

Premium material silicon nitride



CERATIZIT is a high-tech engineering group specialised in tooling and hard material technologies.

Tooling the Future

www.ceratizit.com



Sarah-Jane Breitenreiter,
Customer Service Centre

**Together towards
profitable growth: we
can give you the decisive
competitive advantage.**

Silicon nitride – exactly the solution you are looking for

As a service provider for all relevant sectors that produce goods in an industrial context, CERATIZIT has been offering premium carbide solutions for over 25 years. **Dealing with the toughest requirements** to make the production chains of our customers even more efficient has become **daily routine** for us; we use the best possible individual products that convince our customers in multiple ways.

Whether the product in question is blanks or ground parts, the high-tech special ceramic silicon nitride (Si_3N_4) impresses with its maximum tool life, a standard feature of all products from Hard Material Solutions by CERATIZIT. In addition to high hardness which guarantees **wear resistance**, the material is incredibly light and characterised by mechanical stability. Furthermore silicon nitride products can be used without problems where temperatures vary extremely. And with ceramic, corrosion is not an issue either.

Solutions from CERATIZIT offer you maximum flexibility. Simply inform us of the geometries and dimensions that you require and we will deliver accordingly: this is what premium means. You will always receive the best solution, or more specifically: **exactly the solution you are looking for**. You can benefit from our long-standing expertise along the entire value added chain, as only CERATIZIT manages hard material production from the raw material to the ready-to-use component. Our products are developed to meet our ISO 9001 certification, chosen in mutual consultation between our engineers and optimised for your application. **Rely on leading premium quality** that defies any comparison. We look forward to your ceramic solution!



First choice for many applications

Whenever your applications require the use of silicon nitride, CERATIZIT provides the best tailor-made solutions.

Why is silicon nitride (Si_3N_4) the first choice for special requirements? This list of ten properties of silicon nitride provides the answer.

- ▲ Silicon nitride is corrosion-resistant – even with aggressive media.
- ▲ The mechanical properties are optimal up to 1,200°C.
- ▲ This type of ceramic is extremely hard – even at maximum temperatures.
- ▲ In the long run it excels with optimal damage tolerance.
- ▲ Good friction properties are guaranteed.
- ▲ High specific resistance overcomes any special challenge.
- ▲ It has a unique resistance to thermal shock.
- ▲ Thermal expansion is very low.
- ▲ Si_3N_4 has a very low specific weight.
- ▲ Low density makes many things possible.



Properties that enable the best **solution for your individual requirements** – implemented exactly according to your request.
From Hard Material Solutions by CERATIZIT.



Service by CERATIZIT: experience premium

By developing your ceramic solution with CERATIZIT, you can make use of our **expertise in the smallest details!** You can rely on a specialist who will create a precise solution for your application, optimising and refining it while never losing the focus on technical feasibility. A partner on your level who understands and helps you to select the right grade so that your components meet the highest demands.

CERATIZIT has been providing customers of all industry sectors worldwide with premium solutions covering the entire hard material sector for many years. Ceramic products from Hard Material Solutions by CERATIZIT in this context occupy a special place: **for more than 25 years our carbide experts** as development partners have been responding to specific customer needs. Not only do we supply leading products, but we are **wholeheartedly and passionately committed** to our goal: developing the best solution to ensure optimal

customer satisfaction, for your production and for your premium product.

Partnership? Premium!

For your product at CERATIZIT the following principle applies: **reliability at all times!** From the enquiry to customer advice, development and service: everything from a single source, provided by employees who are available at more than 60 company sites to **answer your questions**, we come to your premises, discuss and create together with you. Our experts **produce reliable products and services** in a reliable fashion. Obviously, this is also the case when it comes to flexible delivery times! All CERATIZIT products of course comply with the strict requirements of ISO:9001. Maximum product quality and an optimum price-performance ratio: as a matter of fact, **exactly the solution you are looking for**, also when it comes to ceramic.



Your selection – your products

‘What can we do for you?’ This is how almost every development process starts: an experienced team of specialists from various disciplines develop ceramic blanks based on your requests and ground **products that stand**

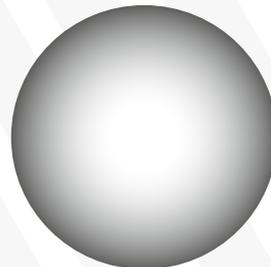
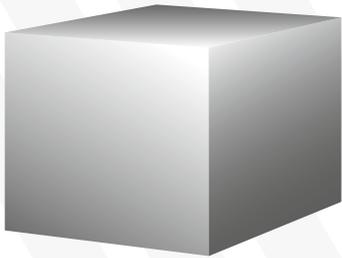
out from the rest. With the solutions of carbide expert CERATIZIT you can be certain of maximum premium quality, no matter what you need.

Solid ceramic bodies

Solid ceramic bodies can be ordered with a maximum volume of **60 x 60 x 60 mm**. Larger components can be produced upon request.

Balls

Balls up to a diameter of **80 mm** are a standard product. Larger balls can be produced upon request.



Blanks: technical data

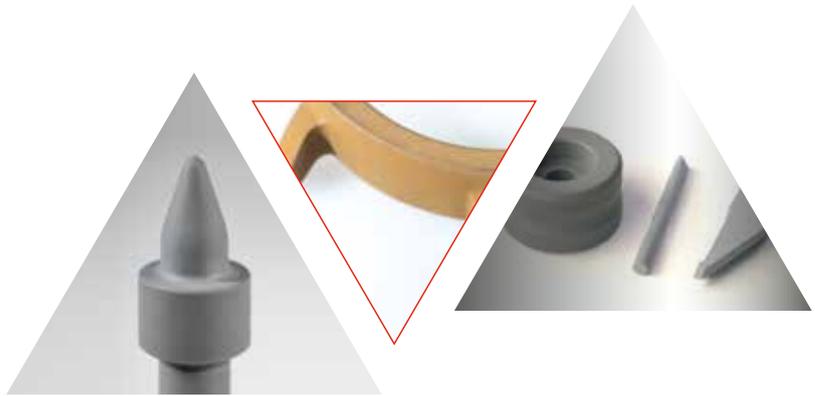
You can receive directly pressed blanks:

- ▲ Tolerance table for ‘Tight tolerances’ can be applied
- ▲ Angularity tolerance: +/- 1°
- ▲ Surface quality: Ra 0.9–1.0

The blanks are also formed manually:

- ▲ Tolerance table for ‘Standard tolerances’ can be applied
- ▲ Angularity tolerance: +/- 2°
- ▲ Surface quality: Ra +/- 1.0

Other position tolerances can be provided at any time and are produced both quickly and efficiently.

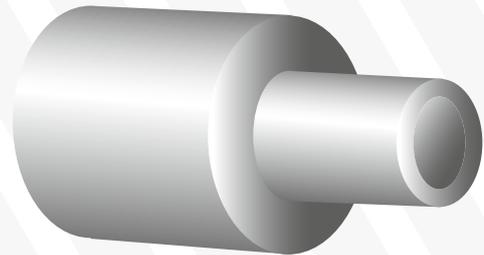
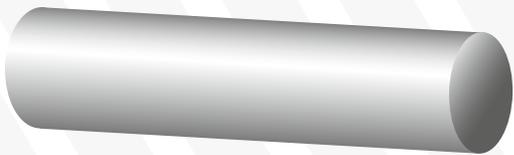


Full ceramic rods

Rods made of full ceramic can be ordered up to a **maximum length of 220 mm**.
The maximum diameter is 40 mm.
Special variants can be produced upon request.

Moulds

You can order any mould within the limit of what is technically feasible: **just state your requirements and CERATIZIT will begin the development** and manufacture of the product with minimum tolerances.
Special formats, sizes and dimensions can be produced upon request.



Ground components: technical data

The following tolerances apply to ground silicon nitride components:

- ▲ Surface quality: $R_a \geq 0.2$
- ▲ Circular run-out: 0.02
- ▲ Circularity: 0.1
- ▲ Parallelism: 0.02
- ▲ Perpendicularity: 0.02
- ▲ Straightness 0.02

If you require even closer tolerances, simply contact your CERATIZIT advisor: together we will find the best solution!

Unlimited variety

If you use premium, you definitely have a reason for doing so: **because your satisfaction as a customer stands or falls on the product quality.** This is what we know with complete certainty at CERATIZIT, as we continually create individual ceramic solutions for different requirements. This means that we have a broad knowledge of the industry, and this is highly valuable because a certain solution sometimes can also be relevant for a similar process in another industrial sector. So the knowledge transfer that takes place substantially supports innovations. **Of course also in this context we follow the principle that everything is created to meet the customer's request,** no conventional standard solutions are offered at all.

Horizontal and vertical

Customers benefit from a portfolio that combines the breadth of various industries with the depth of specialisation. No customer is like

the other, virtually no product is the same as another, processes vary. The logical result is **a portfolio that is exceptional.** Over 25 years of experience with ceramic processes, from the raw material all the way to the final product, guarantee maximum product quality. Drawing on our extensive knowledge in material sciences, we create our **blanks tailored exactly to your requirements;** we can also deliver ground final products.

Leading position in concrete terms

Read about examples of industries and application fields on the next pages. Can't find what you need?

No problem! **Simply get in touch with us: together we can find the right solution for you!** Choose from a portfolio that has proved successful in every respect. From Hard Material Solutions by CERATIZIT.



Wear protection in the machine building industry

Used in high-quality machines throughout the world: products from CERATIZIT.

Product applications

- ▲ Lining material
- ▲ Guide rings for erosion machines
- ▲ Sliding bars
- ▲ Knives
- ▲ Plungers
- ▲ Paddles, crushing bowls and balls
- ▲ Protection rails
- ▲ Transport rolls
- ▲ Bar guides

Technical note

Guide rings are normally glued onto steel. Available as blanks, or ground upon customer request.

Benefits

- ▲ Low weight
- ▲ Low friction coefficient



Wire drawing and metal forming technology



Used in complex processes throughout the world: solutions from CERATIZIT.

Product applications

- ▲ Bending rolls
- ▲ Guide and braking rolls
- ▲ Glass cutters
- ▲ Pressure rolls
- ▲ Forming rolls

Technical note

Metal forming tools made of Si_3N_4 are not only used for cold forming of copper, aluminium, titanium tubes and wire, but also for the hot rolling of stainless steel wire.

All tools show extraordinarily long tool life.

Benefits

- ▲ No electrical conductivity

Welding technology

Used in complex processes throughout the world: ceramic from CERATIZIT.

Product applications

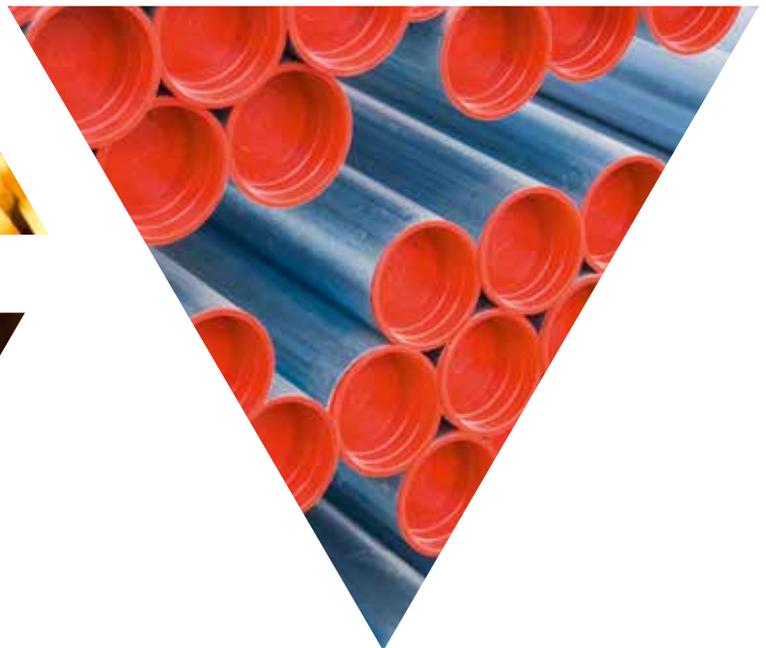
- ▲ Forming rolls
- ▲ Tool holders
- ▲ Centering devices

Technical note

All centering devices are delivered ready for use.

Benefits

- ▲ Thanks to the gas pressure sintering procedure used by CERATIZIT, we are able to deliver even better quality (compared to reaction bonded silicon nitride or zirconia oxide).



Foundry technology

Used throughout the world by foundries:
silicon nitride from CERATIZIT.

Product applications

- ▲ Foundry channels
- ▲ Protective tubes for thermocouples
- ▲ Riser tubes
- ▲ Plunge drawing tubes

Benefits

- ▲ No electro-magnetic reaction with the heating element
- ▲ Very good wetting properties compared to aluminium and non-metal melts
- ▲ Reduced slag sticking



High temperature technology

Used throughout the world with maximum temperatures: innovations from CERATIZIT.

Product applications

- ▲ Guide rolls
- ▲ Sliding blocks
- ▲ Positioning pins
- ▲ Centering devices

Benefits

- ▲ Less temperature reduction when welding
- ▲ Very good insulator



Rolling bearings

Used in important industries throughout the world: reliability from CERATIZIT.

Product applications

- ▲ Glide bearings for the following industries:
 - △ Plant technology
 - △ Chemical industry
 - △ Electrical industry
 - △ Food industry
 - △ Mechanical engineering
- ▲ Hybrid bearings in precision machines
- ▲ Hybrid or full ceramic bearings for the automotive industry (racing), high-speed trains, aerospace industry, wind and marine energy
- ▲ Spindle bearings
- ▲ Bearings for the aerospace industry

Technical note

Balls and rollers are exclusively manufactured from SNCB5.

You will receive mainly blanks, but spindle bearings are available also ground to h6.

Benefits

- ▲ Higher revolution numbers possible
- ▲ Less need for expensive lubricants



Powder technology

Used throughout the world in powder technology: ideas from CERATIZIT.

Product applications

- ▲ Stripper plates/lining material
- ▲ Dedusting systems (cyclones)
- ▲ Screw conveyors
- ▲ Paddles, crushing bowls and balls
- ▲ Mills
- ▲ Impact plates
- ▲ Classifiers

Benefits

- ▲ Higher revolution numbers possible



Food technology

Used throughout the world by leading food producers: premium from CERATIZIT.

Product applications

- ▲ Extruder screws
- ▲ Dies
- ▲ Knives
- ▲ Mixers
- ▲ Pumps
- ▲ Valves

Technical note

In the case of complex components conductive ceramic can be used.

Benefits

- ▲ Chemical resistance
- ▲ FDA approval
- ▲ High thermal conductivity



Grade variety for maximum selection

For different requirements CERATIZIT has the following grades in stock for you:

CTI3105 (SiALON) – cutting tool grade for the machining of special alloys (e.g. full ceramic milling cutters)

CTI3105 (SiALON) – cutting tool grade for the machining of grey cast iron

SNC20 – ECO grade comparable to SNC1

SNC1 – grade for applications where particularly high hardness is decisive

SNCB5 – grade for the production of balls, rollers and rings for bearings (roller bearings, ball bearings etc.)

SNCE10 – ceramic suitable for erosion of very complex components which cannot be produced with the usual procedures. Furthermore this grade is used whenever weight is a relevant factor.

Product range for wear part applications

Properties	Unit	SNC1	SNCB5	SNCE10*	SNC20
Material		grey	black	bronze	
Binder	%	9	12.5	SN/TiN	11.0
Grain size		ultrafine	ultrafine	ultrafine	ultrafine
Density (ISO3369)	g/cm ³	3.25	3.25	4.2	3.24
Hardness (ISO3878)	HV10	1550	1500	1400	1470
Hardness (ISO3738)	HRA	91.5	91.1	90.3	90.8
Transverse rupture strength (ISO3327 – 3 point bend test)	MPa	1100	900	>850	850
Compressive strength	MPa	3000	3000	3000	3000
Modulus of elasticity	GPa	300	300	325	290
Toughness (SEVNB)	MPa·m ^{-1/2}	6.5	6.0	>7	5.7
Thermal conductivity	Wm ⁻¹ K ⁻¹	30	30	60	30
Expansion coefficient	10 ⁻⁶ K ⁻¹	3.3	3.4	5.5	3.4

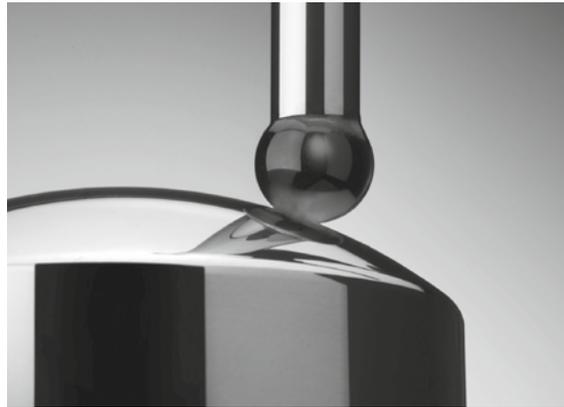
* electro-conductive, suitable for erosion

Hard Material Solutions by CERATIZIT

Wear protection for all applications and industries



- ▲ Individual carbide solutions for your application
- ▲ Tools for metal forming
- ▲ High-performance components for tool construction



Extract from our product portfolio



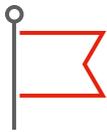
The CERATIZIT Group

For over **95 years**, CERATIZIT has been a **pioneer** developing exceptional hard material products for cutting tools and wear protection.

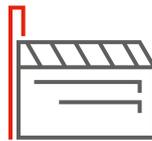
The privately owned company, based in Mamer, Luxembourg, develops and manufactures highly specialised carbide cutting tools, inserts and rods made of hard materials as well as wear parts.

The CERATIZIT Group is the **global market leader** in several wear part application areas, and successfully develops new types of cemented carbide, cermet and ceramic grades which are used for instance in the wood, metal and stone working industries.

Facts and figures



1 headquarters
Mamer (Luxembourg)



34
production sites



> 70
sales subsidiaries



> 9,000
employees



> 100,000
different products



> 1,000
patents and
utility models



> 200
employees in R&D



> 10
innovation awards



30%
of products developed
in the last 5 years

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