



AURAS HOLDING

EST 1996

CERAMIC PRODUCTS





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Introduction

The experts of Auras Ltd. offer the newest construction products to the customers by using their technical experience with the assistance of suppliers to achieve economical operations of the equipment.

We support our customers in following the changes at their furnaces and applications during the production period and in many cases, we offer solutions to maintenance and quality development of the actual machinery.

Our long-term aim is to make our customers satisfied with the supplied products. The development departments of our partners are trying to satisfy all customers' demand.



Silicon Carbide products



Silicon carbide retains its strength at elevated temperatures as high as 1400°C. In its sintered form (sintered SiC – SSiC) it features high corrosion resistance. As silicon-infiltrated SiC – SiSiC, high precision parts with fine detailed and complex structures can be manufactured. Applications include mechanical seals, pump parts, semiconductor equipment related frame and structural components.

Typical properties of the different Silicon Carbide

Item	Unit	Data
Maximum service temperature	°C	1380
Density	g/cm ³	3.02
Open porosity	%	< 0.1
Bending strength	Mpa	250 (20°C)
	Mpa	280 (1200°C)
Elastic modulus	Gpa	330 (20°C)
	Gpa	300 (1200°C)
Thermal conductivity	W/m-k	45 (1200°C)
Thermal expansion coefficient	K ⁻¹ × 10 ⁻⁶	4.5
Mohs hardness		13
Acid and alkali resistance		Excellent

As the core advanced electronic material for electric vehicle charging modules and electrical modules, silicon carbide can achieve green, low carbon, intelligent and sustainable development.

Solar energy field



For more information please ask for our new Silicon Carbide product catalogue

Applications field of Silicon Carbide products

Electric vehicles industry



Silicon carbide power devices are suitable for some high power module applications such as solar inverters. It enables smaller sizes, lower material costs and higher efficiency.

LED Lighting





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At present, the third-generation semiconductor material technology and application of LED optoelectronic devices made of silicon carbide as the core material is becoming a new strategic high ground for the global semiconductor industry.

Smelting And Mineral Processing Industry



Silicon carbide is second only to diamond in hardness and has a strong wear resistance function, so it is the ideal material for wear-resistant pipe,

impeller, pump room, cyclone, and inner lining of ore bucket.

Non-Ferrous Metal Metallurgy Industry



Silicon carbide with high-temperature resistance, high intensity, good thermal conductivity and impact resistance can be used as high-temperature indirect materials such as pot distillation furnace, a rectification furnace tray, aluminum electrolyzer, copper melting furnace lining, zinc powder furnace arc plate, thermocouple protective tube, etc.



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Mullite ceramic products



Mullite ceramics are high temperature ceramic material with good mechanical strength, and excellent thermal shock properties due to its relatively low thermal expansion coefficient. Mullite ceramic is a good lower cost alternative to dense alumina. Typical applications include, but are not limited to, thermocouple applications, furnace muffle tubes, kiln rollers, sight tubes, rods and kiln furniture.

Typical properties of the Mullite ceramics

Material Grade	Mullite
Physical Properties	
Water Absorption (%)	Impervious: 0.00 - 0.00
Density (g/cc)	2.3
Color	Off White
Mechanical Properties	
Flexural Strength (MPa/20°C)	115
Thermal Properties	
C.T.E. (20-1000°C)	5.1 x 10 ⁻⁶
Safe Operating Temperature (°C)	1500

Kiln rollers

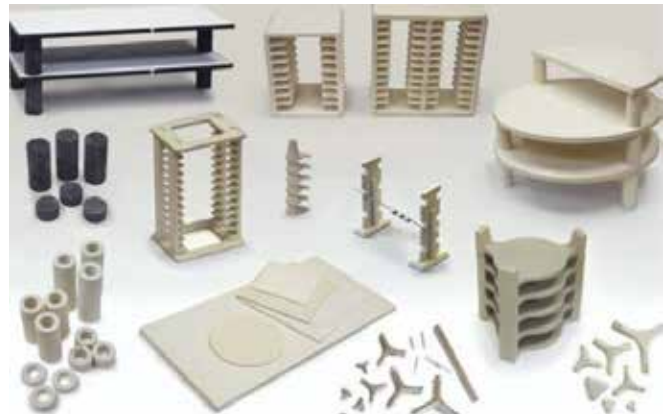


Main applications of Mullite products

Furnace tubes



Kiln furnitures



For more information on our products please ask our staff.



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Alumina ceramics



Alumina or aluminum oxide (Al_2O_3) in its various levels of purity is used more often than any other advanced ceramic material. Auras Refractories Ltd. offers a wide range of material types made by 99,5% and 99,8% Al_2O_3 with different profiles. This material has superb material characteristics such as high electrical insulation, high mechanical strength, high wear and chemical resistance.

Main characteristic of the Aluminum-Oxide (Al_2O_3)

- Very good electrical insulation (1×10^{14} to $1 \times 10^{15} \Omega\text{cm}$)
 - Moderate to extremely high mechanical strength (300 to 630 MPa)
 - Very high compressive strength (2,000 to 4,000 MPa)
 - High hardness (15 to 19 GPa)
 - Moderate thermal conductivity (20 to 30 W/mK)
 - High corrosion and wear resistance
- Good gliding properties
 - Low density (3.75 to 3.95 g/cm³)
 - Operating temperature without mechanical load 1,000 to 1,500°C.
 - Bioinert and food compatible

These products are used for industries in

- automotive industry
- medical and precision equipments
- chemical and petrochemical industry
- paper industry
- chemistry



Magnesium-Oxide (MgO) ceramics



Magnesia (magnesium oxide, MgO) is a specialty ceramic with outstanding high-temperature (2.200 °C) performance, good corrosion resistance, good thermal conductivity and good insulating properties.

Typical properties of the MgO-ceramics

Property	Units	Value
Flexural Strength, MOR (20 °C)	MPa	82 - 103
Fracture Toughness, K_{Ic}	MPa m ^{1/2}	-
Thermal Conductivity (20 °C)	W/m K	-
Coefficient of Thermal Expansion	$1 \times 10^{-6}/^{\circ}\text{C}$	12 - 14
Maximum Use Temperature	°C	-
Dielectric Strength (6.35mm)	ac-kV/mm	-
Dielectric Loss (tan δ)	1MHz, 25 °C	-
Volume Resistivity (25°C)	Ω -cm	1×10^{10} to 6×10^{10}

Applications of MgO-ceramic products

- Thermal engineering
- Heating elements
- Crucibles
- Refractory



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Silicon-Nitrid (Si₃N₄) ceramics



Silicon nitride is a material with excellent specific strengths and very good thermal shock resistance up to application temperatures of 1.600 °C. The low thermal expansion in combination with high stiffness, strength and fracture toughness qualifies the material especially for applications where abrasion is a major problem. Typical applications are parts for mining, milling, mixing and oil and gas industry, automotive industry and gas turbines.

These materials are used for

- Hot and glow plugs in diesel engines
- Molding mold parts (hot forging molds, various molds)
- Casting parts (low pressure castings, various metal melting furnace equipments)
- Die casting machine parts (plungers, sleeves, goosenecks)
- Welding machine parts (guide pin for resistance welding, guide roll for steel pipe weldings)
- Crusher parts (classifiers, airflow type crushers, beads mills)
- Wear resistant parts (wire drawing machine guide rollers, motor shafts, bearings, fishing line yarn paths, wire drawing capstans)
- Semiconductor manufacturing equipment parts (stage parts, linear motors parts)



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Zirkonium (ZrO₂) ceramics



Zirconia offers high strength and toughness. Before zirconia, ceramics were considered impractical for scissors or knife applications. With its excellent properties, zirconia is also used for engineering applications such as pumps.

Zirconia (ZrO₂) is an extremely refractory material. It possesses excellent chemical inertness and corrosion resistance at temperatures well above the melting point of alumina. In addition to its high temperature capability, Zirconia offers low thermal conductivity and is electrically conductive above 800 °C. Also has the unique ability to allow oxygen ions to move freely through the crystal structure above 600 °C.

General properties of Zirkonium Dioxide

Property	Minimum Value	Maximum Value	Units
Atomic Volume (average)	0.02	0.021	m ³ /kmol
Density	5	6,15	Mg/m ³
Energy Content	200	300	MJ/kg
Compressive Strength	1200	5200	MPa
Ductility	0.00066	0.0035	
Elastic Limit	115	711	MPa
Endurance Limit	107	640	MPa
Fracture Toughness	1	8	MPa.m ^{1/2}
Hardness	5500	15750	MPa
Loss Coefficient	0.0005	0.001	
Modulus of Rupture	177	1000	MPa
Shear Modulus	53,4	86,4	GPa
Tensile Strength	115	711	MPa
Young's Modulus	100	250	GPa
Latent Heat of Fusion	700	820	kJ/kg
Maximum Service Temperature	1248	2522	K
Melting Point	2823	2973	K
Specific Heat	420	540	J/kg.K
Thermal Conductivity	1,7	2,7	W/m.K
Thermal Expansion	2,3	12,2	10 ⁻⁶ /K

Application of ZrO₂ products

- Oxygen sensors
- membranes in fuel cells
- deep well valve seats
- marine pump seals
- furnace muffles
- thermocouple protection tubes
- liners
- crucibles
- high temperature heating element support.

These materials are commonly used for pharmaceutical, food, jewellery and cosmetic industries as well.



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Boron-Nitride (BN) ceramics



Boron nitride is a white solid material in the as produced hot pressed form. It is a low porosity solid. It is easily machined into complex shapes using standard carbide tooling. The material is anisotropic in its electrical and mechanical properties due to the hexagonal crystals and their orientation during the hot press consolidation. Due to the densification method used, the physical properties of the material are different according to the perpendicular and parallel axis to the direction of sintering. Boron nitride is non-toxic.

Available Boron Nitride grades:

- NB: Boron Nitride with binder, machinable
- NB HP: high purity Boron Nitride without binder, machinable
- NB HD: high density Boron Nitride, sintered

Characteristic of Boron Nitride products

- High thermal conductivity
- Low thermal expansion
- Excellent thermal shock resistance
- High electrical resistance
- Low dielectric constant and loss tangent
- Chemically inert
- Microwave transparency
- Easily machined – non-abrasive and lubricious

Application of Boron Nitride products

- Plasma arc insulators
- High temperature furnace fixtures and supports (tubes and insulation sleeves)
- Soldering and brazing: nozzles, brazing supports
- Vacuum melting crucibles
- Protection for casting tools
- Smelting and sintering crucibles
- Protection and sheathing for thermocouples and measuring probes
- Electrical insulation at very high temperatures
- Electronic parts- heat sinks, substrates, coil forms, prototypes
- Solar and photovoltaic industry
- Low friction seals
- Microcircuit packaging



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Pyrolytic Boron Nitride Ceramics



PBN is the ideal choice for furnace, electrical, microwave, and semiconductor components.

PBN's properties, its intrinsic purity, superior mechanical strength, and thermal stability make it a superb choice for high temperature furnace and electrical components; microwave and semiconductor components; and industry standardised crucibles for gallium arsenide crystal (GAN) production.

PBN's properties, its intrinsic purity, superior mechanical strength, and thermal stability make it a superb choice for high temperature furnace and electrical components; microwave and semiconductor components; and industry standardised crucibles for gallium arsenide crystal (GAN) production.

PBN will not react with acids, alkalis, organic solvents, molten metals, or Graphite. Bulk impurity levels are less than 100 parts per million with metallic impurities less than 10 parts per million. It withstands 1800° C in vacuum and 2000° C in Nitrogen, showing no melting point, making it an excellent choice for furnace components, and melting vessels. Crucibles heated to 1200°C can be plunged into liquid nitrogen without visible damage. PBN-coated graphite heating elements provide extremely uniform temperature profiles for both compound and silicon semiconductor manufacturing.

Main characteristic of the PBN

- Hexagonal layered structure
- Good thermal conductivity
- High insulation resistance
- High dielectric strength over wide temperature ranges
- Anisotropic physical properties
- High working temperature (>1500° C)
- High electrical resistivity (>10¹⁵ W-cm)
- High dielectric strength
- Low outgassing at elevated temperature
- Non-wetting
- Non-toxic
- Non-reactive to most other compounds
- Withstands high temperatures and rapid cooling
- High purity (>99.99%)



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Cordierite ceramics



Cordierite Ceramics have excellent thermal shock properties. Our Cordierite products are low-cost materials having good mechanical strength, good electrical insulation properties, good wear resistance and can function at safe operating temperatures up to 1500 °C.

General properties fo Cordierite products

No	Item	Value
1	Main Chemical Ingredient	2MgO, 2Al ₂ O ₃ , 5SiO ₂
2	Bulk Density	2.5gm/cc
3	Max Using Temperature	1000°C
4	Water Absorption	0.1%
5	Hardness	800HV
6	Bending Strength	900Kgf/cm ² (20°C)
7	Compressive Strength	3500Kgf/cm ² (20°C)
8	Coefficient of Thermal Expansion	≤2.0(1*10 ⁻⁶ /°C)
9	Dielectric Constant	6(1MHz 25°C)
10	Dielectric Strength	10 ac-KV/mm(ac V/mil)
11	Volume Resistivity	> 10 ¹² ohm-cm(20°C)
12	Color	White, light yellow, etc

Application of Cordierite products

- electric heating elements
- igniters
- resistors
- stand offs
- band heaters
- thermocouple cores
- load banks
- ovens
- furnaces
- connectors
- spacers
- fuses
- gas grill radiants
- sensors
- stiffening rods
- welding backers
- welding ferrules



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Steatite ceramics products



Steatite Ceramics are excellent electrical insulators. Our Steatite products are low-cost materials having good mechanical strength, great electrical insulating properties, good wear and corrosion resistance and can function at safe operating temperatures up to 1000 °C.

General properties of Steatite products

Water Absorption (%)	Impervious: 0.00 – 0.02
Density (g/cc)	2,7
Color	Cream
Flexural Strength (1K PSI)	20
Compressive Strength (1K PSI)	90
Tensile Strength (1K PSI)	9
Hardness (Moh's Scale)	7,5
Impact Resistance (Inch-Lbs.)	5,3
Dielectric Strength (Volts/Mil)	240
Dielectric Constant (@1MHz)	6,2
Volume Resistivity 25 C (ohms-cm)	>1E14
Loss Index (@1MHz)	0.007
C.O.T.E. (20-650 C)	8.4 x 10-6
Safe Operating Temperature (C)	1000
Thermal Conductivity (W/m-C)	3,4

Application of Steatite products

- electric heating elements
- igniters
- lamp bases/sockets
- resistors
- stand offs
- band heaters
- knife sharpeners
- thermocouple cores
- thermostat pins
- load banks
- ovens
- furnaces
- connectors
- spacers
- electrostatic air cleaners
- relays and switches
- fuses
- substrates
- sensors
- stiffening rods



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