List of Services

DasKeramikinstitut

This is the complete catalog of services of the Keramik-Institut. It covers both the unique application-related tests and research-related services of our house and the standards of the raw materials, ceramic materials and product testing, which of course also offered. A catchword index is investigation - methodical structured on the end of the list of services and is an aid to find different services faster.

Table of Content

Processing and Optimization of Ceramic Bodies, Products and Technologies

Processing and Optimization of Ceramic Bodies, Products and Technologies

By making use of production modelling tests focussed on your ceramic technologies, the Keramikinstitut can assist in answering questions about your production system. Our pilot plant enables us to simulate real production flows of all important ceramic technologies with all important ceramic materials on a smaller scale. With our help, you can develop the best-performing and most efficient ceramic materials, and choose the best technologies to process them. All research is done by specialists in applied research, with years of experience in ceramic materials and technologies.

contakt: KI Keramik Institut Meissen phone +49 3521 463-515

Practical Analyses
Assessment of existing masses
Substitution of raw material components
Optimization of mass composition
Processing of optimized technologies
Production of lines of samples in a pilot plant

Possible Ceramic Materials
Porcelain (hard-, sanitary-, electrical-)
Stoneware, vitreous china
Earthenware
Heavy ceramics
Refractories
Alumina ceramics
Zirconium oxide ceramics
Zinc oxide ceramics
Titanium oxide ceramics
Steatite-, mullite- und cordierite bodies

Available Technical Equipment (Selection)	
Comminution	Jaw breaker, fine roller mill, tumbling mills, disc vibrating mill (WC), disc mill, pin crusher mill, ball mills, annular passage mill
Mixing	Eirich-mixer, 5 to 400 litre; double shaft mixer, 5 to 70 litre
Granulation	Spray dryer ZT 50
Plastification	Different Eirich-mixer (5 l…400 l), kneader 20 l (Co. Linde)
Dry pressing	Uniaxial press (160 t), isostatic press (max. 1.700 bar)
Extrusion	Vacuum extrusion presses (Co. Netzsch, Händle, Kema), piston extrusion press
Casting	Manual- and pressure casting (equipment DG 80, Co. Dorst)
Drying	Clime dryer (Co. Weiss), a lot of lab dryers
Sintering	Box kilns (gas, until 1.600 °C), high speed kiln for tiles (electr.), gradient kiln (electr.), different muffle kilns (electr. until 1.750 °C)
Other equipment	Autoclave (until 40 bar), magnetic separator ERIEZ (wet and dry separation), box filter press

Processing of Advanced Ceramics until Line of Samples

For developing high-performance ceramics, the Keramikinstitut offers a package of special supplies focussed on real production flow. Developing components and preparing serial production processes for them is part of our service.

contact: Dr. Rainer Bartusch phone +49 3521 463-542 r.bartusch@keramikinstitut.de

Service Offer Advanced Ceramics
Processing of components for special applications
Processing of technology for producing components
Tests of production technology in a pilot plant standard
Production of prototypes and small serieses in a pilot plant standard
Introduction to large scale production

Offered Advanced Ceramics (Named following DIN EN 60672):
Alumina porcelain (C 120, C 130)
Steatite (C 220)
Titanium oxide (C 330)
Cordierite ceramics (C 410, C 520)
Mullite ceramics (C 620)
Alumina (C 780, C 786, C 795, C 799)
Zirkonium oxide (psz)
Yttrium oxide

Available equipment for advanced ceramics	
Technology	Equipment
Mixing	Eirich-mixer R05 T, R14 D
Granulation	Spray dryer ZT 50
Plastification	Eirich-mixer, kneader 20 l (Co. Linde)
Dry pressing	160 t-press (Co. Raster), isostatic press (max. 1700 bar)
Extruding	Vacuum extrusion press PVZQRG 8a (pressure max. 100 bar, Co. Händle)
Casting	Manual- or pressure casting (DG 80, Co. Dorst)
Drying	Climate dryer (Co. Weiss)
Sintering	Box kilns until 1700 °C

Initiation and Optimization of Production Lines

Wherever you are, the Keramikinstitut´s applied research experts offer a wide range of our services on-site at your facility. They can commission the production operation of your plant, or help to modernise it. We offer our services for all kinds of plants and for all kinds of ceramic products, such as bricks, roofing tiles, or fine ceramics.

contact: Dr. Jens Petzold phone +49 3521 463-508 j.petzold@keramikinstitut.de

Managed Equipments
Extruder
Pressure casting machines
Dryer
Kilns

Deposit Exploration Support

The Keramikinstitut offers a special research package to support evaluation and exploitation of ceramic raw materials deposits.

contact: Dr. Maren Uebel phone +49 3521 463-512 m.uebel@keramikinstitut.de

Analyses according to Field Characterization
Analyses according to LAGA-guideline „standards to material recycling of mineral residual materials / waste materials – technical standards 2004; basic analyses for excavated soil with a content of > 10% impurities resp. builders waste
Water Content according to DIN 18121-1
State Range (consistency limit, flow-, roll out-, and shrinking limit according to DIN 18122-1/ 2)
Grain Size Distribution according to DIN 18123
Proctor Density according to DIN 18127
Loss of Ignition according to DIN 18128
Lime Content analog to DIN 18129
Coefficient of Water Permeability according to DIN 18130-1
Shear Strength according to DIN 18137-1
Classification of Soil according to DIN 18196

Testing of Ceramics and other Materials

Analyses of Physical Properties

The Keramikinstitut offers all testing methods relevant for evaluating the physical properties of raw materials and ceramic materials. Their pressure strength can be determined, as well as their bulk density or grain size distribution. In our laboratories, we can carry out all kinds of sample preparation too. As many testing methods for ceramic materials are suitable for other materials as well, we can test a wide range of non-ceramic materials at your request.

contact: Dr. Maren Uebel phone +49 3521 463-512 m.uebel@keramikinstitut.de

Analyses of Physical Properties; Sample Preparation
Drying, Crushing, Homogenizing, Splitting according to DIN 51061-2 and DIN 51078
Test piece selection of specimens from semifinished- or finished products, also from bounded and similar materials
Sampling from ceramic suspensions, granuled or powder materials
Preparation to a • casting slips • plastic mass • pressable mass
Sample preparation • de-airing extrusion • dry pressing • manual shaping into plaster moulds • manual and pressure casting

Analyses of Physical Properties; Analytical Methods
Moisture following DIN 51078
Plus mesh following DIN 66165-1 and -2
Test sieving following DIN 66165, part 1 and 2, 5, wet and dry
Particle Size Distribution 0,04 - 400 µm by laser granulometer CILAS1064, following testing station instruction 15, in water, alcohol or other dispersing agents
Particle Size Distribution 0,1- 200 µm by SediGraph 5100, following DIN EN 725-5 • true density by Helium-Pycnometer (Accupyc) • plus mesh

• particle size distribution including decomposition by ultrasonic or shaking 0,1 – 200 µm • analysis of persistent sedimentable materials
Bulk Density following DIN EN 1097-3
True Density by pycnometer, following DIN EN 993-2 A1 • by Helium-pycnometer (Accupyc), following testing station instruction 86
Linear Shrinkage following operating instruction 8965
Apparent Specific Gravity of unfired moldings or parts of them following operating instruction 88
Firing and Total Shrinkage following operating instruction 8965
Loss of Ignition following DIN 51081
Deformation due to firing process following operating instruction 18889
Verbal Assessment of fired samples e.g. firing color smelt outs property of surface
Bending Strength after firing following DIN EN 993-6
Impact Bending Strength following operation instruction 20471
Compression Strength following DIN EN 993-5 incl. sample preparation by sawing and core boring (max. 520 X 320 X 320 mm³)
Water Absorption following DIN EN 993-1 resp. DIN EN ISO 10545-3 • boiling method • vacuum method • impregnation method
Apparent Bulk Density of fired samples following DIN EN 993-1
Open Porosity following DIN EN 993-1, completion to water absorption and apparent bulk density
Specific Surface Area of solids following DIN 66132, BET following DIN EN ISO 18757 (old: DIN EN 725-6) by AREA-meter II (Co. Ströhlein Instruments) following HAUL and DÜMBGEN, range 0,1 - 1000 m²/g
Pore Size Distribution by the high pressure mercury porosimeter Pascal 140 and 440 series (Thermo Fisher Scientific S.p.A.) following testing station instruction 76 (DIN 66133) • micro pores 15 µm - ca. 4 nm • macro pores 116 µm - ca. 4 µm • complete measure including sample preparation and determining apparent bulk density
Review of the **Wetting Ability** of low viscose media on solid surfaces by determination of the **Contact Angle** at room temperature; stereo microscope Stemi 2000 (Co. Carl Zeiss)
Measurement of the **Geometrical Properties** following DIN EN 1024 resp. DIN EN ISO 10545-2

Mineralogical Analyses

By using approved and industry-standard testing methods, the Keramikinstitut can investigate the mineralogical composition of raw materials and ceramic materials to predict their application behaviour.

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Mineralogical Analyses following DIN EN 13925, 1-3
Mineralogical analyses by **XRD (x-ray diffraction)** following testing station instruction 45, 47-49, triple determination
Phase analysis, qualitative, **Overview Diffractogram**
Phase analysis quantitative, **Clay** • qualitative analysis – overview diffractogram • determining of feldspar, quartz; identification of different clay minerals like Kaolinite, Illite, Smectite, Mica, Montmorillonite; differentiate of swellable and non swellable 3- and 4-layer clay minerals • determining of Chlorite, Hematite, Calcite, Dolomite, Anatase, Goethite and further mineral phases
Phase analysis quantitative, **Refractories and other Fired Materials / Products** • qualitative analysis – overview diffractogram • determining of Quartz; Mullite, Cristobalite, Corundium, Cordierite/ Indialite, Si_3N_4-phases, SiC, Silicium a.s.o.

Chemical Analyses

The Keramikinstitut offers chemical analysis of both raw materials and ceramic materials. We focus on elements and compounds made important by industry technologies or regulatory provision. As many chemical analyses for ceramic materials are suitable for other materials as well, we can analyse a wide range of non-ceramic materials at your request.

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Chemical Analyses
Silicate Analyses by XRF (x-ray fluoreszence) quantitative, following DIN 51001, (basically: SiO_2, Al_2O_3, Fe_2O_3, TiO_2, CaO, K_2O, MgO, Na_2O, LOI)
XRF-Screening range from Fluor to Uranium
Determining of **Boron and Lithium in glazes or glasses** (wet chemical extraction, ICP)
Determining of **Pollutions** following guideline for industrial sludge act
Determining of Fluorine, Sulphur and Chlorine in bodies and raw materials (XRF) • as **Emission Relevant Contents** • differentiation into sulfide and sulfate
V, Mn, Co, Sr, Zr, Ba, Cr, Ni, Zn, Mo and Cu in silicate materials, concentration ≥ 0,01 % at the ignited(XRF) • in addition of silicate analysis • as separate analysis
Water Soluble Salts • percolation according to DIN EN ISO 21587, part 1 and 2 (old: DIN 51 100) • eluation following DIN 38414, part 4 Analysis of **Water** (process water, eluate, percolate and further) • content of SO_3 following DIN EN ISO 21587 • content of alkaline and alkaline earth (Ca^{2+} and Mg^{2+}, Na^{+} and K^{+}) following DIN EN ISO 11885 • content of chloride (Cl^{-}) according to DIN EN ISO 10304-1 • sulfate (SO_4^{2-}) following DIN EN ISO 10304-1
pH-Value of ceramic slips, glazes, dissolutions and other following testing station instruction 37159
Electrical Conductivity in hydrous dissolutions following DIN EN 27888
Content of Carbon according to GEISLER
Methylen Blue Value

• Soils, clays, kaolines
Acid Resistance / Pollutant Emission following DIN EN 1388-1 • determination of lead and cadmium • cold acidification • hot extraction The test of pollutant emission follows different foreign standards is possibly by arrangement.
Element Screening of Water (process water, eluates, percolates and further) by ICP
Total **Organic Carbon**; total **Inorganic Carbon**; total carbon following DIN ISO 10694 • solids or liquids

Thermal Analyses

The Keramikinstitut can investigate thermal behaviour of raw materials and ceramic materials to predict their reaction to fire and heat. To do this, thermogravimetric testing is used, as well as differential thermoanalysis and dilatometric testing. As many testing methods for ceramic materials are suitable for other materials as well, we can test a wide range of non-ceramic materials at your request.

contact: Dr. Maren Uebel phone +49 3521 463-512 m.uebel@keramikinstitut.de

Simultaneous Thermal Gravimetric Analysis (TG) / Differential Thermal Analysis (DTA)
Simultaneous Thermal Gravimetric Analysis (TG) / Differential Thermal Analysis (DTA) • up to 1570 °C • in atmosphere • heating / cooling rate 5 K/min or specified by client

Dilatometric analyses
Preparation of Grinded Samples by: • casting • moulded from plastic masses • cutting • dried and fired samples
Thermal Expansion Coefficient following DIN 51045, part 1-5 • up to 1570 °C • heating / cooling rate 5 K/min or specified by client
Expansion- / shrinkage curve following DIN 51045, part 1-5 • up to 1570 °C • heating / cooling rate 5 K/min or specified by client
Low Temperature Dilatometric Measurements: • temperature range: - 170 °C bis 1000 °C • moisture expansion after defined hydrothermal treatment • thermal expansion coefficient
Heating Microscope (image interpretation) following testing station instruction 21 • T_{max} 1500 °C • max. heating rate 50 K/min

Testing of Rheological Properties and Filtration Behavior

The Keramikinstitut can test the properties of raw materials and ceramic materials in a humid or liquid state to predict their processing behaviour. Approved testing methods are applied.

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Rheological Tests, Filtration Behavior
Water Absorption (Swelling) Capacity according to ENSLIN according to testing station instruction 18884
Mixing Water Requirement according to PFEFFERKORN type M-1192 following operating instruction 18887; determining the deformation ratio for the evaluation of the processing moisture
Filtration Capability of suspensions by BAROID according to testing station instruction 135
Casting Slip Characterization / Optimal Liquefaction of raw materials and masses • density and litre weight • viscosity measurements according to LEHMANN, KEYL, FORD (flow time with breaker including determination of thixotropy) • viscosity according to GALLENKAMP including thixotropy following DIN EN ISO 2431 • body formation, time to truncate and assesment of body features following operating instruction 18879 • Optimal liquefaction of plastic raw materials and masses by using different (default: 2) deffloculants, complete characterization of the casting slip in the optimum • Viscosity measurement with a rotating-cylinder viscosimeter (Rheolab MC 1), shear gradient or shear stress specified by customer
Characterization of **Pressure Casting Slips**: Testing the pressure casting slip on a pressure casting equipment (DGA 80, Co. DORST) including characterization of the technological behavior and assessment of body formation

Optical Characteristics

The Keramikinstitut can detect gloss and color of ceramic product surfaces. As many testing methods for ceramic materials are suitable for other materials as well, we can test a wide range of non-ceramic materials at your request.

contact: Dr. Maren Uebel phone +49 3521 463-512 m.uebel@keramikinstitut.de

Optical Characteristics
Gloss Measurement on flat surfaces following testing station instruction 103 • remission measurement, 3 angular degrees
Color Measurement using a MINOLTA-spectrometer following DIN 5033, part 2, 3, 8 • L*, a*, b*-values (or other color system values) • Degree of whiteness (according to BERGER and further standards)

Characterization of Microstructure

Along with the development of new ceramic materials, properties testing, or investigating cases of damage, the Keramikinstitut can investigate the microstructure of ceramic materials or products, including sample preparation. As many testing methods for ceramic materials are suitable for other materials as well, we can test a wide range of non-ceramic materials at your request.

contact: Gero Stolle phone +49 3521 463-530 g.stolle@keramikinstitut.de

Characterization of Microstructure
Scanning Electron Microscope Analyses, following testing station instruction 30 – 34: • Polished surface area • Magnification up to 20000fold • Secundary electron images • EDX-analyses • Line scans • Mappings
Stereomicroscopic Images

Drying Test

The Keramikinstitut can test drying of both raw materials and ceramic materials to predict their processing behaviour. Approved testing methods are applied.

contact: Dr. Rainer Bartusch phone +49 3521 463-542 r.bartusch@keramikinstitut.de

Drying Test
Drying by given Temperature-Humidity Profile to max. 140 °C Drying chamber: 0,9 m³, ca. 0,7 x 1 x 1,25 m³ (W x L x H) Registration of the **Bigot**-Curve and loss of water
Drying in a **Climate Test Chamber** WK1-180/40 Drying chamber 0,125 m³, ca. 0,55 x 0,45 x 0,5 m³ (W x L x H) Cold-heat working range: -40 to 180 °C Climate working range: 10 to 95 °C by 10 to 98 % rel. humidity Dew point temperature range: 4 to 94 °C
Drying in a **Spray Dryer** water evaporation capacity: 60 l/h max. pressure of pump: 20 bar minimum approach: 120 l slip unary bushing system, different spray heads and twist bodies to realize a corresponding grading fraction (100 µm to 500 µm)
Drying in a **Laboratory Dryer** with circulation air, Drying chamber 0,75 m³ Temperature range: 20 to 250 °C

Moulding Material Testing

The Keramikinstitut offers special testing methods to evaluate the processing behaviour of different ceramic moulding materials – especially the properties of gypsum.

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Moulding Material Testing
Determination of the **Plus Mesh** on the sieves 3,15 mm; 1,25 mm; 0,2 mm following DIN ISO 3310-1
Determination of the **Particle Size Distribution 0,04 – 400 µm** using a laser granulometer CILAS 1064 following testing station instruction 15, measurement in alcohol
Determination of the **Strew Amount** following DIN EN 13279, part 1 and 2
Determination of the **Flow Spread** following working instruction
Determination of the **Beginning of Stiffen** following DIN EN 13279, part 1 and 2
Determination of the **Compression Strength** following DIN EN 13279, part 1 and 2
Determination of the **Diffusion Coefficient** following operation instruction 18 879
Measurement of the **Permeability** in a baroid following testing station instruction 135
Measurement of the **Flexural Strength** following DIN EN 993-6
Measurement of the **Water Absorption, Apparent Bulk Density and Open Porosity** following DIN EN 993-1 (vacuum method)
Measurement of the **Pore Size Distributio**n following testing station instruction 76
Testing the **Mould Material** on an pressure casting equipment (DGA80G) including an assessment of the body formation

Firing Service

Firing of ceramics can be carried out at the Keramikinstitut, not only for testing, but also for commissioned products. We can use our range of different kinds of kilns for producing small-scale series of your ceramic products.

contact: Dr. Jens Petzold phone +49 3521 463-508 j.petzold@keramikinstitut.de

Available Furnace Technology
Gas fired **Chamber Kiln 1440 °C (rapid firing):** net dimensions: 0,9 x 0,5 x 0,55 m^3 (WxTxH); firing temperature: max. 1440 °C • min. cycle time (cold/cold): 90 min to 1100 °C; 120 min to 1400 °C • oxidizing and reducing atmosphere • possibility to add separate O_2 • automatic registration of temperature and atmosphere conditions (O_2, CO_2 und CO)
Gas fired **Chamber Kiln 1300 °C:** • net dimensions: 0,5 x 0,6 x 0,8 m^3 (WxTxH) • firing temperature: max. 1300 °C • min. cycle time (cold/cold): 4 h • oxidizing firing • thermal afterburning
Gas fired **Chamber Kiln 1600 °C:** • net dimensions: 1,0 x 0,45 x 0,6 m^3 ^{3} (WxTxH) • firing temperature: max. 1600 °C • min. cycle time (cold/cold): ca 20 h • firing system: IVF (Infinite Variable Flash Firing) • control type: modulating, impulse • oxidizing and reducing atmosphere • thermal afterburning • possibility to add separate O_2 • computer control of temperature, atmosphere (O_2, CO_2, CO) and pressure in the furnace chamber • data capture of relevant parameters • data transfer to other systems as ASCII-File

Electrical heated **Chamber Kiln Typ SO 1093;** • Firing temperature: 1380 °C • gas-tight design with thermal afterburning • free programmable heating and cooling < 1100 °C • net dimensions: 350 x 350 x 400 mm³
Electrical heating **Gradient Kiln:** • firing temperature: max. 1250 °C • 6 temperature segments, all free programmable in temperature-time-profile • effective section dimension (WxTxH) ca. 150 x 150 x 80 mm³
Electrical heating **High Speed Kiln** type HTM: • Firing temperature: max. 1550 °C • Heating rate min. ca. 30 min cold to cold; to heat to 1200 °C in 4 h is possible • Especially suitable for tile firing • Net dimension for example for two tiles 250 x 200 mm^2 • Furnace chamber height is variable to approx. 100 mm
Electrical heating **Lift Floor Kiln for Rapid Firing** 1800 °C: • net dimension: 300 x 230 x 200 mm^3 • Firing temperature: max. 1800 °C • Permanent working temperature: 1730 °C • Max. heating rate: 15 K/min
Electrical heating **Laboratory Firing Aggregates**: • in 9-KW-kiln to 1350 °C • in high temperature kiln to 1600 °C • in high temperature kiln to 1750 °C

Product Testing

Raw and Ready-Made Glaze Testing

The Keramikinstitut can test the processing behaviour of raw glazes and the properties of glazed ceramic surfaces. Approved testing methods are applied.

contact: Gero Stolle phone +49 3521 463-530 g.stolle@keramikinstitut.de

Glazes-Testing
Determination of the **Length of Flow** of glazes and ceramic fluxes by a channel viscosimeter following operation instruction 18880
Determination of the Melting behaviour with **Heating Microscope** and **Dilatometer Analyses**
Glazing Stress Test according to Steger (qualitative)
Scratching Test according to Mohs (old: DIN EN 101)
Determination of the **Glaze Abrasion Resistance**; sprinkling method using corundum K63 (it corresponds to graininess no. 24 following DIN) following operation instruction 18881 (10 pieces)
Determination of the **Glaze Crazing Resistance** under hydrothermal conditions (autoclave test) following operation instruction 37160 and DIN EN ISO 10545-11
Determination of the **Moisture Expansion** after hydrothermal treatment • test piece preparation • autoclave test • determining moisture expansion
Color Measurement and determination of **Degree of Whiteness**
Gloss Measurement on flat surfaces Remission measurement with 3 angles following testing station instruction 103
Determination of the **Contact Angle** for a review of the wetting ability of glazes at room temperature with the stereo microscope Stemi 2000

Tile and Plate Testing

The Keramikinstitut can test the performance characteristics of ceramic tiles and plates according to the requirements of DIN EN 14411. Approved testing methods are applied.

contact: Kerstin Hohlfeld phone +49 3521 463-545 k.hohlfeld@keramikinstitut.de

Tiles and Plate Testing
Determination of **Dimensions** and **Surface Characteristics** of tiles and plates following DIN EN 10545-2
Determination of the **Water Absorption** of tiles and plates following DIN EN ISO 10545-3
Determination of the **Drying Bending Strength** of wall and floor tiles following DIN EN ISO 10545-4
Determination of the **Bending Strength after Firing** of wall and floor tiles following DIN EN ISO 10545-4
Determination of the **Scratching Resistance** according to Mohs (old: DIN EN 101)
Determination of the resistance against **Surface Abrasion** of glazed tiles und plates following DIN EN ISO 10545-7 (8 pieces à 10 x10 $cm^{2)}$
Determination of the **Linear Thermal Expansion** of ceramic tiles and plates following DIN EN ISO 10545-8
Determination of the **Thermo Shock Resistance** of ceramic tiles and plates following DIN EN ISO 10545-9
Determination of the **Moisture Expansion** of ceramic tiles and plates following DIN EN ISO 10545-10
Measurement of **Resistance against Glaze Cracks** of ceramic tiles and plates following DIN EN ISO 10545-11
Determination of **Frost Resistance** of ceramic tiles and plates following DIN EN ISO 10545-12
Chemical Resistance of ceramic wall tiles and plates following DIN EN ISO 10545-13
Resistance against Specking of ceramic wall tiles and plates following DIN EN ISO 10545-14
Determination of the solubility of **Lead and Cadmium** following DIN EN ISO 10545-15
Determination of **Slip Resistant Properties** following DIN 51130
Measurement of **Geometrical Properties** following DIN EN ISO 10545-2

Roofing Tiles Testing

The Keramikinstitut can test the performance characteristics of roofing tiles. Approved testing methods are applied.

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Roofing Tiles Testing
Determination of **Frost Resistance** of roofing tiles and roofing tiles accessories following DIN EN 539-2, frost acts on all over after impregnation in vacuum
Water Impermeability of roofing tiles following DIN EN 539-1
Determination of **Water Soluble Salts** (elution method), (old: DIN 51110)
Determination of **Floating Enclosures** (steam test) (old: DIN 105-1)
Abrasive wear test according to Böhme following DIN 52108 • Loss of volume • Loss of thickness
Determination of **Moisture Expansion** with the dilatometer after hydrothermal treatment
Determination of the **Crazing Safety** of glazed structural ceramics in the autoclave
Determination of **UV-Resistance / Light Stability** of glazed structural ceramics accomplishing cyclic stress with UV radiation and sprinkling
Determination of **Weathering Resistance** of glazed structural ceramics to moisture and temperature in the climate chamber
Determination of the **Resistance of Surfaces to Boiling Water and Water Vapour** following DIN ISO 28706-2 by using a tester as described in DIN ISO 2733
Measurement of **Geometrical Properties** of roofing tiles following DIN EN 1024
Determination of the **Bending Loading Capacity** of roofing tiles following DIN EN 538
Determination of **Leaching Behaviour** (chemical resistance) of glazed roofing tiles following DIN EN ISO 28706-2 (old: DIN EN 14483-2)

Brick and Clinker Brick Testing

The Keramikinstitut can test the performance characteristics of bricks and clinker bricks according to DIN requirements. Approved testing methods are applied.

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Brick and Clinker Brick Testing
Determination of **Water Soluble Salts** (elution method or percolation method) (old: DIN 51100)
Determination of **Frost Resistance** of brick and clinker brick following DIN 52252-1
Determination of **Floating Enclosures** (steam test) following DIN EN 771-1
Determination of the **Acid Resistance** depending on the use, • Following DIN EN ISO 10545-13; bricks • Following DIN 51102-1; sewerage stoneware • Following DIN EN 993-16; for example ceramic clinker for acid protective building • Following DIN 4051; sewer brick
Abrasive Wear Test according Böhme, following DIN 52108 • Determination of the loss of volume • Determination of the loss of thickness
Determination of the **Moisture Expansion** with the dilatometer after autoclave treatment
Determination of the **Crazing Safety** of glazed structural ceramics in the autoclave
Determination of the **UV-Resistance / Light Stability** of glazed structural ceramics by means of cyclic stress with UV radiation and sprinkling
Determination of **Weathering Resistance** of glazed structural ceramics to moisture and temperature in the climate chamber
Determination of the **Resistance of Surfaces to Boiling Water and Water Vapour** following DIN ISO 2744 by using a tester following DIN ISO 2733
Determination of the **Compression Strength** of solid bricks and hollow bricks
Measurement of **Geometrical Properties** following DIN EN 771-1

Paving Bricks and Clay Paver Testing

The Keramikinstitut can test the performance characteristics of paving bricks and clay pavers. Approved testing methods are applied.

contact: Rüdiger Köhler phone +49 3521 463-510 r.koehler@keramikinstitut.de

Paving Bricks and Clay Paver Testing
Determination of **Water Soluble Salts** (elution method) (old: DIN 51100)
Determination of **Frost Resistance** of paving bricks and clay paver following DIN EN 1344
Determination of **Floating Enclosures** (steam test) following DIN EN 771-1
Determination of the **Acid Resistance** depending on the use, • Following DIN 51102-1; sewerage stoneware, in lumps • Following DIN EN 993-16; for example ceramic clinker for acid protective building, grained • Following DIN EN 1344; paving bricks • Following DIN 4051; sewer brick, grained
Abrasive Wear Test according to Böhme, following DIN 52108 • Determination of the loss of volume • Determination of the loss of thickness
Determination of the **Moisture Expansion** with the dilatometer after autoclave treatment
Determination of the **Crazing Safety** of glazed structural ceramics in the autoclave
Determination of the **UV-Resistance / Light Stability** of glazed structural ceramics by means of cyclic stress with UV radiation and sprinkling
Determination of **Weathering Resistance** of glazed structural ceramics to moisture and temperature in the climate chamber
Determination of the **Resistance of Surfaces to Boiling Water and Water Vapour** following DIN ISO 2744 by using a tester following DIN ISO 2733
Determination of the **Bending Loading Capacity** following DIN EN 1344 as the bending tension load and the **Compression Strength** following DIN 18503
Determination of the **Water Absorption** following DIN 18503
Determination of the **Water Impermeability** (coefficient of permeability) following guideline for water permeable paving bricks of featuring no fines concrete
Measurement of **Geometrical Properties** following DIN EN 1344

Granular Material Testing

The Keramikinstitut can test the performance characteristics of ceramic granular materials according to DIN requirements. Approved testing methods are applied.

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Granular Material Testing
Test Sieving following DIN 66165, part 1 and 2; max. 7 screen cuts
Determination of the **Trickling Behaviour** of granular following testing station instruction 84
Determination of the **Bulk Density**, following DIN EN 1097-3
Determination of the **Abrasion** of granules following testing station instruction 83
Determination of the **Granule Strength** following testing station instruction 24, Min. 50 single determinations of a defined fraction with statistical evaluation

Fine Ceramics Testing

The Keramikinstitut can test the performance characteristics of fine ceramic products, especially of tableware. Approved testing methods are applied.

contact: Dieter Erdmann phone +49 3521 463-531 d.erdmann@keramikinstitut.de

Fine Ceramic Testing
Determination of the **Thermal Shock Resistance** of fine ceramics (table porcelain) following operating instruction 18877 (Harkort-test)
Determination of the **Dishwasher Safety** of decorated table porcelain following DIN EN 12875-1 with testing dishwasher (G540 Miele)
Determination of the **Acid Resistance** / **Pollutant Emission** of lead and cadmium following DIN EN 1388-1 • Cold acidification • Hot extraction • Lead determination • Cadmium determination
Water Absorption of ceramic articles (food-contact) following DIN EN 1217
Resistance to Scratching according to MOHS (old: DIN EN 101)
Determination of the **Crazing Safety** of dishes after hydrothermal treatment

Refractory Testing

The Keramikinstitut can test the performance characteristics of ceramic refractory materials. Approved testing methods are applied.

contact: Kerstin Hohlfeld phone +49 3521 463-545 k.hohlfeld@keramikinstitut.de

Refractory testing
Determination of the **Bulk Density, Open Porosity and True Porosi**ty following DIN EN 993-1
Determination of the **Cold Compression Strength** in accordance with DIN EN 993-5
Determination of the **Bending Strength** at **Room Temperature** in accordance with DIN EN 993-6
Determination of the **Bending Strength** at **Elevated Temperature** in accordance with DIN EN 993-7
Determination of the **Pressure Flow** following DIN EN 993-9
Abrasive Wear Test according to Böhme (DIN 52108)
Determination of the **Thermo Shock Resistance** of refractory bricks following DIN 51068 (water quenching method) and DIN EN 993-11
Determination of the **Post Shrinkage / Secondary Expansion** following DIN EN 1094-6 (old: DIN 51066, Part 1und 2) and DIN EN 993-10
Determination of the **Bulk Density of Granular Material** according to the mercury displacement technique following DIN 993-17
Determination of the **Oxidation Resistance** of 3 samples to 950°C by steam atmosphere, according to ASTM C 863-83
Determination of the **Si_3N_4** quantitatively by means x-ray diffraction (XRD)
Determination of the **Silicon** in silicon carbide, quantitatively by X-ray diffraction analysis
Determination of the **Pyrometric Cone Equivalent** following DIN EN 993-12

Special Services

Special Services

On request, the ceramics institute will be pleased to carry out tests and research based services that do not belong to the usual range of ceramic research - either because they were borrowed from other industries or because the object of investigation does not have any standardized methods. At this point, only two deputy research methods were mentioned in the first category, which have already been asked several times.

contact: KI Keramik Institut Meissen phone +49 3521 463-515

Special services
Determination of the **Calorific an Heating Value** following DIN 51900 part 1 and 2
Determination of the **Bacterial Counts** in ceramic masses (anaerobic / aerobic)

Catchword Index

Imprint

State of the List of Services:
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