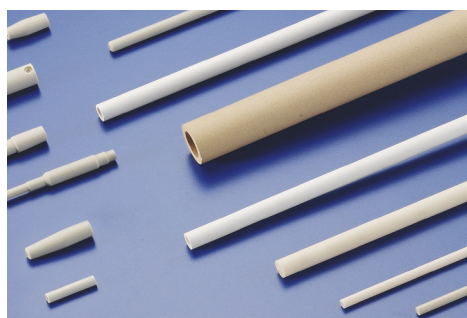
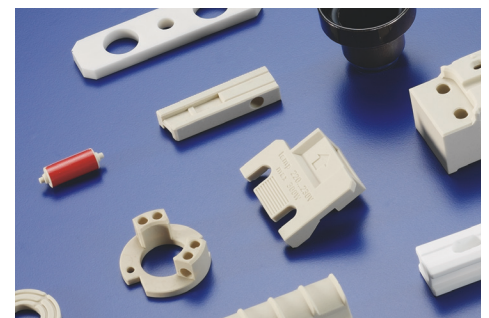
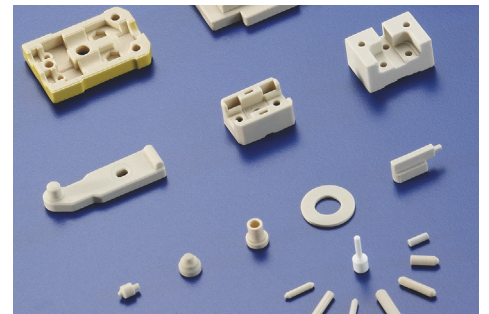


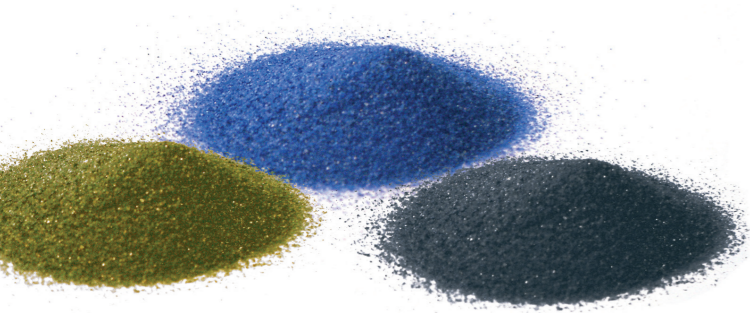
VOGT

Ceramic Components



Innovative
in Ceramics

VOGT Ceramic Components



For more than 40 years, VOGT GmbH has been manufacturing technical ceramic components. Our many years of experience have contributed towards our customers' success. With the aid of our expertise, we can influence the design of a new product at an early stage.

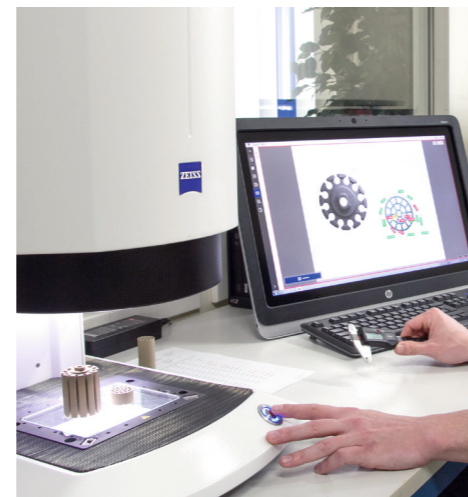
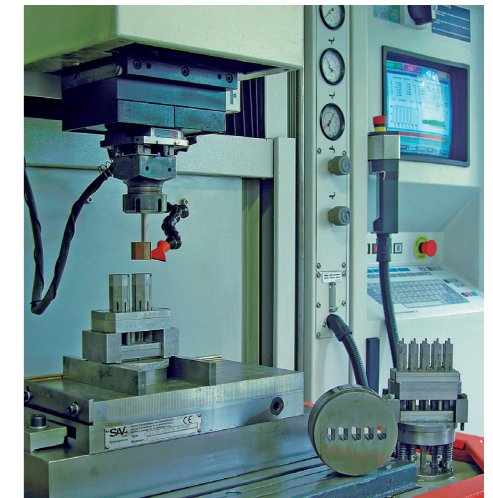
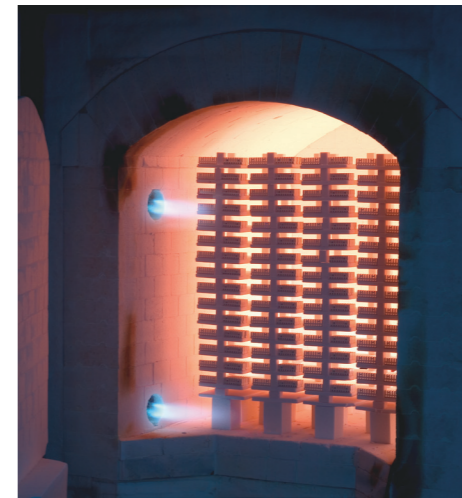
Thus, we are not only suppliers, but also competent partners in the development of functional solutions. Our targets are engineering ceramics for high-tech applications and performing value analyses.

State-of-the-art moulding machines and sintering plants with temperatures up to 1750°C enable production of high-precision and high-quality ceramic components over an area of 4,000 m². The tools, designed using CAD/CAM technologies, are manufactured in our own tool-shop and form the basis for our flexibility and capability. DIN ISO 9001:2000 certification is a prerequisite to ensure our customers' increasingly stringent requirements.

Due to their excellent physical properties, technical ceramic components are used in a wide range of industries. Components made of such materials are especially characterized by their electrical and mechanical properties at maximum temperatures, their wear and corrosion resistance. They offer decisive advantages where other materials meet their limits. Thus, technical ceramic components often have a crucial task as integral parts of high-quality system modules.

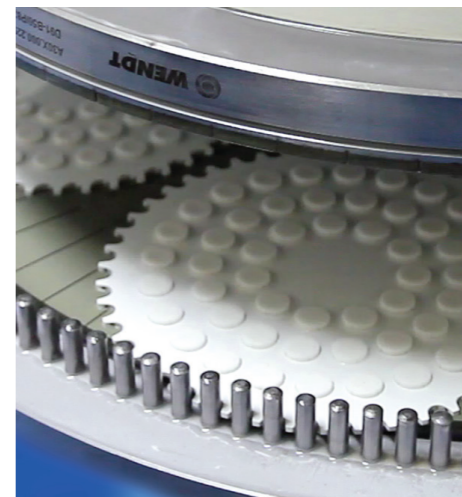
The advantages of ceramic components at a glance:

- Electrical insulation
- Mechanical strength
- Low density
- Wear resistance and hardness
- Tracking resistance
- Resistance to high temperatures
- Resistance to thermal shock
- Resistance to climate and ageing
- Environmentally compatible disposal
- Chemical resistance
- Food safe

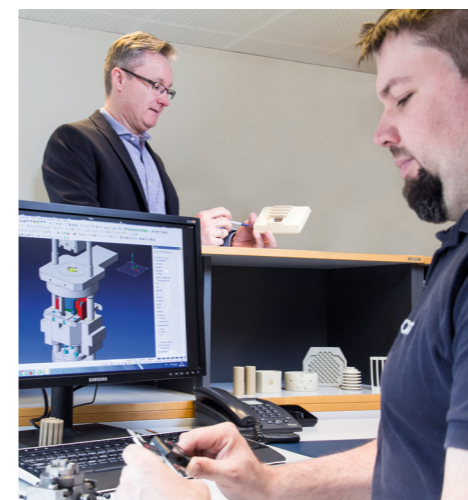


DRY PRESSING

QUALITY ASSURANCE



GRINDING

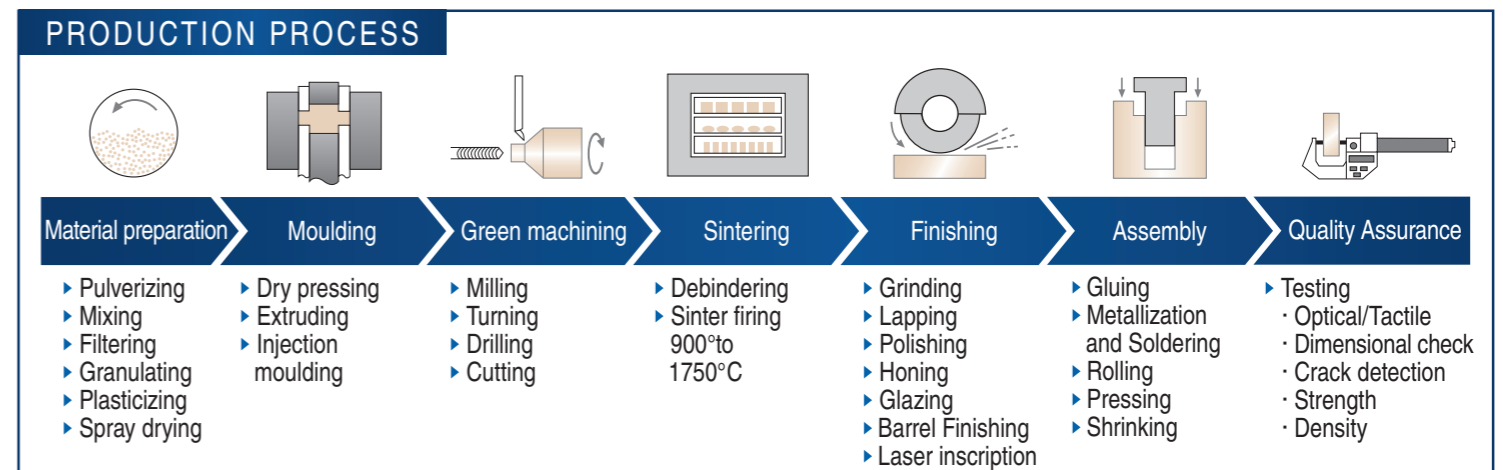
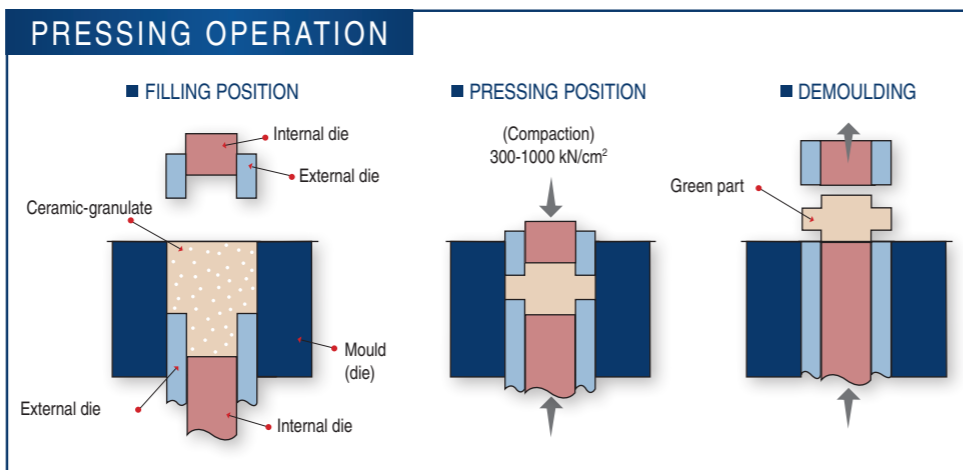


DESIGN

TOOLMAKING



SINTERING



Highlights in Ceramics

Application examples



Sealing and regulating discs
for hydro-engineering, pneumatic, hydraulic systems

Valves
in medical technology and in household appliances

Pump components
for sliding ring bearings, pistons, seals, suitable for abrasive substances



Parts for processing plant and apparatus engineering
Level indicators, soldering stations, projectors, high-accuracy weighing machines, spark suppressors, laser systems, X-ray analyzers, locators for high-load resistors, potentiometer rings, insulating rings for injection-moulding tools with low heat conduction



Bushes and break tubes
for tubular heaters and heating cartridges

Heater formers
for cylinder heating and heating/cooling combination system, fan heaters

Structural parts
for industrial furnaces, heat guns, continuous-flow heaters, heat exchangers



Pressure sensors
with diaphragm thicknesses up to 0.12 mm, fluid-resistant

Sensor holder
for smoke detector in aircraft construction

Temperature sensors
for thermal protection, air conditioning, thermometers



Components for household appliances
such as thermal radiators, cookers, toasters, fan heaters, microwave ovens and the components required for

Temperature controllers
such as controller housing, baseplate, actuating pins and control levers.

Thermocouples and plug-in connectors



Lamp holders
also in special design with coding and for multi-lamp fitting, Ex-protected holders



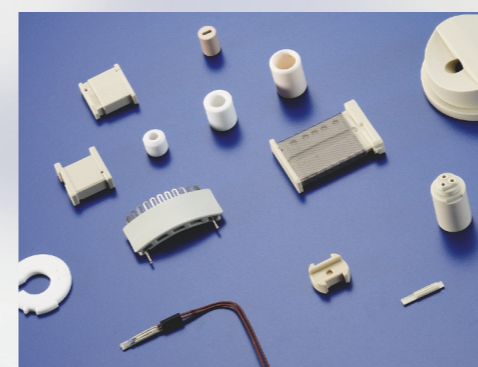
Lamp sockets
in more than 100 variations of standard and special design for UV and IR radiators, halogen metal vapor lamps with 1, 2 or 4 pins in brass, nickel, steel or with pigtail leads. On request with colored glazing or laser inscription.



Nozzles
featuring high abrasion-resistance, minimum wear and high corrosion-resistance for high-pressure cleaning systems up to 2,000 bar and nozzle-hole diameters up to 0.15 mm, for metal-powder atomizing, powder coating plants or glue supply systems



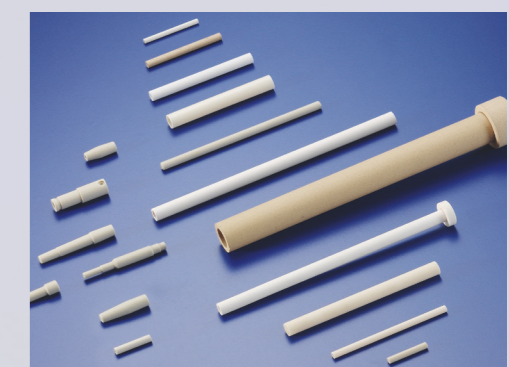
Insulators
for apparatus construction, electrostatic filter plants, transformer bushes, post insulators, corona surface coating plants, unglazed and glazed



Automotive components
for lambda probes, diesel emission engineering, sealing discs for petrol pumps, electrical resistors for fan motors and instrument illumination, plain bearings in aggressive exhaust gas, support for temperature sensors in heating installations



Ceramics-metal composites
all the conventional connection techniques, screw-fastening, riveting, upsetting, roller-burnishing, gluing, soldering, in industrial quantities using assembly robots



Tubes, axes, measuring components
Tubes: single- and multi-hole, collar tubes, tubes for starting electrode
Axes: high-precision grinded with cross-holes or grooves

Background image

- Sensor holder
- Cutting blades and knives
- Special lamp holders
- Pincer inserts
- Micro components
- Parts of watches and jewellery

Steatite C221

Primarily consisting of magnesium silicate
Dense material structure
Good mechanical properties
High volume resistance up to 1000°C
Small loss factor

Steatite porous C230

Primarily consisting of magnesium silicate
Porous material structure
Low mechanical strength
Machinable

Cordierite C410

Magnesium aluminium silicate
Dense material structure
High resistance to thermal shock
Very low linear expansion

Cordierite porous C520

Magnesium aluminium silicate
Porous material structure
Low mechanical strength
High resistance to thermal shock
Low linear expansion

Mullite C620

Aluminium silicate
Approx. 70% Al₂O₃
Dense material structure

Aluminium oxide C795, C799, ZTA

C795: >95% bis 99% Al₂O₃ - our standard with approx. 96% purity
C799: >99% Al₂O₃ - our standard with 99.7% purity, in addition, a high-purity variant with 99.99% is available
Mixed oxide ceramics ZTA: from aluminum oxide and zirconium oxide
Dense material structure
High mechanical strength and hardness
High surface quality
High thermal conductivity and thermostability
High chemical resistance

Zirconium oxide C830

TZP Yttrium-partially stabilized
Very high mechanical strength
High edge stability
Very good surface quality

PSZ Magnesium-partially stabilized
Very good tribological properties
High corrosion resistance

Aluminium titanate ATI

Porous material structure
Very low linear expansion
Very high resistance to thermal shock
Low thermal conductivity
Low wetting in case of metal melts

Properties	Symbol	Unit	Steatite C221	Steatite porous C230	Cordierite C410	Cordierite porous C520	Mullite C620	Aluminium oxide C795	Aluminium oxide C799	Zirconium oxide Y ₂ O ₃ partially stabilized C830 / TZP	Zirconium oxide MgO partially stabilized C830 / PSZ	Aluminium titanate ATI	
Mechanical (at room temp.)													
Open porosity	P _a	% by vol.	0	35	0,5	20	0	0	0	0	0	7-16	
Min. density	P _a	g/cm ³	2,7	1,8	2,1	1,9	2,8	3,7	3,9	6,0	5,7	3,5	
Compressive strength	σ ₀₈	MPa	900	100	300	200	-	1800	2100	2200	1800	450	
Bending strength	σ ₁₈	MPa	140 ¹⁾	30 ¹⁾	60 ¹⁾	25 ¹⁾	150 ²⁾	280 ²⁾	300 ²⁾	1100 ¹⁾	500 ¹⁾	40 ²⁾	
Modulus of elasticity	E	GPa	110	-	-	-	150	280	300	205	205	35	
Mohs' hardness (index)	MH	Diamond=1	7	-	7	6	7	9	9	8	6,5	-	
Vickers hardness	HV ₁₀	GPa	-	-	-	-	-	12-15	17-23	12	9	5	
Thermal													
Coefficient of thermal linear expansion	α _t	10 ⁻⁶ K ⁻¹	20-100°C	6-8	8-10	1-3	3-6	5-6	5-7	5-7	8-9	8-9	0,5
			20-300°C	7-9	8-10	1-3	4-6	5-6	6-7,5	6-8	9-11	9-11	0,5 - 1,5
			20-600°C	7-9	8-10	2-4	4-6	5-7	6-8	7-8	10-12	10-12	1 - 2
			20-1000°C	8-9	-	2-4,5	4-6	5-7	7-9	7-9	11-13	11-13	1,5 - 2
Specific heat capacity	c _p	Jkg ⁻¹ K ⁻¹	800-900	800-900	800-1200	750-850	850-1050	850-1050	850-1050	450-500	450-550	800	
Thermal conductivity	λ	Wm ⁻¹ K ⁻¹	2-3	1,5-2	1,5-2,5	1,3-1,8	6-15	16-28	19-30	1,2-3,5	1,2-3,5	1,5-2,5	
Resistance to thermal shock	ΔT	K	100	-	250	200	150	140	150	80	80	700	
Max. application temperature	T	°C	1200	900	1200	1200	1200	1400	1500	1000	800	900	
Electrical													
Electric strength	E _d	kVmm ⁻¹	20	-	10	-	15	15	17	-	-	-	
Withstand voltage (1-min.)	U	kV	30	-	15	-	20	18	20	-	-	-	
Dielectric constant	ε _r	-	6	-	5	-	8	9	9	22	22	-	
Dissipation factor 20°	tan δ	10 ⁻³	48-62Hz	1,5	-	25	-	-	0,5	0,2	-	-	
			1kHz	-	-	-	-	-	1	0,5	-	-	
Volume resistivity	ρ _v	Ωcm	20°C	10 ¹³	-	10 ¹²	-	10 ¹³	10 ¹⁴	10 ¹⁴	10 ¹¹	10 ¹¹	10 ¹⁴
			200°C	10 ¹¹	10 ¹⁰	10 ⁸	10 ⁹	10 ¹¹	10 ¹²	10 ¹²	-	-	
			600°C	10 ⁷	10 ⁷	10 ⁵	10 ⁵	10 ⁶	10 ⁸	10 ⁸	10 ³ -10 ⁶	10 ³ -10 ⁶	10 ⁹
T for volume resistivity	T _{k100}	°C	100 MΩcm	500	500	200	-	300	500	500	100	100	-
			1 MΩcm	800	800	400	500	600	800	800	350	350	-
Tracking behaviour	KF	KC-steps	600	600	600	600	-	600	600	600	600	-	

Admissible dimensional deviations in mm

Nominal size range	≤ 4	≤ 6	≤ 8	≤ 10	≤ 13	≤ 16	≤ 20	> 20
Tolerance according to DIN 40680 mean	±0,15	±0,2	±0,25	±0,3	±0,35	±0,4	±0,45	±2,0%
Restricted tolerance Class I to be agreed upon	±0,1	-	±0,15	-	±0,2	-	±0,25	±1,5%
Restricted tolerance Class II to be agreed upon	-	±0,1	-	-	±0,15	-	±0,2	±1,0%
Shape and position Tolerance according to DIN 40680-2m	e.g. straightness 0,5% of the length independent according to DIN ISO 8015							
Precision finishing	Tolerances as required grinding, lapping, polishing, honing etc.							

¹⁾ = three-point bending test

²⁾ = four-point bending test

Material comparison

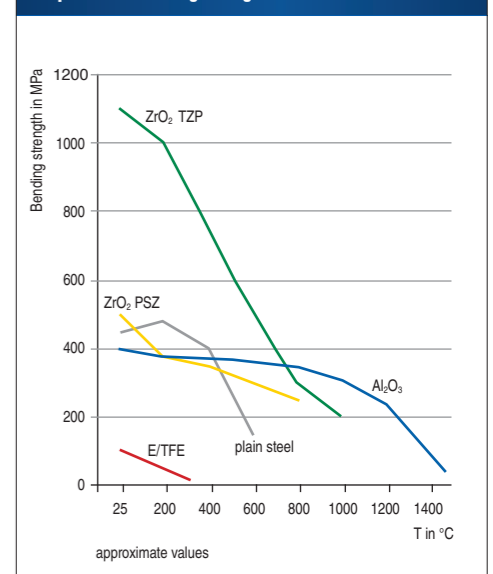
	C221	C230	C410	C520	C620	C795	C799	C830	ATI	Metal	Plastics
Mechanical											
Strength	O	--	-	--	0	+	+	++	-	O	--
Density	-	--	-	--	-	O	+	++	O	++	--
Hardness	O	--	O	-	0	+	++	+	-	O	--
Wear resistance	O	--	-	-	0	+	++	++	-	-	--
Thermal											
Conductivity	-	-	-	-	0	++	++	-	-	++	--
Thermal linear expansion	O	+	--	-	0	O	O	+	--	+	++
Resistance to thermal shock	O	O	+	+	0	O	O	-	++	++	-
High temperature stability	+	O	+	+	+	++	++	O	++	-	--
Electrical											
Electrical insulation	++	-	O	--	+	+	+	O	+	--	++
Dielectric constant	-	-	-	-	0	O	O	++	-	-	-
Dissipation factor	-	-	++	-	-	-	-	-	-	-	-
Chemical resistance	O	--	-	-	0	+	++	+	O	-	--

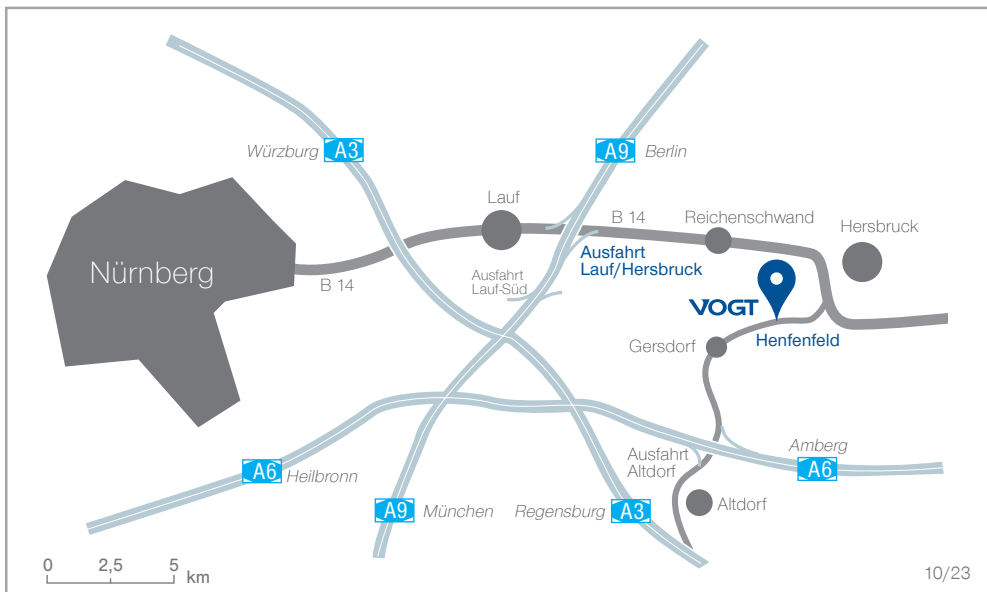
++ very high + high O average - low -- very low

The materials used for our components comply with DIN EN 60672.

The specified values refer to tests performed with test specimens and thus can only be used conditionally for serial components.

Comparison of bending strengths





For further information,
please scan the
pictured QR-Code.



VOGT GmbH

Ottensooser Straße 52
D-91239 Henfenfeld

Tel.: +49 (0) 91 51 90 75 - 0
Fax: +49 (0) 91 51 90 75 - 200

Mail: info@vogt-ceramic.de
Web: www.vogt-ceramic.de