ISO 10304-1
2009-07 Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate

DIN 38405-21
1990-10 Determination of dissolved silicate by spectrometry (D 21)

DIN 38405-24
1987-05 Photometric determination of chromium(VI) using 1,5-diphenylcarbonohydrazide (D 24)

6.1.4 Cations

DIN EN ISO 11885
2009-09 Water quality - Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES)
(*Extension to: Nb, Ti*)

DIN EN ISO 14911
1999-12 Water quality - Determination of dissolved Li^+ , Na^+ , NH_4^+ , K^+ , Mn^{2+} , Ca^{2+} , Mg^{2+} , Sr^{2+} and Ba^{2+} using ion chromatography - Method for water and waste water

DIN EN ISO 17294-2
2017-01 Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes
(*Extension to: Eu, I, Nb, Np, S, Si, Ta, Tc, Ti*)

6.1.5 Summary indices of actions and substances

DIN EN ISO 9377-2
2001-07 Water quality - Determination of hydrocarbon oil index - Part 2: Method using solvent extraction and gas chromatography

DIN EN 1484
2019-04 Water analysis - Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)

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DIN 38409-1 1987-01	Determination of total dry residue, filtrate dry residue and residue on ignition (H 1)
DIN 38409-2 1987-03	Determination of filterable matter and the residue on ignition (H 2)

6.1.6 Individual components

MB 01-005 2019-02	Determination of boron in aqueous solutions by volumetric analysis
MB 02-068 2019-02	Isotope ratio determination in aqueous solutions by ICP-MS

6.2 Sludges and sediments

DIN EN ISO 10304-1 2009-07	Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate <i>(here for determination in sludges and sediments after sample pretreatment using MB 10-009, 10-010)</i>
DIN EN ISO 11885 2009-09	Water quality - Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) <i>(Extension to: Nb, Ti)</i>
DIN EN ISO 17294-2 2017-01	Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes <i>(Extension to: Eu, I, Nb, Np, S, Si, Ta, Tc, Ti)</i>
DIN EN 1484 2019-04	Water analysis - Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)
DIN 38405-24 1987-05	Photometric determination of chromium(VI) using 1,5-diphenylcarbonohydrazide (D 24) <i>(here for determination in sludges and sediments after sample pretreatment using MB 10-009, 10-010)</i>
DIN 38409-1 1987-01	Determination of total dry residue, filtrate dry residue and residue on ignition (H 1) <i>(here for determination in sludge and sediments)</i>

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DIN 38409-2 1987-03	Determination of filterable matter and the residue on ignition (H 2) <i>(here for determination in sludge and sediments)</i>
MB 02-068 2019-02	Isotope ratio determination in aqueous solutions by ICP-MS <i>(here for determination in sludges and sediments after sample pretreatment using MB 10-009, 10-010)</i>
MB 10-009 2019-02	High-temperature digestion for the determination of Br, Cl, F and S in solid and liquid samples
MB 10-010 2019-06	Preparation and digestion of operational, waste and environmental samples, metals and non-metals <i>(for sample pretreatment of sludges and sediments)</i>
MB 10-011 2019-04	Microwave sample digestion of operational and waste samples, samples from environmental monitoring as well as urine, metals, metal oxides and ceramics <i>(for sample pretreatment of sludges and sediments)</i>

7 Analysis of metals and metal oxides

DIN EN ISO 10304-1 2009-07	Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate <i>(here for determination in metals and metal oxides after sample pretreatment using MB 10-009, 10-010)</i>
DIN EN ISO 11885 2009-09	Water quality - Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) <i>(Extension to: Nb, Tl; for determination in metals and metal oxides after sample pretreatment using MB 10-010, 10-011)</i>
DIN EN ISO 15350 2010-08	Steel and iron - Determination of total carbon and sulfur content - Infrared absorption method after combustion in an induction furnace (routine method) <i>(for determination in metals and metal oxides)</i>
DIN EN ISO 15351 2010-08	Steel and iron - Determination of nitrogen content - Thermal conductimetric method after fusion in a current of inert gas (routine method) <i>(for determination in metals and metal oxides)</i>

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DIN EN ISO 17294-2 2017-01	Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes <i>(Extension to: Eu, I, Nb, Np, S, Si, Ta, Tc, Ti; for determination in metals and metal oxides after sample pretreatment using MB 10-010, 10-011)</i>
DIN EN 10276-2 2003-10	Chemical analysis of ferrous materials - Determination of oxygen content in steel and iron - Part 2: Infrared method after fusion under inert gas <i>(for determination in metals and metal oxides)</i>
MB 02-068 2019-02	Isotope ratio determination in aqueous solutions by ICP-MS <i>(for determination in metals and metal oxides after sample pretreatment using MB 10-010, 10-011)</i>
ASTM E 415 2017-05	Standard Test Method for Analysis of Carbon and Low-Alloy Steel by Spark Atomic Emission Spectrometry <i>(Extended element and work area)</i>
ASTM E 1086 2014-03	Standard Test Method for Analysis of Austenitic Stainless Steel by Spark Atomic Emission Spectrometry <i>(Extended element and work area)</i>
ASTM E 1251 2017-10	Standard Test Method for Analysis of Aluminum and Aluminum Alloys by Spark Atomic Emission Spectrometry
ASTM E 3047 2016-04	Standard Test Method for Analysis of Nickel Alloys by Spark Atomic Emission Spectrometry
MB 03-031 2019-07	Determination of hydrogen in metals and metal oxides by hot extraction
MB 10-009 2019-02	High-temperature digestion for the determination of Br, Cl, F and S in solid and liquid samples
MB 10-010 2019-06	Preparation and digestion of operational, waste and environmental samples, metals and non-metals
MB 10-011 2019-04	Microwave sample digestion of operational and waste samples, samples from environmental monitoring as well as urine, metals, metal oxides and ceramics

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8 Analysis of operating equipment

DIN EN ISO 9377-2 2001-07	Water quality - Determination of hydrocarbon oil index - Part 2: Method using solvent extraction and gas chromatography
DIN EN ISO 10304-1 2009-07	Water quality - Determination of dissolved anions by liquid chromatography of ions - Part 1: Determination of bromide, chloride, fluoride, nitrate, nitrite, phosphate and sulfate
DIN EN ISO 10523 2012-04	Water quality - Determination of pH
DIN EN ISO 11885 2009-09	Water quality - Determination of selected elements by inductively coupled plasma optical emission spectrometry (ICP-OES) <i>(Extension to: Nb, Tl)</i>
DIN EN ISO 17294-2 2017-01	Application of inductively coupled plasma mass spectrometry (ICP-MS) - Part 2: Determination of selected elements including uranium isotopes <i>(Extension to: Eu, I, Nb, Np, S, Si, Ta, Tc, Ti)</i>
DIN EN 14039 2005-01	Characterisation of waste - Determination of hydrocarbon content in the range of C10 to C40 by gas chromatography (GC-FID)
DIN EN 1484 2019-04	Water analysis - Guidelines for the determination of total organic carbon (TOC) and dissolved organic carbon (DOC)
DIN 38405-21 1990-10	Determination of dissolved silicate by spectrometry (D 21)
DIN 38405-24 1987-05	Photometric determination of chromium(VI) using 1,5-diphenylcarbonohydrazide (D 24)
DIN 38409-1 1987-01	Determination of total dry residue, filtrate dry residue and residue on ignition (H 1)
DIN 38409-2 1987-03	Determination of filterable matter and the residue on ignition (H 2)
MB 01-005 2019-02	Determination of boron in aqueous solutions by volumetric analysis
MB 02-068 2019-02	Isotope ratio determination in aqueous solutions by ICP-MS

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MB 10-009 2019-02	High-temperature digestion for the determination of Br, Cl, F and S in solid and liquid samples
MB 10-010 2019-06	Preparation and digestion of operational, waste and environmental samples, metals and non-metals
MB 10-011 2019-04	Microwave sample digestion of operational and waste samples, samples from environmental monitoring as well as urine, metals, metal oxides and ceramics

In the “Irradiation facility” laboratory:

9 Irradiation testing

DIN IEC 60544-2 VDE 0306-2 1996-03	Electrical insulating materials - Guide for determining the effects of ionizing radiation on insulating materials - Part 2: Procedures for irradiation and test
DIN EN 60749-18 2003-09	Semiconductor devices - Mechanical and climatic test methods - Part 18: Ionizing radiation (total dose)
IEEE 323 2003	Qualifying class 1E equipment for nuclear power generating stations <i>(Only section 6.3.1.9)</i>
KTA 3505 2018-04	Type testing of measuring sensors and transducers of the safety-related instrumentation and control system <i>(Only sections 5.11.2.2 & 5.11.4)</i>
MB 07-002 2019-07	Performing of irradiation tests on the CUBE-34

Abbreviations used

ASTM	American Society for Testing and Materials
DIN	Deutsches Institut für Normung (German Institute for Standardization)
EN	European standard
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
ISO	International Organization for Standardization
KTA	Kerntechnischer Ausschuss (German Nuclear Safety Standards Commission)
MB	In-house method (method description) of Framatome GmbH
NF	Norme française