VICAR®

CATALOGUE

TECHNICAL CERAMICS
POWDERS AND BODIES

VICAR is a manufacturing company located in Manises (Valencia, Spain) that produces ceramic bodies. **VICAR** was formed in **1972**, by the merging of two family companies (Vila and Carpintero), who had been working since **1913** in the ceramic field.

SERVICES

VICAR offers not only ceramic compositions, but also specialized services about working methods and processes. **VICAR** offers to its customers:

LABORATORY SERVICES ASSISTANCE

PROCESS

Intensive mixing, wet ball milling, calcination, spray-drying, filter-pressing and granulation

ASSISTANCE

For the development and optimization of new products

TECHNICAL ADVICE

On industrial processes and applied engineering

PRODUCTS

VICAR has two commercial lines of products: Traditional ceramic bodies and Technical ceramic bodies.

This catalog shows the standard products of Technical Ceramics, which include the following family products: electroceramics, alumina, steatites, cordierites, mullites, alumina, crucibles, 3D printing, refractory...

The main application areas of these products are: insulators, fuses, filters, high resistance alumina parts, valves, capillary tubes, lamp holders, burners, high tech coatings, sockets, spark plugs protectors, refractory kiln furniture, honeycombs ...

VICAR has many years of experience in the technical ceramics field, which has made us a specialist company in this sector on a national and international scale.

Our customers have a wide range of products at their disposal. The products are sold in different formats depending on the customer's needs:

CRUSHED *Material obtained by mechanical crushing. Size between 0 and 2 cm.*

POWDER *Fine granulated material obtained by dry mixing of micronized materials. Particle size between 0 and 1 mm.*

SPRAY DRIED POWDER *Powdered material obtained by spray drying. Granules between 0 and 0.5 mm.*

PLASTIC MASS *Wet material in the form of plastic mass obtained by filter pressing.*

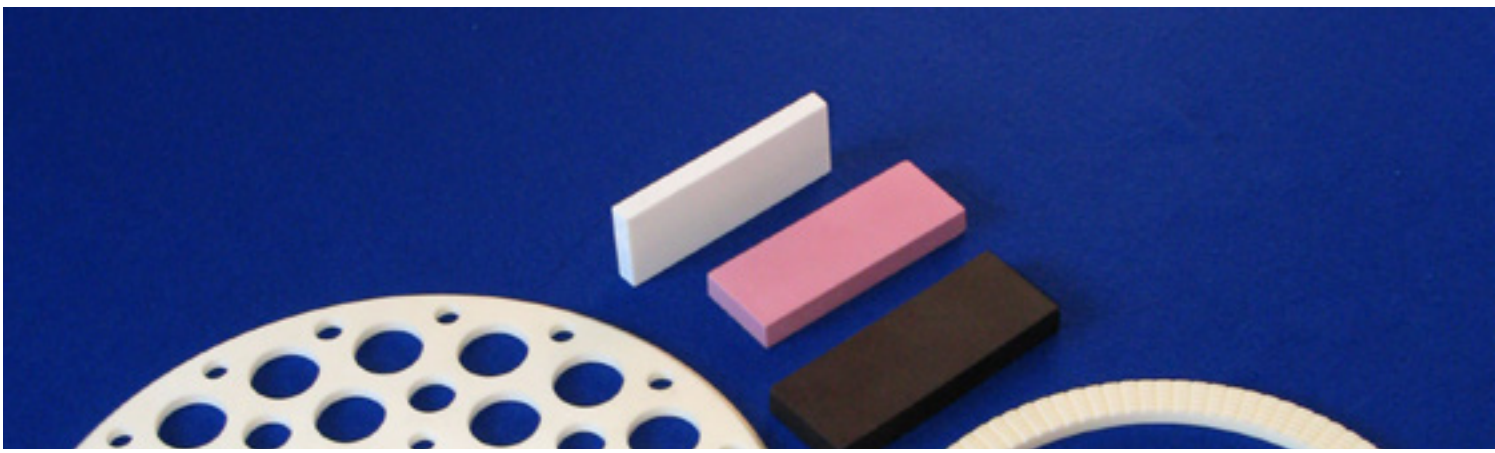
CUSTOMIZED PRODUCTS

VICAR not only offers its standard products, but also offers its customers the possibility of developing new compositions based on their requirements.

VICAR studies new products and prepares samples so the client can test and validate them.

VICAR manufactures these products based on orders with minimum quantities for production to be feasible.

Please contact us if you are interested in compositions with specific parameters, we will be happy to produce it for you.



GROUP C-100 ALUMINO - SILICATES

ELECTROPORCELAINS The Group C100 is composed of porcelains with different alumina content.

Siliceous porcelains (Sub-groups C111 and C112) apply in low voltage areas. Porcelains with improved electrical, mechanical and thermal properties are pro- duced by exchanging quartz (SiO_2) for alumina (Al_2O_3).

The outstanding properties of aluminous porcelains are: very high strength, even under permanent thermal load and favorable long-term behaviour in outdoor con- ditions. Aluminous porcelain is mostly used in outdoor insulators. Nowadays VICAR has materials according to the norm C111, C120 and C130. We can also develop new products according to customer specifications.

NAME	NORM IEC 60672	FIRING TEMPERATURE °C	TEC (25°-600°) 10^{-6} K^{-1}	MANUFACTURING METHOD	FINAL PRODUCT	DESCRIPTION
EPOR-BO2-AT	C-111	1230-1280	7,5 - 8,0	Pressing and extrussion	S	Siliceous electroporcelain
EPOR-SER2-AT	C-111	1150-1200	7,5 - 8,0	Pressing and extrussion	S	Siliceous electroporcelain
EPOR-LTR-AT	C-120	1250-1300	5,5 - 6,0	Pressing and extrussion	S	Siliceous electroporcelain with medium alumina content
EPOR-DUR-AT	C-130	1275-1325	6,2 - 6,7	Pressing and extrussion	S	Electroporcelain with high alumina content
EPOR-DUR-MP	C-130	1250-1300	6,2 - 6,7	Extrussion	M	Filter pressed cakes

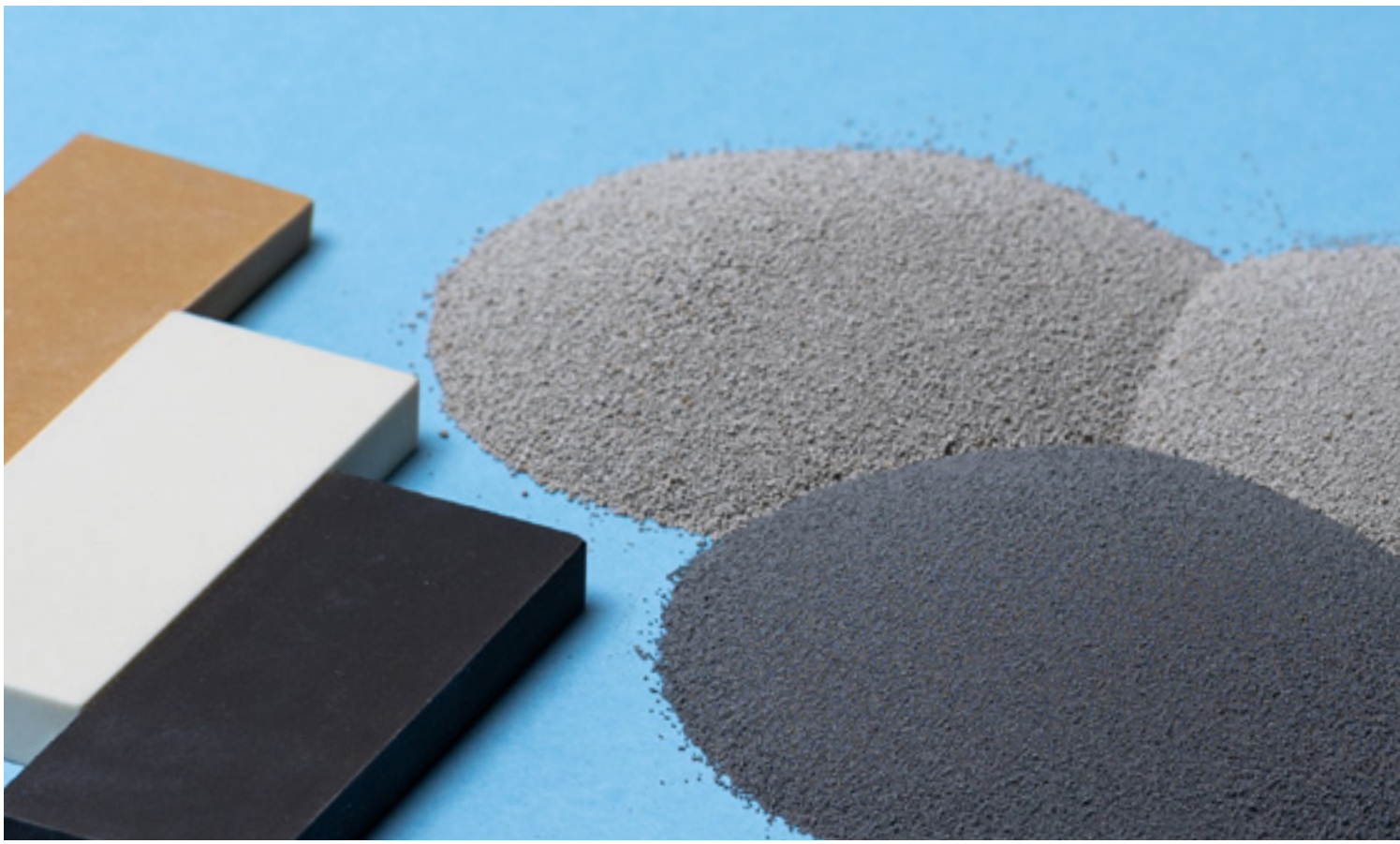
S Spray dried powder M Moist body

GROUP C-200 MAGNESIUM SILICATES

Steatite is a ceramic material composed of natural raw materials, mainly soapstone (magnesium silicate) with the addition of clay, feldspar or barium carbonate as fluxes. Steatite has excellent dielectric properties and it has been used for years in electrical engineering, electronic and heat engineering. Examples of applications include: sockets, control housings, insulating beads, low-voltage power fuses, etc.

Steatites belong to the magnesium silicates group (C200 group).

The type of flux affects the electrical characteristics and leads to the following differentiation: steatite for low-frequency (C210), normal steatite (C220), and special steatite with "low loss factor" (C221).



NAME	NORM IEC 60672	FIRING TEMPERATURE ºC	TEC (25º-600º) 10^{-6} K^{-1}	MANUFACTURING METHOD	FINAL PRODUCT	DESCRIPTION
ST-EX3-AT	C-220	1250-1300	7,5 - 8,0	Extrussión	S	Steatite
ST-SOC-AT	C-220	1240-1280	7,5 - 8,0	Pressing	S	Steatite
ST-GER-AT	C-220	1250-1300	7,7 - 8,2	Pressing	S	Steatite
ST-3D-AT	C-221	1260-1310	7,7 - 8,2	Pressing	S	Steatite
ST-NE-AT	-	1250-1280	8,1 - 8,6	Pressing	S	Coloured dark-brown steatite
FORSTERITA 9-AT	C-240	1350-1400	10,5 - 11,0	Pressing	S	Forsterite

S Spray dried powder

GROUP C-400 / C-500 CORDIERITES

CORDIERITE C410 is often found in insulating applications, heating cartridges or electrical engineering.

The group C500 includes the aluminosilicate magnesium materials. The most important crystalline phase in these compositions is cordierite (2MgO.2Al2O3.5MgO), and the most important property is its low thermal expansion coefficient and its good mechanical resistance.

In the past years, cordierite-based porous ceramics have become more and more important, as light structural materials, thermal insulating or catalyst supports, among others. This group includes the subgroups C510, C511 and C520, which are compositions with different cordierite and porosity contents.

Some examples of current applications are: flow electric water heaters, heating element pipes, heating element supports in furnaces, link heaters, heating cartridges for soldering irons, gas heater inserts, spark protectors catalyst carriers in the automotive industry and so on.

NAME	NORM IEC 60672	FIRING TEMPERATURE °C	TEC (25°-600°) 10^{-6} K^{-1}	MANUFACTURING METHOD	FINAL PRODUCT	DESCRIPTION
COR-CW-AT	C-410	1240-1280	3,2 - 3,7	Pressing and extrussion	S	Non porous aluminous cordierite
COR-22-AT	C-410	1300-1350	4,3 - 4,8	Pressing and extrussion	S	Non porous aluminous cordierite
COR-FUS2-AT	C-410	1300-1350	2,8 - 3,3	Pressing and extrussion	S	Non porous aluminous cordierite
COR-MIK-MP	C-511	1200-1250	2,8 - 3,3	Pressing and extrussion	M	Brownish porous cordierite
COR-51P-AT	C-511	1270-1320	3,2 - 3,7	Pressing	S	Brownish porous cordierite
COR-ITS-AT	C-520	1250-1300	3,0 - 3,5	Pressing	S	Brownish porous cordierite
COR-MAS-AT	C-520	1250-1300	2,8 - 3,3	Pressing	S	Brownish porous cordierite
COR-NEX-AT	C-520	1200-1250	2,8 - 3,3	Pressing and extrussion	S	Brownish porous cordierite
COR-CANDEL-AT	C-520	1200-1250	2,8 - 3,3	Pressing and extrussion	S	Brownish porous cordierite
COR-CANBIS-AT	C-520	1180-1230	2,2 - 2,7	Pressing	S	Brownish porous cordierite
COR-BACO-AT	-	1240-1280	3,2 - 3,7	Pressing and extrussion	S	White dense cordierite
COR-PRESS-PO	-	1270-1320	2,7 - 3,2	Pressing and extrussion	P	Cordierite for refractory applications
COR-P75-PO	-	1230-1280	3,5 - 4,0	Pressing and extrussion	P	High porous cordierite for burners

S Spray dried powder M Moist body P Powder

C-600 MULLITES

Group C600 includes compositions with high content of mullite (3Al2O3.2SiO2). It comprises sub-groups C610 and C620, depending on the alumina content. C610 compositions have between 50-65% of alumina content, and C620 compositions have between 65-80% of alumina content. The microstructure of this material is composed of mullite, corundum and a vitreous phase with low porosity levels. Mullites are dense materials with excellent properties: high strength, low thermal expansion, high resistance to corrosion and high resistance to creep at high tempe- ratures. Applications include: thermocouple protection tubes, carrying rollers for high temperature, molten metal handling, roller kilns, refractory parts for foundry, etc. VICAR uses materials in accordance to the norm C610 and C620, and is also able to develop new products according to customer requirements.

NAME	NORM IEC 60672	FIRING TEMPERATURE ºC	TEC (25º-600º) 10^{-6} K^{-1}	MANUFACTURING METHOD	FINAL PRODUCT	DESCRIPTION
MUL-GAL57X-AT	C-610	1280-1330	6,0 - 6,5	Extrussión	S	Mullite for Refractory applications
MUL-GAL57P-AT	C-610	1280-1330	6,0 - 6,5	Pressing	S	Mullite for Refractory applications
MUL-6202X-AT	C-620	1300-1350	6,7 - 7,2	Extrussión	S	Mullite for Refractory applications
MUL-6212P-AT	C-620	1350-1400	6,8 - 7,3	Pressing	S	Mullite for Refractory applications
MUL-CUP-AT	-	1330-1380	4,2 - 4,7	Pressing	S	Mullite for Refractory applications
MUL-GAL71P-AT	-	1430-1480	5,0 - 5,5	Pressing	S	Mullite for Refractory applications

S Spray dried powder

C-700 ALUMINA

The Group C700 is made up of compositions with high content of alumina (Al2O3). Sub-groups classification (C780, C786, C795 and C799) depend on the alumina content in the composition.

Sub-group C780 has a percentage of alumina content between 80-86%; C786 a percentage of 86-95% alumina content; C795 com- positions have between 96-99% alumina content, and finally sub-group C799 has an alumina content higher than 99%.

Alumina ceramic is the most mature of the engineering ceramics, and it has excellent properties, such as: high strength and hardness, high resistance to corrosion, high thermal conductivity, excellent insulation properties, high toughness and high-temperature strength.

This material has many applications: electrical engineering, electronics, mechanical and plant engineering, chemical and processing technology, medical technology, etc.

NAME	NORM IEC 60672	FIRING TEMPERATURE ºC	TEC (25º-600º) 10^{-6} K^{-1}	MANUFACTURING METHOD	FINAL PRODUCT	DESCRIPTION
ALU-7801P-AT	C-780	1370-1420	6,8 - 7,3	Pressing	S	White alumina composition
ALU-8601P-AT	C-780	1430-1480	7,2 - 7,7	Pressing	S	White alumina composition
ALU-86R25P-AT	C-780	1450-1500	7,2 - 7,7	Pressing	S	86% dark pink alumina
ALU-86R7P-AT	C-780	1450-1500	7,2 - 7,7	Pressing	S	86% light Pink alumina
ALU-9201P-AT	C-786	1525-1575	7,2 - 7,7	Pressing	S	92% alumina
ALU-92R25P-AT	C-786	1525-1675	7,2 - 7,7	Pressing	S	92% dark pink alumina
ALU-92R7P-AT	C-786	1550-1600	7,2 - 7,7	Pressing	S	92% light pink alumina
ALU-9518X-AT	C-795	1550-1600	7,3 - 7,8	Extrussion	S	95% alumina
ALU-9601P-AT	C-795	1620-1670	7,3 - 7,8	Pressing	S	96% alumina
ALU-96R5P-AT	C-795	1620-1670	7,0 - 7,5	Pressing	S	96% light pink alumina
ALU-9901P-AT	C-795	1600-1650	7,3 - 7,8	Pressing	S	99% alumina

S Spray dried powder

CRUCIBLE AND REFRACTORY COMPOSITIONS

This section includes different materials used for the production of refractory elements, murals, sculptures or any other applications with high temperature firing.

These compositions are usually made with a mix of refractory clays and diverse grog (chamotte) qualities. The particle size of these bodies is usually up to 1 mm, to help the resistance of the stresses caused by the gross thickness of the final parts or by thermal shock. We have also included special bodies for crucible manufacturing within this material classification.

They can be used for covering graphite crucibles or directly in foundry of precious metals.

NAME	NORM IEC 60672	FIRING TEMPERATURE ºC	TEC (25º-600º) 10^{-6} K^{-1}	MANUFACTURING METHOD	FINAL PRODUCT	DESCRIPTION
REF-FRAME-1450-PO	Refractory composition	1400-1450	4,5 - 5,0	Pressing and extrussion	P	Mullite for Refractory applications
COR-MUL-PO	Refractory composition	1400-1450	3,5 - 4,0	Pressing and extrussion	P	Cordierite-Mullite for refractory applications
CR-14C-PO	Refractory composition	1200-1300	3,3 - 3,8	Casting	P	Crucible production
CR-14T-PO	Refractory composition	1200-1300	3,6 - 4,1	Pressing	P	Crucible production
CR-DENTAL-G30-PO	Refractory composition	1000-1050	1,5 - 2,0	Casting	P	Crucible production
CR-DENTAL-G100-PO	Refractory composition	1000-1050	1,5 - 2,0	Casting	P	Crucible production

P Powder

POROUS CERAMIC POWDERS

This classification includes various compositions used for manufacturing elements with controlled porosity. Porous materials have very interesting properties, such as: low density, low thermal conductivity and high thermal shock resistance. These materials are suitable in several applications and across different industries: liquid filtering, honeycombs, catalyst supports, thermal insulators, porous burners, perfume industry, etc.

The chemistry composition and the distribution, shape and size of the pores are defined according to the desired application.

NAME	NORM IEC 60672	FIRING TEMPERATURE ºC	TEC (25º-600º) 10^{-6} K^{-1}	MANUFACTURING METHOD	FINAL PRODUCT	DESCRIPTION
DIF3-AT	Porous	1000-1300	4,0 - 7,1	Pressing and extrussión	S	Perfums and other difusion applications
DIF-1400-CA	Porous	1375-1425	6,5 - 7,0	Casting slip	C	Perfums and other difusion applications

S Spray dried powder C Casting Slip

ZIRCONA

Zirconium dioxide (or zircona, ZrO2), sometimes known as zircona, is a white crystalline oxide of zirconium. It crystallizes in monoclinic, tetragonal or cubic systems. Due to the fact the transformation to monoclinic structure brings a volumetric change, different cations are used to stabilize these crystalline structures, such as: magnesium oxide (MgO), calcium oxide (CaO) or yttria oxide (Y2O2). There are two options when stabilizing it: totally (totally stabilized zirconia (TSZ) or partially stabilized zircona (PSZ). The PSZ process is remarkable as it prevents the tetragonal phase transformation to monoclinic phase. The zirconium oxide has achieved a high importance over recent years due to the following properties: extreme fracture resistance, high wear and corrosion resistance, thermal expansion similar to cast iron and low thermal conductivity.

NAME	NORM IEC 60672	FIRING TEMPERATURE ºC	TEC (25º-600º) 10^{-6} K^{-1}	MANUFACTURING METHOD	FINAL PRODUCT	DESCRIPTION
ZIRCONA	3Y-Zircona	1450	-	Pressing	S	Excellent Mechanical Properties

S Spray dried powder

TITANATES

The main characteristic of Alumina Titanate is its exceptional resistance to thermal shock. It has a perfect composition for products that require an extreme thermal shock resistance. They are also chemically inert. Titanates are mainly used in aluminium foundries because of their non-wettability with molten metals.

NAME	NORM IEC 60672	FIRING TEMPERATURE ºC	TEC (25º-600º) 10^{-6} K^{-1}	MANUFACTURING METHOD	FINAL PRODUCT	DESCRIPTION
ALTI-12P-AT	Aluminum Titanate	1410-1460	0,3 - 0,8	Pressing	S	Excellent Thermal Shock Resistance

S Spray dried powder

ADDITIVE MANUFACTURING

Vicar has a range of ceramic powders (silicate and oxide ceramics) for the use as filler in filaments for 3D additive manufacturing, feedstock for CIM (Ceramic Injection Moulding) and other part-forming techniques. A range of compositions covering several ceramic families are available: steatite, cordierite and alumina. These materials are available in micronized powder, conditioned by mechanical and thermal treatments. We have the knowledge and know-how to be able to make compositions adapted to the client's processes.

NAME	NORM IEC 60672	FIRING TEMPERATURE ºC	TEC (25º-600º) 10^{-6} K^{-1}	MANUFACTURING METHOD	FINAL PRODUCT	DESCRIPTION
COR-RJ-CPO	C-410	1300-1350	3,5 - 4,0	3D and CIM	M	Cordierite for AD-CIM Feedstock production
ST-MAG-CPO	C-221	1350-1380	7,4 - 7,9	3D and CIM	M	Steatite for AD-CIM Feedstock production
ST-RJ-CPO	C-220	1270-1320	8,2 - 8,7	3D and CIM	M	Steatite for AD-CIM Feedstock production
ALU-95-CPO	C-795	1550-1600	7,3 - 7,8	3D and CIM	M	Alumina for AD-CIM Feedstock production

M Micronized Powder

ASPIRADOR
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IN CERAMICS

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