DAkkS
Deutsche
Akkreditierungsstelle

Deutsche Akkreditierungsstelle GmbH

Entrusted according to Section 8 subsection 1 AkkStelleG in connection with Section 1 subsection 1 AkkStelleGBV
Signatory to the Multilateral Agreements of EA, ILAC and IAF for Mutual Recognition

Accreditation

The Deutsche Akkreditierungsstelle GmbH attests that the testing laboratory

CeramTec GmbH
CeramTec-Platz 1-9, 73207 Plochingen

at location:

Zentrale Labore LAB
CeramTec-Platz 1-9, 73207 Plochingen

is competent under the terms of DIN EN ISO/IEC 17025:2018 to carry out tests in the following fields:

chemical, physico-chemical, physico-technical, microscopic and mechanical tests of ceramic raw materials, auxilliary and operating materials, ceramic masses, ceramic test specimens and ceramic structural elements

The accreditation certificate shall only apply in connection with the notice of accreditation of 09.06.2021 with the accreditation number D-PL-18721-01. It comprises the cover sheet, the reverse side of the cover sheet and the following annex with a total of 7 pages.

Registration number of the certificate: **D-PL-18721-01-01**

Frankfurt am Main, 09.06.2021	Dipl.-Ing. (FH) Ralf Egner Head of Division	Translation issued: 21.07.2021	Head of Division

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.

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

See notes overleaf.

Deutsche Akkreditierungsstelle GmbH

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Spittelmarkt 10
10117 Berlin

Office Frankfurt am Main
Europa-Allee 52
60327 Frankfurt am Main

Office Braunschweig
Bundesallee 100
38116 Braunschweig

The accreditation was granted pursuant to the Act on the Accreditation Body (AkkStelleG) of 31 July 2009 (Federal Law Gazette I p. 2625) and the Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products (Official Journal of the European Union L 218 of 9 July 2008, p. 30). DAkkS is a signatory to the Multilateral Agreements for Mutual Recognition of the European co-operation for Accreditation (EA), International Accreditation Forum (IAF) and International Laboratory Accreditation Cooperation (ILAC). The signatories to these agreements recognise each other's accreditations.

The up-to-date state of membership can be retrieved from the following websites:
EA: www.european-accreditation.org
ILAC: www.ilac.org
IAF: www.iaf.nu

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Annex to the Accreditation Certificate D-PL-18721-01-01 according to DIN EN ISO/IEC 17025:2018

Valid from: **09.06.2021**

Date of issue: 21.07.2021

Holder of certificate:

CeramTec GmbH
CeramTec-Platz 1-9, 73207 Plochingen

at location:

Zentrale Labore LAB
CeramTec-Platz 1-9, 73207 Plochingen

Tests in the fields:

chemical, physico-chemical, physico-technical, microscopic and mechanical tests of ceramic raw materials, auxilliary and operating materials, ceramic masses, ceramic test specimens and ceramic structural elements

The testing laboratory is permitted, without being required to inform and obtain prior approval from DAkkS, to use standards or equivalent testing methods listed here with different issue dates. The testing laboratory maintains a current list of all testing 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.
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1 Chemical tests

DIN 51001 2003-08	Testing of oxidic raw materials and basic materials - General bases of work for X-ray fluorescence method (XRF)
DIN 51001 Supplement Sheet 1 2010-05	Testing of oxidic raw materials and basic materials - General bases of work for X-Ray fluorescence method (XRF) - General survey on disintegration methods referred to groups of materials for the determination of test specimens for XRF
DIN EN ISO 12677 2013-02	Chemical analysis of refractory products by X-ray fluorescence (XRF) - Fused cast-bead method
DIN 51418-2 2015-03	X-ray spectrometry - X-ray emission and X-ray fluorescence analysis (XRF) - Part 2: Definitions and basic principles for measurements, calibration and evaluation of results (here: *clauses 6-11*)

2 Physico-chemical and physico-technical tests

2.1 Tests for determining structural properties

DIN EN 13925-1 2003-07	Non-destructive testing - X-ray diffraction from polycristalline and amorphous material - Part 1: General principles (here: *only clause 7*)
DIN EN 13925-2 2003-07	Non-destructive testing - X-ray diffraction from polycristalline and amorphous material - Part 2: Procedures

2.2 Tests for material characterisation

DIN 66165-1 2016-08	Particle size analysis - Sieving analysis - Part 1: Fundamentals (here: *clause 5-11*)
DIN 66165-2 2016-08	Particle size analysis - Sieving analysis - Part 2: Procedure
DIN EN 725-5 2007-04	Advanced technical ceramics - Methods of test for ceramic powders - Part 5: Determination of the particle size distribution
ISO 13320 2020-01	Particle size analysis - Laser diffraction methods

DIN EN ISO 18757 2006-01	Fine ceramics (advanced ceramics, advanced technical ceramics) - Determination of specific surface area of ceramic powders by gas adsorption using the BET method
DIN EN 623-2 1993-11	Advanced technical ceramics; monolithic ceramics; general and textural properties; part 2: determination of density and porosity
ISO 18754 2020-04	Fine ceramics (advanced ceramics, advanced technical ceramics) - Determination of density and apparent porosity
DIN EN ISO 23145-2 2016-11	Fine ceramics (advanced ceramics, advanced technical ceramics) - Determination of bulk density of ceramic powders - Part 2: Untapped density
DIN EN ISO 3675 1999-11	Crude petroleum and liquid petroleum products - Laboratory determination of density - Hydrometer method
DIN EN 725-10 2007-11	Advanced technical ceramics - Methods of test for ceramic powders - Part 10: Determination of compaction properties
ISO 17562 2016-05	Fine ceramics (advanced ceramics, advanced technical ceramics) - Test method for linear thermal expansion of monolithic ceramics by push-rod technique
DIN EN 821-1 1995-04	Advanced technical ceramics - Monolithic ceramics - Thermophysical properties - Part 1: Determination of thermal expansion (*withdrawn standard*)
DIN EN ISO 11664-3 2020-03	Colorimetry - Part 3: CIE tristimulus values
DIN EN ISO 11664-4 2020-03	Colorimetry - Part 4: CIE 1976 L*a*b* colour space
DIN 51078 2002-12	Testing of ceramic materials - Preparation of samples for the determination of change of mass during drying and for chemical analysis (*withdrawn standard*)
DIN EN 12048 1996-11	Solid fertilizers and liming material - Determination of moisture content - Gravimetric method by drying at (105 ± 2) °C

DIN 51081 2002-12	Testing of oxidic raw materials and materials - Determination of change in mass on ignition
ISO 806 2004-10	Aluminium oxide primarily used for the production of aluminium - Determination of loss of mass at 300 °C and 1.000 °C
DIN 51082 2003-02	Testing of ceramic raw materials and ceramic materials - Determination of pH value of suspensions of non-soluble powders
DIN EN ISO 10523 2012-04	Testing of ceramic raw materials and ceramic materials - Determination of pH value of suspensions of non-soluble powders
DIN EN 27888 1993-11	Water quality; determination of electrical conductivity
DIN 51423-2 2010-02	Testing of mineral oils - Part 2: Measurement of the relative refractive index with the Abbe-refractometer
ASTM D1747 2014	Standard Test Method for Refractive Index of Viscous Materials

2.3 Sampling

DIN EN 1006 2009-10	Advanced technical ceramics - Monolithic ceramics - Guidance on the selection of test pieces for the evaluation of properties
DIN 51061 2017-04	Testing of ceramic raw and finished materials - Sampling of ceramic raw materials (here: *chapter 3-5*)
DIN EN ISO 1927-2 2013-03	Monolithic (unshaped) refractory products - Part 2: Sampling for testing (here: *chapter 4-5*)

3 Microscopic tests

DIN EN ISO 13383-1 2016-11	Fine ceramics (advanced ceramics, advanced technical ceramics) - Microstructural characterization - Part 1: Determination of grain size and size distribution
DIN EN 843-6 2009-12	Advanced technical ceramics - Mechanical properties of monolithic ceramics at room temperature - Part 6: Guidance for fractographic investigation

ASTM C 1322 2015	Standard Practice for Fractography and Characterization of Fracture Origins in Advanced Ceramics
ISO 15632 2012-08	Microbeam analysis - Selected instrumental performance parameters for the specification and checking of energy-dispersive X-ray spectrometers for use in electron probe microanalysis
ISO 22309 2011-10	Microbeam analysis - Quantitative analysis using energy-dispersive spectrometry (EDS) for elements with an atomic number of 11 (Na) or above
DIN EN 1071-4 2006-05	Advanced technical ceramics - Methods of test for ceramic coatings - Part 4: Determination of chemical composition by electron probe microanalysis (EPMA)

4 Mechanical tests

4.1 Tests on strength, hardness, ductility and elasticity

DIN EN 843-1 2008-08	Advanced technical ceramics - Mechanical properties of monolithic ceramics at room temperature - Part 1: Determination of flexural strength
ISO 14704 2016-04	Fine ceramics (advanced ceramics, advanced technical ceramics) - Test method for flexural strength of monolithic ceramics at room temperature
DIN 51105 2010-08	Advanced technical ceramics - Mechanical properties of monolithic ceramics at room temperature - Determination of flexural strength by the ring-on-ring test
ASTM C 1499 2015	Standard Test Method for Monotonic Equibiaxial Flexural Strength of Advanced Ceramics at Ambient Temperature
DIN EN 843-5 2007-03 + Correction 1 2007-06	Advanced technical ceramics - Mechanical properties of monolithic ceramics at room temperature - Part 5: Statistical analysis

ISO 20501 2019-03	Fine ceramics (advanced ceramics, advanced technical ceramics) - Weibull statistics for strength data
DIN EN 843-3 2005-08	Advanced technical ceramics - Mechanical properties of monolithic ceramics at room temperature - Part 3: Determination of subcritical crack growth parameters from constant stressing rate flexural strength tests
ISO 22214 2006-02	Fine ceramics (advanced ceramics, advanced technical ceramics) - Test method for cyclic bending fatigue of monolithic ceramics at room temperature
DIN EN 843-4 2005-08	Advanced technical ceramics - Mechanical properties of monolithic ceramics at room temperature - Part 4: Vickers, Knoop and Rockwell superficial hardness *(withdrawn standard)*
ISO 14705 2016-12	Fine ceramics (advanced ceramics, advanced technical ceramics) - Test method for hardness of monolithic ceramics at room temperature
ISO 14627 2012-07	Fine Ceramics - Test method for fracture resistance of silicon nitride materials for rolling bearing balls at room temperature by indentation fracture method
DIN ISO 23146 2016-11	Fine ceramics (advanced ceramics, advanced technical ceramics) - Test methods for fracture toughness of monolithic ceramics - Single-edge V-notch beam (SEVNB) method
DIN EN 843-2 2007-03	Advanced technical ceramics - Mechanical properties of monolithic ceramics at room temperature - Part 2: Determination of Young's modulus, shear modulus and Poisson's ratio
DIN EN ISO 15732 2005-09	Fine ceramics (advanced ceramics, advanced technical ceramics) - Test method for fracture toughness of monolithic ceramics at room temperature by single edge precracked beam (SEPB) method

Abbreviations used:

ASTM	American Society for Testing and Materials
DIN	German Institute for Standardisation
EN	European Standard
ISO	International Organisation for Standardisation
IEC	International Electrotechnical Commission