DasKeramikinstitut

List of Services

This is the complete catalog of services of the Keramik-Institut.
It covers all analyses for ceramic products and raw materials (Chapter 3 to 9).
Also application-related tests and research-related services of our company are specified (Chapter 1,2 and 10 to 21).

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1. Development services

		contact
1.1.	**Development** and optimization of ceramic mass, products and technologies	Mr. Hantzsch / Ms. Hohlfeld
1.2.	**Development** of advanced ceramics until testproduction	Mr. Clauß
1.3.	**Initiation** and optimization of production lines	Mr. Dr. Petzold / Mr. Clauß

2. Deposit exploration support

		contact
2.1.	**Deposit exploration support**	Mr. Hantzsch / Mr. Köhler

3. Analyses of physical properties

	Analyses of physical properties; sample preparation	contact
3.1.	**Drying, crushing, homogenizing, splitting** according to DIN 51061:2017-04	Ms. Friedrich
3.2.	**Test piece selection** of specimen from semifinished- or finished products, also from compound and similar materials	Ms. Friedrich
3.3.	**Sampling** from ceramic suspensions, granulated or powder materials	Ms. Friedrich
3.4.	**Preparation of** • Casting slips • Plastic mass • Pressable mass	Ms. Friedrich
3.5.	**Sample production by** • extruder • (isostatic) press • plaster mould • slip casting / pressure casting	Mr. Clauß
3.6.	Determination of **moisture** content according to DIN EN ISO 12570:2018-07	Ms. Friedrich
3.7.	Determination of **sieve residue** according to DIN 66165-1 and -2	Ms. Friedrich
3.8.	**Sieve analysis** according to DIN 66165, part 1 and 2, wet and dry, max. 8 sieve fractions for dry sieving	Ms. Friedrich
3.9.	Determination of **grain size distribution 0,02 - 1600 µm** by laser granulometer Microtrac S 3500, • in water, • in alcohol, • in special dispersant *if necessary, sieving at 1600 µm*	Mr. Hantzsch
3.10.	Determination of **grain size distribution 0,02 - 400 µm** by laser granulometer CILAS 1090, • in water, • in alcohol, • in special dispersant *if necessary, sieving at 400 µm*	Mr. Hantzsch

3.11.	Determination of **grain size distribution 0,2 -200 µm by** SediGraph 5100, according to DIN EN 725-5
	• sieve residue determination
	• grain size distribution including preparation by ultrasonic or shake up
	  ○ from 0,2 - 200 µm or
	  ○ from 1,0 - 200 µm
	• analysis of hardly sedimenting materials
		Mr. Hantzsch /
		Ms. Friedrich

3.12.	Determination of **powder density** according to DIN EN 1097-3	Ms. Friedrich
3.13.	Determination of **true density** by pycnometer, according to DIN EN 993-2 A1 or by Helium-pycnometer (Accupyc)	Ms. Friedrich
3.14.	Determination of **linear drying shrinkage**	Ms. Friedrich
3.15.	Determination of **bulk density** of dried and fired ceramic materials	Ms. Friedrich
3.16.	Determination of **firing and total shrinkage**	Ms. Friedrich
3.17.	Determination of **deformation** due to the firing process	Mr. Bormann
3.18.	**Verbal assessment** of fired samples (e.g. firing color, lumps, property of surface)	Ms. Hohlfeld
3.19.	Determination of **bending strength** according to DIN EN 993-6	Ms. Friedrich

3.20.	Determination of **impact bending strength** according to DIN EN 993-5 Sample preparation by sawing, core drilling, face grinding or Sample appropriation by costumer (max. 520 X 320 X 320 mm^3)	Ms. Friedrich
3.21.	Determination of **water absorption** according to DIN EN 993-1 or DIN EN ISO 10545-3 Boiling method Vacuum method Impregnation method *(plus sample preparation)*	Ms. Friedrich
3.22.	Determination of **bulk density** of fired samples according to DIN EN 993-1 *(plus sample preparation)*	Ms. Friedrich
3.23.	Determination of **open porosity** according to DIN EN 993-1, additional to determination of water absorption and bulk density *(plus sample preparation)*	Ms. Friedrich
3.24.	Determination of **water absorption, bulk density and open porosity** (according to DIN EN 993-1 vacuummethod)	Ms. Friedrich
3.25.	Determination of **specific surface** of solids according to DIN 66132, BET-method, DIN EN ISO 18757 by AREA-meter II (Ströhlein Instruments) following Haul and Dümbgen, specific surface range 0,1 - 1000 m^2/g	Ms. Friedrich
3.26.	Determination of **pore size volume** or **pore size distribution** by high-pressure mercury porosimeter (Pascal 140 / 440) according to DIN ISO 15901-1 Mesopores 15 µm - ca. 4 nm macropores 115 µm - ca. 4 µm	Ms. Friedrich
3.27.	Review of the **wetting ability** of low viscosity media on solid surfaces by determination of the **contact angle** at room temperature by digitalmicroscope VHX 5000 (Keyence)	Mr. Hantzsch

4. Mineralogical analyses (phase analysis)

	Mineralogical analyses according to DIN EN 13925, 1-3	**contact**
4.1.	Phaseanalysis, qualitative, **overview diffractogram** (XRD)	Mr. Köhler
4.2.	Mineralogical analysis by **x-ray diffraction**(XRD), triple determination, qualitative analysis (overview diffractogram), Determination of Feldspar, Quartz, Kaolinite, Chlorite, Hematite, Calcite, Dolomite, Anatase, Goethiteand more	Mr. Köhler
4.3.	Mineralogical analysis by **x-ray diffraction** (XRD), triple determination, qualitative analysis mainly of clays and partially of kaolin (overview diffractogram) Determination of Feldspar, Quartz, Kaolinite, Chlorite, Hematite, Calcite, Dolomite, Anatase, Goethite and more <u>Differentiation of swellable and non swellable 3- and 4-layer clay minerals</u>	Mr. Köhler
4.4.	Phaseanalysis of fired materials (**e.g. sintering aid, porcelain**) quantitative (XRD), triple determination qualitative analysis (overview diffractogram) Determination of Quartz, Mullite, Cristobalite, Corundum and Cordierite/ Indialite, Si_3N_4-phases; SiC, Silicium and more	Mr. Köhler

5. Chemical analyses

	Chemical analyses	contact
5.1.	**Determination of loss of ignition** according to DIN 51081 Loss of ignition at 1050 °C or 1200 °C	Mr. Köhler/ Ms. Wloszczynski
5.2.	**Silicate analyses by x-ray fluorescence (XRF)**, quantitative, according to DIN 51001 or DIN EN ISO 12677, (e.g.: SiO_2, Al_2O_3, Fe_2O_3, TiO_2,CaO, K_2O, MgO, Na_2O, loss of ignition)	Mr. Köhler/ Ms. Wloszczynski
5.3.	**Metal oxides in silicates, concentrations > 0,01%, ignited sample (XRF) (addition to silicate analysis)**	Mr. Köhler/ Ms. Wloszczynski
5.4.	**Metal oxides in silicates, concentrations > 0,01%, ignited sample (XRF) (separate analysis)**	Mr. Köhler/ Ms. Wloszczynski
5.5.	**XRF-Screening** range from Fluor to Uranium with quantitative evaluation	Mr. Köhler
5.6. **5.7.**	Determination of **Boron and Lithium in glazes or glasses** (wet chemical extraction, ICP)	Mr. Köhler
5.8. **5.9.** **5.10.** **5.11.**	Determination of Fluorine, Sulphur and Chlorine compositions and raw materials (XRF) as **emission relevant contents** Differentiation into sulfide and sulfate	Mr. Köhler / Ms. Wloszczynski
5.12.	Determination of **water-soluble salts,** preparation of eluate according to DIN 19529 Analysis of **water** (process water, eluate, percolate and more), Content of SO3 according to DIN EN ISO 21587, Content of alkali oxide and alkaline earth (Ca^{2+} u. Mg^{2+}, Na^{+} and K^{+}) according to DIN EN ISO 11885, Content of chloride and/or sulfate according to DIN EN ISO 10304-1	Ms. Friedrich Mr. Köhler
5.13.	Determination of **Fe-solubility**	Ms. Friedrich
5.14.	Determination of **pH-value** of ceramic slips, glazes, dissolutions and other materials	Ms. Friedrich
5.15.	Determination of **electrical conductivity** in hydrous dissolutions according to DIN EN 27888	Ms. Friedrich
5.16.	Determination of **Carbonate content** according to Geisler	Ms. Wloszczynski
5.17.	Determination of M**ethylene blue value** from soils, clays and kaolin	Ms. Friedrich
5.18.	Determination of total Carbon **(TC)** in solids	Mr. Köhler / Ms. Wloszczynski
5.19.	Determination of organic and inorganic Carbon content in solids **(TOC/TIC/TC)**	Mr. Köhler / Ms. Wloszczynski
5.20.	Determination of **acid resistance / pollutant emission** of lead and cadmium according to DIN EN 1388-1 + DIN EN 1388-2 cold acidification hot extraction Determination of lead and cadmium The test of pollutant emissions following different foreign standards is possible according to prior agreement.	Ms. Pylypenko

6. Analyses of thermal properties

	Analyses of thermal properties: Thermal gravimetric / Differential thermal analysis / dynamic differential calorimetry	contact
6.1.	**Simultaneous differential thermal analysis / thermal gravimetric analysis (DTA/TGA)**, up to 1550 °C, according to standard parameters [5 K/min; synthetic air] or according to customized heating	Mr. Hantzsch
6.2.	**Simultaneous differential scanning calorimetry / thermal gravimetric analysis (DTA/TGA)**, up to 1550 °C, according to standard parameters [5 K/min; synthetic air] or according to customized heating	Mr. Hantzsch
6.3.	**Sample preparation:** Slip casting or moulding from plastic masses Cutting and grinding of fired or dried bodies	Mr. Hantzsch / Ms. Friedrich
6.4.	**Dilatometric analyses** or determination of **thermal expansion coefficient** according to DIN 51045 part 1-5, up to 1600 °C (standard parameters or customized heating), additionally determination of glass-transition temperature and dilatometric softening of glazes / engobes	Mr. Hantzsch
6.5.	**Thermal mechanical analysis** by high temperature-TMA, up to 1500 °C max. heating rate 100K/min, max. pressure load 1,47N, constant, linear or sinusoidal load, linking of different loads, additionally expansion-shrinkage-curve, linear thermal expansion coefficient, phase transformation temperatures and dilatometric softening	Mr. Hantzsch
6.6.	Determination of **expansion-shrinkage-curve** according to DIN 51045, part 1-5, up to 1600 °C	Mr. Hantzsch
6.7.	Dilatometric analysis by **low temperature dilatometer** - 170 °C up to 800 °C Determination of moisture expansion (495 °C) Determination of thermal expansion coefficient up to 800 °C	Mr. Hantzsch Ms. Hohlfeld
6.8.	**Heating microscope analysis** by optical image interpretation software (Hesse Instruments) (up to 1500 °C; max. heating rate 50 K/min)	Mr. Hantzsch

7. Analysis of rheological properties and filtration behavior

	Rheologicalanalysis, filtration analyses	contact
7.1.	Determination of water absorption- (swelling-) capacity according to **Enslin**	Ms. Friedrich
7.2.	Determination of **mixing water requirement** according to Pfefferkorn; determination of deformation behavior for the evaluation of the processing moisture by plasticity tester M-1192	Ms. Hohlfeld
7.3.	Determination of **filtration capability** of suspensions by Baroid	Ms. Friedrich
7.4.	**Casting slip characterization / optimal liquefaction** of raw materials and masses • density (liter weight) • viscosity according to Lehmann, Keyl, Ford (flow time with breaker) including determination of thixotropy coefficient • viscosity according to Gallenkamp including thixotropy coefficient according to DIN EN ISO 2431 • casting body formation, time to truncate and body evaluation • optimal liquefaction of plastic raw materials and masses including slip characterization in optimum	Mr. Hantzsch
7.5.	**Characterization of casting slips:** Pressure casting test by pressure casting equipment DGA 80 with characterization of technological behavior of casting slip including evaluation of body formation	Mr. Bormann

8. Analysis of optical properties

	Opticalanalysis	contact
8.1.	**Gloss measurement** on flat surfaces, remission measurement with 3 angles	Ms. Friedrich
8.2.	**Color measurement** by Minolta-spectrometer CM-600d according to DIN 5033, part 1, 2, 3, 7, 8, 9, L*, a*, b*-values (or other color systems), optional whiteness degree (e.g. according to Berger)	Mr. Hantzsch / Ms. Friedrich

9. Characterization of microstructure

	characterization of microstructure	contact
9.1.	**Scanning electron microscope analyses** • secondary electron images • EDX-analyses • line scan • mapping	Mr. Hantzsch
9.2.	**Stereo microscopic images**	Mr. Hantzsch
9.3.	**Polished material**	Mr. Hantzsch
9.4.	**Digital microscopic images**	Mr. Hantzsch

10. Drying analyses

	Drying analyses	contact
10.1.	Drying by given temperature-moisture-profile up to 140°C Drying chamber 0,9 m³, ca. 0,7 x 1 x 1,25 m³ (W x L x H) Registration of **Bigot**-curve and loss of water	Mr. Bormann
10.2.	Drying by **climate test chamber** WK1 - 180/40 Drying chamber 0,125 m³, ca. 0,55 x 0,45 x 0,5 m³ cold–heat –range : - 40 up to 180 °C climate– range: 10 up to 95 °C by 10 up to 98 % rel. humidity dew point temperature range: 4 up to 94 °C	Mr. Bormann
10.3.	Drying by **spray dryer** water evaporation capacity 50 l/h or 100 l/h, maximum pumping pressure: 20 bar, minimum approach: 120 l slip, pressure nozzle or two-substance nozzle	Mr. Clauß
10.4.	Drying by **laboratory dryer** with circulating air, drying chamber: 0,75 m³ temperature range: 20 up to 250 °C	Mr. Bormann
10.5.	Determination of moisture	Ms. Friedrich

11. Analyses of ceramic moulding materials

	Moulding material analyses	contact
11.1.	Determination of **sieve residue** on the sieves 3,15 mm, 1,25 mm and 0,2 mm	Ms. Friedrich
11.2.	Determination of **grain size distribution 0,04 – 400 µm** by lasergranulometer CILAS 1090	Mr. Hantzsch
11.3.	Determination of **strew amount** according to DIN EN 13279, part 1 and 2	Ms. Friedrich
11.4.	Determination of **flow spread according** to working instruction	Ms. Friedrich
11.5.	Determination of **beginning of stiffen** according to DIN EN 13279, part 1 and 2	Ms. Friedrich
11.6.	Determination of **bending strength** according to DIN EN 13279, part 1 and 2	Ms. Friedrich
11.7.	Determination of **diffusion coefficient**	Ms. Friedrich
11.8.	Measurement of **permeability** by Baroid	Ms. Friedrich
11.9.	Measurement of **bending strength** according to DIN EN 993-6	Ms. Friedrich
11.10.	Determination of **water absorption, bulk density and open porosity** according to DIN EN 993-1 (vacuummethod)	Ms. Friedrich
11.11.	Determination of **pore size distribution**	Ms. Friedrich
11.12.	**Pressure casting test** on pressure casting equipment DGA80G including characterization of body formation	Mr. Bormann

12. Firing services

	Available firing technology	contact
12.1.	Gas fired **chamber kiln 1440 °C (rapid firing):** net dimensions: 0,9 x 0,5 x 0,55 m^3 (WxLxH); max. firing temperature: 1440 °C • Minimum cycle time (cold/cold): 90 min to 1100 °C; 120 min to 1400 °C • oxidizing and reducing atmosphere • automatic registration of temperature- and atmosphere conditions (O_2, CO_2 und CO) • Firing curve development	Mr. Dr. Petzold / Mr. Bormann / Mr. Clauß
12.2.	Gas fired **chamber kiln 1300°C:** • net dimensions: 0,5 x 0,6 x 0,8 m^3 (WxLxH) • max. firing temperature: 1300°C • minimum cycle time (cold/cold): 4 h • oxidizing atmosphere • thermal reburning	Mr. Dr. Petzold / Mr. Bormann / Mr. Clauß
12.3.	Gas fired **chamber kiln 1600°C:** • net dimensions: 1,0 x 0,45 x 0,6 m^3 (WxLxH) • max. firing temperature 1600°C • minimum cycle time (cold/cold): 20 h • firing system: IVF (Infinite Variable Flash Firing) • control type: modulating, impulse • oxidizing and reducing atmosphere • computer control of temperature, atmosphere (O_2, CO_2, CO) and chamber pressure • data capture of relevant parameters	Mr. Dr. Petzold / Mr. Bormann / Mr. Clauß
12.4.	Electrical heated **chamber kiln Typ SO 1093:** • max. firing temperature 1380 °C • gas-tight design with thermal reburning • free programmable heating and cooling < 1100 °C • net dimensions: 350 x 350 x 400 mm^3	Mr. Bormann / Mr. Clauß
12.5.	Electrical heated **gradient kiln:** • max. firing temperature 1250 °C • 6 temperature segments, all freely programable in temperature-time-profile, • effective section dimensions (WxLxH) app. 150 x 150 x 80 mm^3	Mr. Bormann / Mr. Clauß
12.6.	Electrical heated **rapid firing simulation kiln** Type HTM: • max. firing temperature **1550 °C** • min. cycle time: approx. 30min cold/cold; 1200 °C in 4 min possible • especially for rapid tile firing • firing chamber e.g. for two tiles 250 x 200 mm • firing chamber height variable up to approx. 100 mm	Mr. Bormann / Mr. Clauß
12.7	Electrical heated **lift floor kiln 1800 °C:** • net. dimensions: 300 x 230 x 200 mm • max. firing temperature 1800 °C • permanent working temperature: 1730 °C • max. heating rate: 15 K/min	Mr. Bormann / Mr. Clauß
12.8	Electrical heated **laboratory firing aggregates:** • 9-KW-kilnup to 1350 °C • High temperature kiln up to 1600 °C • High temperature kiln up to 1750 °C	Mr. Bormann / Mr. Clauß

13. Analyses of raw- and ready-made glazes

	glaze-analyses	contact
13.1.	Determination of **length of flow** of glazes and ceramic fluxes by channel viscosimeter	Ms. Hohlfeld
13.2.	Determination of melting behavior by **heating microscope** and **dilatometer analyses**	Mr. Hantzsch
13.3.	Determination of **scratch hardness** according to Mohs according to DIN EN 15771	Ms. Hohlfeld
13.4.	Determination of **glaze abrasion resistance**; sprinkling method with corundum K 63 (it corresponds to DIN graininess 24)	Ms. Friedrich
13.5.	Determination of **glaze crazing resistance** under hydrothermal conditions (autoclave test) according to DIN EN ISO 10545-11	Ms. Hohlfeld
13.6.	**Color measurement** and determination of whiteness degree	Mr. Hantzsch
13.7.	**Gloss measurement** of flat surfaces Remission measurement with 3 angles	Ms. Friedrich
13.8.	Review of the **wetting ability** of low viscosity media on solid surfaces by determination of the **contact angle** at room temperature by digital microscope VHX 5000 (Keyence)	Mr. Hantzsch

14. Analyses of ceramic tiles and plates

	Analyses of ceramic tiles and plates	Contact
14.1.	Determination of **dimensions and surface characteristics** of tiles and plates according to DIN EN10545-2	Ms. Hohlfeld
14.2.	Determination of **water absorption** of tiles and plates according to DIN EN ISO 10545-3	Ms. Hohlfeld / Ms. Friedrich
14.3.	Determination of **bending strength after drying** of unfired wall and floor tiles according to DIN EN ISO 10545-4	Ms. Hohlfeld / Ms. Friedrich
14.4.	Determination of **bending strength after firing** of fired wall and floor tiles according to DIN EN ISO 10545-4	Ms. Hohlfeld / Ms. Friedrich
14.5.	Determination of **scratch hardness** according to Mohs according to DIN EN 15771	Ms. Friedrich
14.6.	Determination of **deep abrasion** of unglazed tiles and plates according to DIN EN ISO 10545-6	Ms. Hohlfeld
14.7.	Determination of resistance of glazed tiles and plates to **surface abrasion** according to DIN EN ISO 10545-7	Ms. Hohlfeld / Ms. Friedrich
14.8.	Determination of **linear thermal expansion** of tiles and plates according to DIN EN ISO 10545-8	Ms. Hohlfeld / Ms. Friedrich
14.9.	Determination of **thermal shock resistance** of tiles and plates according to DIN EN ISO 10545-9	Ms. Hohlfeld
14.10.	Determination of **moisture expansion** of tiles and plates according to DIN EN 10545-10	Ms. Hohlfeld / Mr. Hantzsch
14.11.	Measurement of **resistance to glaze cracks** of tiles and plates according to DIN EN ISO 10545-11 (autoclave)	Ms. Hohlfeld
14.12.	Determination of **frost resistance** of tiles and plates according to DIN EN 10545-12	Ms. Hohlfeld
14.13.	**Chemical resistance** of wall tiles and plates according to DIN EN ISO 10545-13	Ms. Hohlfeld / Ms. Friedrich
14.14.	Determination of **resistance to specking** of wall tiles and plates according to DIN EN 10545-14	Ms. Hohlfeld / Ms. Friedrich
14.15.	Determination of **the solubility of Lead and Cadmium** according to DIN EN 10545-15	Ms. Hohlfeld
14.16.	Determination of **slip resistant properties** according to DIN 51130 + 51097	Ms. Hohlfeld

15. Analyses of roof tiles

	Analyses of roof tiles	contact
15.1.	Analysis of **frost resistance** of roof tiles and roof tile accessories - according to DIN EN 539-2:013, all-over freezing after soaking - according to KI – method (48 cycles / vacuum soaking / all-over freezing) - according to old DIN 52253-2 / Stegmüller method / vacuum soaking	Ms. Hohlfeld
15.2.	**Water impermeability** of roof tiles according to DIN EN 539-1	Ms. Hohlfeld
15.3.	Determination of **water-soluble salts,** eluate preparation in dependence on DIN 19529	Ms. Hohlfeld
15.4.	Determination of **floating enclosures** (steam test) DIN 105-41 / DIN 105-4	Ms. Hohlfeld
15.5.	Determination of **moisture expansion** by low temperature dilatometer	Ms. Hohlfeld / Mr. Hantzsch
15.6.	Determination of **crazing safety** of glazed structural ceramics by autoclave	Ms. Hohlfeld
15.7.	Determination of **UV-resistance / light stability** of glazed structural ceramics by cyclic stress with UV radiation and sprinkling (28 days)	Ms. Hohlfeld
15.8.	Determination of **climate persistence** of glazed structural ceramics against humidity and temperature in a climate chamber	Ms. Hohlfeld
15.9.	Determination of **persistence of glazed surfaces against boiling water and steam** (leaching behavior) according to DIN ISO 28706-2	Ms. Hohlfeld
15.10.	**Hydrochloric acid rapid test** to determine glaze persistence (3% HCl / 7 day testing/ day 7 under Infrared)	Ms. Hohlfeld
15.11.	Determination of **bending loading capacity** of roof tiles according to DIN EN 538	Ms. Hohlfeld
15.12.	Measurement of **geometrical properties** according to DIN EN 1024	Ms. Hohlfeld

16. Analyses of bricks, facing bricks and backing bricks

	Analyses of bricks, facing bricks and backing bricks	contact
16.1.	Determination of **water-soluble salts,** eluate preparation according to DIN 19529	Ms. Hohlfeld
16.2.	**Frost persistence** (25 cycles) according to DIN 52252-1	Ms. Hohlfeld
16.3.	Determination of **floating enclosures** (steam test) DIN 105-41 / DIN 105-4	Ms. Hohlfeld
16.4.	Analysis of **acid persistence**, depending on the use, according to DIN EN ISO 10545-13; bricks according to DIN EN 993-16; e.g. bricks for acid protective building according to DIN 4051; sewer bricks	Ms. Hohlfeld
16.5.	**Abrasive wear test** according to Böhme, according to DIN 52108 • Determination of loss of volume • Determination of loss of thickness	Ms. Hohlfeld
16.6.	Determination of **moisture expansion** by low temperature dilatometer	Ms. Hohlfeld / Mr. Hantzsch
16.7.	Determination of **crazing safety** of glazed structural ceramics by autoclave	Ms. Hohlfeld
16.8.	Determination of **UV-resistance / light stability** of glazed structural ceramics by cyclic stress with UV radiation and sprinkling	Ms. Hohlfeld
16.9.	Determination of **climate persistence** of glazed structural ceramics against humidity and temperature in a climate chamber	Ms. Hohlfeld
16.10.	Determination of **compression strength** of solid bricks and hollow bricks according to DIN EN 772-1	Ms. Hohlfeld
16.11.	Measurement of **geometrical properties** according to DIN EN 771-1	Ms. Hohlfeld

17. Analyses of paver bricks

	Analyses of paver bricks	contact
17.1.	Determination of **water-soluble salts,** eluate preparation according to DIN 19529	Mr. Köhler
17.2.	**Frost persistence** (100 cycles) according to DIN EN 1344	Mr. Köhler / Ms. Hohlfeld
17.3.	Determination of **floating enclosures** (steam test) DIN 105-41 / DIN 105-4	Mr. Köhler / Ms. Hohlfeld
17.4.	Analysis of **acid persistence**, depending on the use, according to old DIN 51102-1, sewer bricks, lumps according to DIN EN 993-16; e.g. bricks for acid protective building, grains according to DIN EN 1344 paver bricks according to DIN 4051, sewer bricks , grains	Mr. Köhler / Ms. Hohlfeld
17.5.	**Abrasive wear test** according to Böhme, according to DIN 52108 • Determination of loss of volume • Determination of loss of thickness	Mr. Köhler / Ms. Hohlfeld
17.6.	Determination of **moisture expansion** by low temperature dilatometer	Mr. Köhler / Mr. Hantzsch
17.7.	Determination of **crazing safety** of glazed structural ceramics by autoclave	Mr. Köhler / Ms. Hohlfeld
17.8.	Determination of **UV-resistance / light stability** of glazed structural ceramics by means of cyclic stress with UV radiation and sprinkling	Mr. Köhler / Ms. Hohlfeld
17.9.	Determination of **climate persistence** of glazed structural ceramics to humidity and temperature in a climate chamber	Mr. Köhler / Ms. Hohlfeld
17.10.	Determination of **bending loading capacity** according to DIN EN 1344 also of flexural tension load and compression strength according to DIN 18503	Mr. Köhler
17.11.	Determination of **water absorption** according to DIN 18503	Mr. Köhler
17.12.	Determination of **water permeability** (coefficient of permeability) according to guideline for water permeable paver bricks featuring no fines concrete	Mr. Köhler
17.13.	Measurement of **geometrical properties** according to DIN EN 1344	Mr. Köhler / Ms. Hohlfeld

18. Analyses of granules

	Analyses of granules	contact
18.1.	**Test sieving** according to DIN 66165, part 1 and 2; max. 7 sieves	Mr. Clauß
18.2.	Determination of **free-flowing behavior** of granules	Mr. Clauß
18.3.	Determination of **powder density,** according to DIN EN 1097-3	Mr. Clauß
18.4.	Determination of **abrasion** of granules	Mr. Clauß

19. Analyses of fine ceramics

	Analyses of fine ceramics	contact
19.1.	Determination of **thermal shock resistance** of fine ceramics (Harkort-test)	Ms. Hohlfeld
19.2.	Determination of **dishwasher persistence** of decorated tableware, according to DIN EN 12875 -1 by testing dishwasher G 540 Miele	Ms. Friedrich
19.3.	**Microwave test** according to DIN EN 15284	Ms. Friedrich
19.4.	Determination of **acid resistance / pollutant emission** of lead and cadmium according to DIN EN 1388-1 and -2 • cold acidification • hot extraction • Determination of lead and cadmium	Ms. Pylypenko
19.5.	Determination of **scratch hardness** according to Mohs according to DIN EN 15771	Ms. Friedrich
19.6.	Measurement of **resistance to glaze cracks** of table ware (autoclave)	Ms. Hohlfeld
19.7.	Determination of **edge impact stability**	Ms. Friedrich

20. Analyses of refractories

	Analyses of refractories	contact
20.1.	Determination of **bulk density, open porosity and total porosity** according to DIN EN 993-1	Ms. Hohlfeld
20.2.	Determination of **cold compression strength** according to DIN EN 993-5	Ms. Hohlfeld
20.3.	Determination of **bending strength at room temperature** according to DIN EN 993-6	Ms. Hohlfeld
20.4.	Determination of **bending strength at elevated temperature** according to DIN EN 993-7	Ms. Hohlfeld
20.5.	Determination of **pressure flow** according to DIN EN 993-9 • Up to 1500 °C / 25 h or 50 h	Ms. Hohlfeld
20.6.	**Abrasive wear test** according to Böhme (DIN 52108) • Determination of loss of volume • Determination of loss of thickness	Ms. Hohlfeld
20.7.	Determination of **thermal shock resistance** of refractory bricks according to DIN 51068 (water quenching method) or DIN EN 993-11	Ms. Hohlfeld
20.8.	Determination of **post shrinkage / secondary expansion** according to DIN EN 1094-6 or DIN EN 993-10	Ms. Hohlfeld
20.9.	Determination of **pressure softening** according to DIN EN ISO 1893	Ms. Hohlfeld
20.10.	Determination of **bulk density of granular materials** by mercury expulsion method according to DIN EN 993-17	Ms. Hohlfeld
20.11.	Determination of **oxidation resistance** of max. 10 SiC-samples up to 1200 °C by steam atmosphere, in dependence on ASTM C 863 -83	Ms. Hohlfeld
20.12.	Analysis of **Si_3N_4**, quantitative by x-ray diffractometer (XRD)	Mr. Köhler
20.13.	Analysis of **SiC**, quantitative by x-ray diffractometer (XRD)	Mr. Köhler
20.14.	Determination of **pyrometric cone equivalent** according to DIN EN 993-12	Mr. Köhler

21. Special services

	Special services	contact
21.1.	Determination of **calorific and heating value** according to DIN 51900 part 1 and 2	Mr. Bormann
21.2.	Determination of **bacterial counts** in ceramic masses (anaerobic / aerobic)	Mr. Clauß
21.3	Execution of **measurements of emission** - Check systems for emission limiting values	Mr. Dr. Petzold