



VEHICLES



AEROSPACE



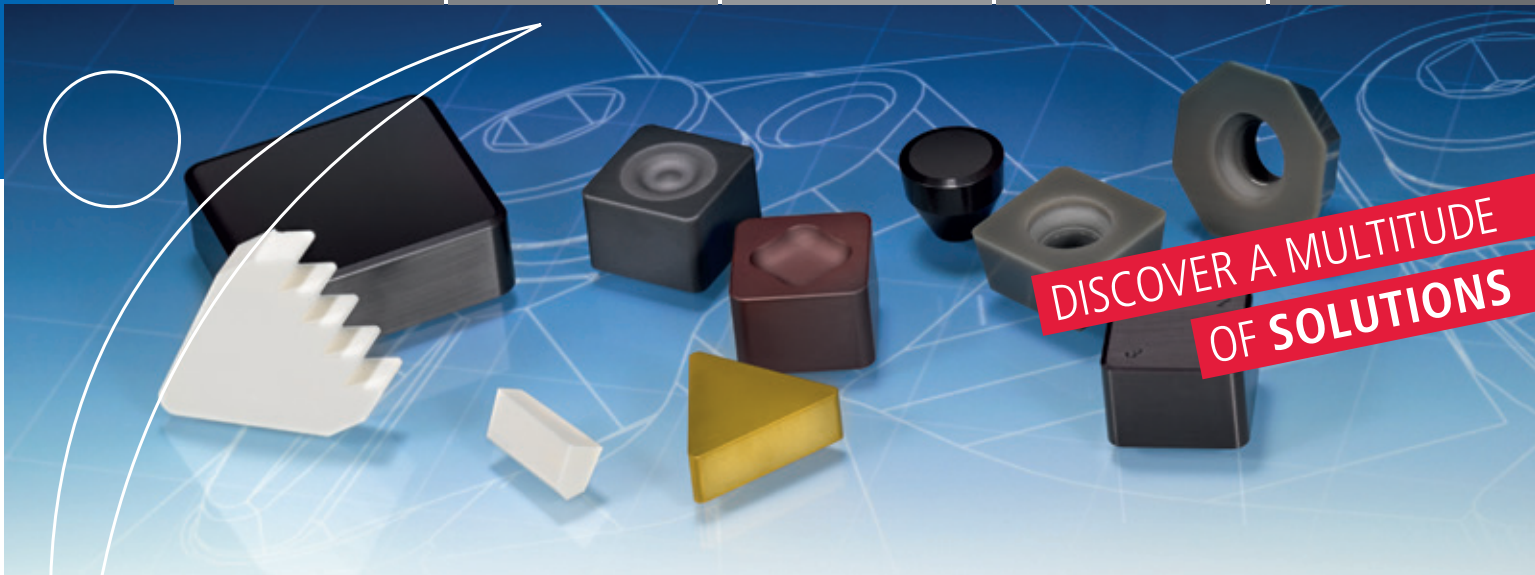
GEARS & BEARINGS



ENGINEERING



WIND ENERGY



DISCOVER A MULTITUDE
OF SOLUTIONS

CERAMIC INSERTS

For Turning, Grooving and Milling

DISCOVER A MULTITUDE OF SOLUTIONS

AEROSPACE

The aerospace industry places extremely high demands on machining. In this field, machining capacity and process safety are the decisive parameters, and our CSA cutting materials together with our Monsoon Tool Technology tools are the optimal solution. Component examples: Jet engine components such as blisks.



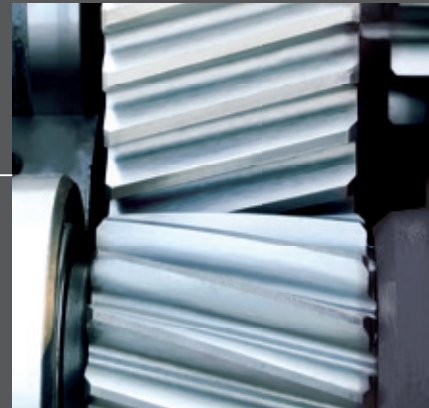
AUTOMOTIVE INDUSTRY

For over 50 years, precision tools from CeramTec have been an integral part of highly productive machining solutions for components from the automotive industry. With our tool solutions, the implementation of concrete cost savings and increased productivity is always top priority. Component examples: Brake discs, gear components, fly wheels, clutch plates, brake components, drive shafts, hydraulic elements, engine/motor components.



MACHINERY AND PLANT ENGINEERING

Manufacturing complex components made of different materials with extreme precision and optimal surface quality in an economic way – that is the basic structure of requirements for which we work together with our customers to create innovative, cost-efficient machining solutions. Component examples: gearbox housings, flanges, guides, shafts, rollers.



WIND ENERGY

In the field of wind energy, special machining solutions are often required because the components involved are frequently very large. Strict tolerance requirements and a high level of surface quality place exceptional demands on the cutting materials and tool holders. By observing and analysing the determining factors for machining, we are able to provide our customers with extremely efficient and cost-effective machining solutions. Component examples: Rotor flanges, rotor blade connections, planetary gear holders, gearbox housings, gear components.

GEAR TECHNOLOGY, DRIVE TECHNOLOGY AND BEARING INDUSTRY

Surface quality, tolerances and the tool life of the cutting materials are the quality standards for hard machining. Our unique range of cutting materials made of PCBN and ceramics, together with our perfectly matched tools, set the bar in this industry. In practice, this results in highly efficient and cost-effective machining. Component examples: Gear wheels, shafts, large gearbox components, bearing rings and rolling elements.

VEHICLE MANUFACTURING INDUSTRY

MOTOR INDUSTRY

The high-performance materials that are used in this industry require cutting materials that ensure an extremely high level of process reliability and a consistently high quality level. Our cutting materials and tools are the perfect solution.

Component examples: Connecting rods, pulley wheels, cylinder heads, cylinder liners.

TRANSPORT

When machining components for the transport industry, special solutions are often required in order for the machining process to remain economic and efficient. Our tools and cutting materials make these kinds of solutions possible.

Component examples: Wheel rims, shafts, bearings.

AGRICULTURAL AND CONSTRUCTION MACHINERY

We offer highly efficient bearing solutions for components for agricultural and construction machinery. Our range of solutions are currently used for machining of soft steel as well as processing cast iron and hardened parts. Component examples: Brake components, drive shafts, hydraulic elements, motor components.

AUTOMOTIVE

For over 50 years, precision tools from CeramTec have been an integral part of highly productive machining solutions for components from the automotive industry:

Component examples: Brake discs, brake drums, fly wheels, connecting rods, gear components, engine blocks.



Motor industry



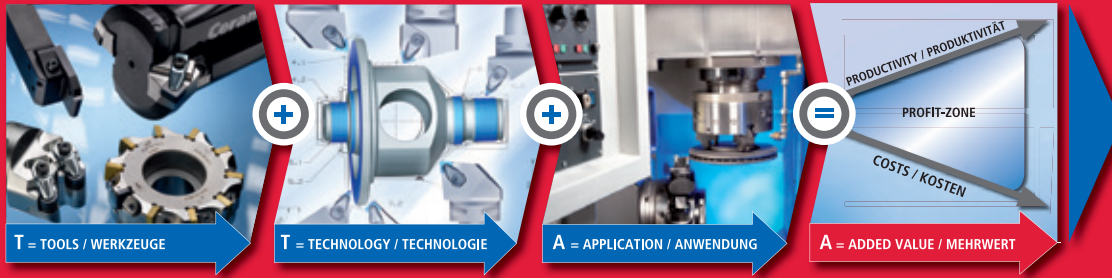
Transport



Agricultural and construction machinery



Automotive





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OXIDE CERAMICS

The traditional ceramic cutting materials based on Al_2O_3 and ZrO_2 are used for grooving, rough turning and finishing grey cast iron and alloyed grey cast iron workpieces without coolant.

SN 60 The Al_2O_3 cutting material with the highest wear resistance and red hardness. Ideal for grooving and turning cast iron with continuous cut.

SN 80 E A standard cutting material for turning cast iron and alloyed cast iron with continuous cut, larger measurements and high standards for wear resistance.

SN 180 This cutting material offers maximum reliability for finish-turning and rough turning grey cast iron with continuous cut thanks to its improved thermal and wear resistance.

MIXED CERAMICS

Mixed ceramics are composite materials made of aluminium oxide and a titanium hardening component with excellent wear resistance and edge stability, even at high temperatures. Mixed ceramics are used in hard part turning of hardened steels, hard turning of rolls and fine machining of workpieces made of grey cast iron.

SH 2 has an extremely homogeneous submicron structure. This results in increased mechanical and thermal resistance and allows a highly precise design of the cutting edges. The mixed ceramic material for hard fine machining with continuous cut.

SH 4 This mixed ceramic material has a significantly increased wear resistance, as well as extreme toughness and high edge stability. The ideal cutting material for both roll machining and finishing grey cast iron and ductile cast iron with continuous or light interrupted cut.

SILICON NITRIDE AND SiAlON CERAMICS

Our cutting materials have to meet a wide variety of requirements, from those of basic rough turning to high-performance machining of difficult to machine cast iron materials with continuous or interrupted cut. Our broad range of cutting materials offers the optimal solution for numerous cutting applications.

SL 408 The basic cutting material for rough turning grey cast iron workpieces with continuous or interrupted cut.

SL 406 This basic type has a fine, homogeneous structure, making it ideal for semi-finishing grey cast iron components with continuous or interrupted cut.

SL 500 This standard silicon nitride ceramic grade offers advantages for a broad range of applications in roughing and finishing grey cast iron materials with continuous or interrupted cut.

SL 506 The finishing specialist for finish turning grey cast iron materials. Embedded hardening components give this material extremely high edge stability and wear resistance without sacrificing its toughness.

SL 508 This cutting material is designed especially for rough turning grey cast iron workpieces, particularly with an interrupted cut. It features maximum toughness with extreme hardness and good wear resistance.

SL 606 This cutting all-rounder can handle applications from finishing to light rough turning. It also offers high size accuracy.

SL 608 This roughing material is ideal for alloyed cast iron materials. It ensures a consistently high output, even under difficult conditions.

SL 808 The SL 808's optimised toughness and wear resistance deliver maximum cutting lengths when rough milling grey cast iron and ductile cast iron with highest feed rates per tooth.

SL 550 C The TiN- Al_2O_3 coating on this silicon nitride ceramic allows it to perform roughing and semi-finishing operations on ductile cast iron workpieces, even under difficult cutting conditions.

SL 554 C The multi-layer Ti-based coating offers increased wear resistance and reduces the friction forces between the material being machined and the cutting material. It is optimised for roughing high-strength ductile cast iron workpieces with an interrupted or smooth cut.

SL 654 C The multi-layer TiCN/TiN coating ensures optimum performance for rough turning fresh grey cast iron. It also allows the cutting data and, as a result, the machining volume to be increased considerably.

SL 658 C This high-end cutting material delivers its best performance during HPC machining of ductile cast iron workpieces. Its multi-layer Al_2O_3 coating allows maximum cutting speeds and large chip cross-section to optimise the cost-effectiveness and productivity of roughing operations.

SL 854 C The multi-layer TiN coating reduces wear and significantly decreases friction between the cutting material and the material being machined. As a result, it offers longer tool lives. This cutting material can be used for semi-finishing and finishing grey cast iron and ductile cast iron.

SL 858 C Maximum toughness and wear resistance make this TiN- Al_2O_3 -coated material ideal for milling in high-performance roughing and semi-finishing operations on grey cast iron and ductile cast iron components.

SPK Cutting Ceramics: Specifications and Application Table

| | SPK type | ISO* | Material group | | | Machining technique | | | Area of application (DIN ISO 513) | | | | |
|------------------------------------|----------|--------|----------------|---|---|---------------------|---|---|-----------------------------------|----|----|----|----|
| | | | | | | | | | 01 | 10 | 20 | 30 | 40 |
| Applications | | | P | K | H | T | M | G | | | | | |
| Mixed ceramic | SH 2 | CM-K10 | ● | ● | ● | ● | ● | ○ | | | | | |
| | SH 4 | CM-K10 | | ● | ● | ● | | | | | | | |
| Oxide ceramic | SN 60 | CA-K10 | | ● | | ● | | ● | | | | | |
| | SN 80 E | CA-P20 | ○ | ● | | ● | | ● | | | | | |
| | SN 180 | CA-K15 | | ● | | ● | | | | | | | |
| Silicon nitride ceramic and SiAlON | SL 406 | CN-K25 | | ● | | ● | | | | | | | |
| | SL 408 | CN-K30 | | ● | | ● | | | | | | | |
| | SL 500 | CN-K25 | | ● | | ● | ● | ● | | | | | |
| | SL 506 | CN-K20 | | ● | | ● | | | | | | | |
| | SL 508 | CN-K30 | | ● | | ● | | | | | | | |
| | SL 606 | CN-K25 | | ● | | ● | | | | | | | |
| | SL 608 | CN-K30 | | ● | | ● | | ● | | | | | |
| | SL 808 | CN-K30 | | ● | | | ● | | | | | | |
| Coated | SL 550 C | CC-K25 | | ● | | ● | | | | | | | |
| | SL 554 C | CC-K20 | | ● | | ● | | | | | | | |
| | SL 654 C | CC-K25 | | ● | | ● | | | | | | | |
| | SL 658 C | CC-K30 | | ● | | ● | | | | | | | |
| | SL 854 C | CC-K20 | | ● | | | ● | | | | | | |
| | SL 858 C | CC-K30 | | ● | | | ● | | | | | | |

*ISO: ISO application group

Material group:

P = steel

K = cast iron

H = hard materials

Machining technique:

T = turning

M = milling

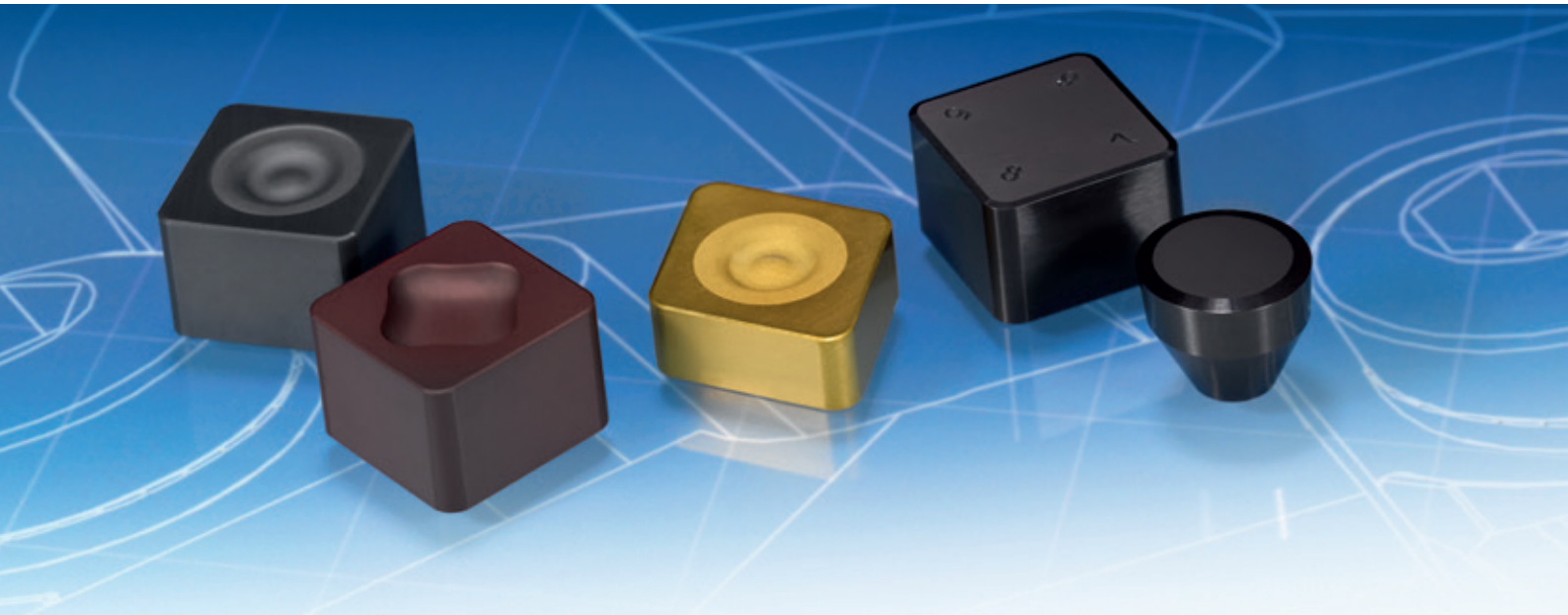
G = grooving

← Main area of application
 ← Area of application










Primary applications

Additional applications

SPK Ceramic Inserts for Turning



Cutting Data Recommendations for Turning Grey Cast Iron

| MATERIAL NO. | HARDNESS (HB) |  |  |  |  |  |  |  |  |  |
|--------------|---------------|---|---|---|---|---|---|---|---|---|
| | | DIN | EN | AFNOR | B.S. | SS | UNE | UNI | AISI/SAE | JIS |
| 0.6015 | 190 | GG-15 | GJL-150 | Ft 15 D | Grade 150 | 0115-00 | FG 15 | G 15 | No 25 B | FC 150 |
| 0.6020 | 210 | GG-20 | GJL-200 | Ft 20 D | Grade 220 | 0120-00 | | G 20 | No 30 B | FC 200 |
| 0.6025 | 240 | GG-25 | GJL-250 | Ft 25 D | Grade 260 | 0125-00 | FG 25 | G 25 | No 35 B | FC 250 |
| 0.6030 | 260 | GG-30 | GJL-300 | Ft 30 D | Grade 300 | 0130-00 | FG 30 | G 30 | No 45 B | FC 300 |
| 0.6035 | 280 | GG-35 | GJL-350 | Ft 35 D | Grade 350 | 0135-00 | FG 35 | G 35 | No 50 B | FC 350 |

SPK silicon nitride ceramic / SiAlON

| HARDNESS (HB) | CUTTING SPEED v_c (m/min) | | CUTTING DEPTH a_p (mm) | FEED RATE f (mm) | | GRADE |
|---------------|-----------------------------|---------------|--------------------------|--------------------|---------------|-------|
| | RECOMMENDED VALUE | OVERALL RANGE | | RECOMMENDED VALUE | OVERALL RANGE | |

Roughing with continuous cut

| | | | | | | |
|-----------|------|------------|-----------|------|-------------|---------|
| 140 - 210 | 800 | 400 - 1200 | 1.0 - 4.0 | 0.40 | 0.20 - 0.60 | SL 406 |
| | 800 | 400 - 1200 | 2.0 - 6.0 | 0.50 | 0.20 - 0.80 | SL 408 |
| | 800 | 400 - 1000 | 1.0 - 5.0 | 0.40 | 0.15 - 0.60 | SL 500 |
| | 900 | 500 - 1200 | 1.0 - 4.0 | 0.40 | 0.15 - 0.50 | SL 506 |
| | 900 | 500 - 1200 | 2.0 - 6.0 | 0.50 | 0.15 - 0.90 | SL 508 |
| | 1000 | 500 - 1200 | 2.0 - 4.0 | 0.40 | 0.15 - 0.60 | SL 606 |
| | 900 | 500 - 1200 | 2.0 - 6.0 | 0.50 | 0.20 - 0.90 | SL 608 |
| | 1000 | 500 - 1200 | 1.0 - 4.0 | 0.40 | 0.20 - 0.60 | SL 654C |
| | 1000 | 500 - 1200 | 1.0 - 5.0 | 0.40 | 0.20 - 0.60 | SL 554C |
| 220 - 240 | 800 | 400 - 1200 | 1.0 - 4.0 | 0.40 | 0.20 - 0.60 | SL 406 |
| | 800 | 400 - 1200 | 2.0 - 6.0 | 0.50 | 0.20 - 0.80 | SL 408 |
| | 800 | 400 - 1200 | 1.0 - 5.0 | 0.40 | 0.15 - 0.60 | SL 500 |
| | 900 | 500 - 1200 | 1.0 - 4.0 | 0.40 | 0.15 - 0.50 | SL 506 |
| | 900 | 500 - 1200 | 2.0 - 6.0 | 0.50 | 0.15 - 0.90 | SL 508 |
| | 1000 | 500 - 1200 | 2.0 - 4.0 | 0.40 | 0.15 - 0.50 | SL 606 |
| | 900 | 500 - 1200 | 2.0 - 6.0 | 0.50 | 0.20 - 0.90 | SL 608 |
| | 1000 | 500 - 1200 | 1.0 - 4.0 | 0.40 | 0.20 - 0.60 | SL 654C |
| | 900 | 500 - 1200 | 1.0 - 5.0 | 0.40 | 0.20 - 0.60 | SL 554C |
| 250 - 280 | 700 | 400 - 1100 | 1.0 - 3.0 | 0.35 | 0.20 - 0.50 | SL 406 |
| | 700 | 400 - 1100 | 2.0 - 4.0 | 0.40 | 0.20 - 0.70 | SL 408 |
| | 700 | 400 - 900 | 1.0 - 4.0 | 0.30 | 0.15 - 0.60 | SL 500 |
| | 800 | 500 - 1200 | 1.0 - 3.0 | 0.30 | 0.15 - 0.50 | SL 506 |
| | 800 | 500 - 1200 | 2.0 - 5.0 | 0.40 | 0.15 - 0.80 | SL 508 |
| | 900 | 500 - 1200 | 2.0 - 4.0 | 0.30 | 0.15 - 0.50 | SL 606 |
| | 800 | 500 - 1200 | 2.0 - 5.0 | 0.50 | 0.20 - 0.80 | SL 608 |
| | 900 | 500 - 1200 | 1.0 - 0.3 | 0.30 | 0.20 - 0.50 | SL 654C |
| | 800 | 500 - 1100 | 2.0 - 4.0 | 0.30 | 0.20 - 0.60 | SL 554C |

Cutting Data Recommendations for Turning Grey Cast Iron

| HARDNESS (HB) | CUTTING SPEED v_c (m/min) | | CUTTING DEPTH a_p (mm) | FEED RATE f (mm) | | GRADE |
|------------------|-----------------------------|---------------|-----------------------------|----------------------|---------------|-------|
| | RECOMMENDED VALUE | OVERALL RANGE | | RECOMMENDED VALUE | OVERALL RANGE | |

$\sqrt[2.5]{}$ Roughing with an interrupted cut

| | | | | | | |
|-----------|------|------------|-----------|------|-------------|---------|
| 140 - 210 | 800 | 400 - 1200 | 1.0 - 3.0 | 0.40 | 0.20 - 0.60 | SL 406 |
| | 800 | 400 - 1200 | 2.0 - 4.0 | 0.50 | 0.20 - 0.90 | SL 408 |
| | 800 | 400 - 1000 | 1.0 - 4.0 | 0.50 | 0.15 - 0.70 | SL 500 |
| | 900 | 500 - 1200 | 2.0 - 5.0 | 0.50 | 0.15 - 1.00 | SL 508 |
| | 900 | 500 - 1200 | 2.0 - 5.0 | 0.50 | 0.20 - 1.00 | SL 608 |
| | 1000 | 500 - 1200 | 1.0 - 4.0 | 0.30 | 0.20 - 0.50 | SL 554C |
| 220 - 240 | 800 | 400 - 1200 | 1.0 - 3.0 | 0.40 | 0.20 - 0.60 | SL 406 |
| | 800 | 400 - 1200 | 2.0 - 4.0 | 0.50 | 0.20 - 0.90 | SL 408 |
| | 800 | 400 - 1200 | 1.0 - 4.0 | 0.50 | 0.15 - 0.70 | SL 500 |
| | 900 | 500 - 1200 | 2.0 - 5.0 | 0.50 | 0.15 - 1.00 | SL 508 |
| | 900 | 500 - 1200 | 2.0 - 5.0 | 0.50 | 0.20 - 1.00 | SL 608 |
| | 1000 | 500 - 1200 | 1.0 - 4.0 | 0.30 | 0.20 - 0.50 | SL 554C |
| 250 - 280 | 700 | 400 - 1100 | 1.0 - 3.0 | 0.35 | 0.20 - 0.50 | SL 406 |
| | 700 | 400 - 1100 | 2.0 - 3.0 | 0.40 | 0.20 - 0.70 | SL 408 |
| | 800 | 400 - 900 | 1.0 - 3.0 | 0.40 | 0.15 - 0.60 | SL 500 |
| | 800 | 500 - 1200 | 2.0 - 4.0 | 0.40 | 0.15 - 0.80 | SL 508 |
| | 800 | 500 - 1200 | 2.0 - 4.0 | 0.40 | 0.20 - 0.80 | SL 608 |
| | 800 | 500 - 1200 | 1.0 - 4.0 | 0.30 | 0.20 - 0.40 | SL 554C |

$\sqrt[6.3]{}$ Finishing with continuous or interrupted cut

| | | | | | | |
|-----------|------|------------|-----------|------|-------------|---------|
| 140 - 280 | 900 | 400 - 1200 | 0.5 - 1.5 | 0.25 | 0.20 - 0.50 | SL 406 |
| | 800 | 400 - 1200 | 0.5 - 2.0 | 0.25 | 0.15 - 0.50 | SL 500 |
| | 1000 | 500 - 1200 | 0.5 - 1.5 | 0.15 | 0.07 - 0.55 | SL 506 |
| | 1000 | 500 - 1200 | 0.5 - 2.0 | 0.25 | 0.20 - 1.00 | SL 606 |
| | 1000 | 600 - 1200 | 0.5 - 2.0 | 0.25 | 0.20 - 0.50 | SL 554C |
| | 1000 | 600 - 1200 | 0.5 - 1.5 | 0.20 | 0.20 - 0.40 | SL 654C |

Cutting Data Recommendations for Turning Grey Cast Iron

SPK oxide ceramic

| HARDNESS (HB) | CUTTING SPEED v_c (m/min) | | CUTTING DEPTH a_p (mm) | FEED RATE f (mm) | | GRADE |
|---|-----------------------------|---------------|-----------------------------|----------------------|---------------|---------|
| | RECOMMENDED VALUE | OVERALL RANGE | | RECOMMENDED VALUE | OVERALL RANGE | |
| 25 ∇ Roughing with continuous cut | | | | | | |
| 140 - 210 | 600 | 300 - 1000 | 1.0 - 4.0 | 0.30 | 0.20 - 0.50 | SN 80 E |
| | 800 | 400 - 1000 | 1.0 - 4.0 | 0.30 | 0.20 - 0.50 | SN 180 |
| 220 - 240 | 500 | 200 - 800 | 1.0 - 4.0 | 0.30 | 0.20 - 0.50 | SN 80 E |
| | 600 | 400 - 800 | 1.0 - 4.0 | 0.30 | 0.20 - 0.50 | SN 180 |
| 250 - 280 | 300 | 100 - 400 | 1.0 - 4.0 | 0.30 | 0.20 - 0.50 | SN 80 E |
| | 400 | 200 - 600 | 1.0 - 4.0 | 0.30 | 0.20 - 0.50 | SN 180 |
| 6.3 ∇ Finishing with continuous cut | | | | | | |
| 140 - 210 | 750 | 400 - 1200 | 0.2 - 1.0 | 0.20 | 0.15 - 0.40 | SN 60 |
| | 600 | 400 - 1000 | 0.2 - 1.0 | 0.25 | 0.15 - 0.40 | SN 180 |
| 220 - 240 | 550 | 300 - 800 | 0.2 - 1.0 | 0.20 | 0.15 - 0.40 | SN 60 |
| | 400 | 300 - 600 | 0.2 - 1.0 | 0.25 | 0.15 - 0.40 | SN 180 |
| 250 - 280 | 350 | 150 - 450 | 0.2 - 1.0 | 0.20 | 0.15 - 0.40 | SN 60 |
| | 300 | 150 - 400 | 0.2 - 1.0 | 0.25 | 0.15 - 0.40 | SN 180 |

SPK mixed ceramic

| HARDNESS (HB) | CUTTING SPEED v_c (m/min) | | CUTTING DEPTH a_p (mm) | FEED RATE f (mm) | | GRADE |
|------------------------------------|-----------------------------|---------------|-----------------------------|----------------------|---------------|-------|
| | RECOMMENDED VALUE | OVERALL RANGE | | RECOMMENDED VALUE | OVERALL RANGE | |
| 6.3 ∇ Finishing | | | | | | |
| 140 - 210 | 800 | 400 - 1200 | 0.5 - 2.0 | 0.20 | 0.15 - 0.25 | SH 2 |
| | 900 | 400 - 1200 | 0.5 - 2.0 | 0.20 | 0.15 - 0.25 | SH 4 |
| 220 - 240 | 600 | 400 - 1200 | 0.5 - 2.0 | 0.20 | 0.15 - 0.25 | SH 2 |
| | 800 | 400 - 1200 | 0.5 - 2.0 | 0.20 | 0.15 - 0.25 | SH 4 |
| 250 - 280 | 400 | 400 - 1000 | 0.5 - 2.0 | 0.20 | 0.15 - 0.25 | SH 2 |
| | 600 | 400 - 1000 | 0.5 - 2.0 | 0.20 | 0.15 - 0.25 | SH 4 |
| 0.8 ∇ Fine finishing | | | | | | |
| 140 - 240 | 550 | 300 - 650 | 0.1 - 1.0 | 0.1 | 0.10 - 0.20 | SH 2 |
| | 650 | 300 - 650 | 0.1 - 1.0 | 0.1 | 0.10 - 0.20 | SH 4 |
| 240 - 280 | 400 | 150 - 500 | 0.1 - 1.0 | 0.1 | 0.10 - 0.20 | SH 2 |
| | 500 | 150 - 500 | 0.1 - 1.0 | 0.1 | 0.10 - 0.20 | SH 4 |

Cutting Data Recommendations for Turning Ductile Cast Iron

| MATERIAL NO. | UTS (N/mm ²) | (D) | (EU) | (F) | (GB) | (S) | (E) | (I) | (USA) | (J) |
|--------------|--------------------------|--------|------------|------------|------------|---------|-----------|-----------|-----------|---------|
| | | DIN | EN | AFNOR | B.S. | SS | UNE | UNI | AISI/SAE | JIS |
| 0.7040 | 400 | GGG-40 | GJL-400-15 | FGS 400-12 | SNG 420/12 | 0717-02 | FGE 38-17 | GS 370-17 | 60-40-18 | FCD 400 |
| 0.7050 | 500 | GGG-50 | GJL-500-7 | FGS 500-7 | SNG 500/7 | 0727-02 | FGE 50-7 | GS 500-7 | 65-45-12 | FCD 500 |
| 0.7060 | 600 | GGG-60 | GJL-600-3 | FGS 600-3 | SNG 600/3 | 0732-03 | FGE 60-2 | GS 600-2 | 80-55-06 | FCD 600 |
| 0.7070 | 700 | GGG-70 | GJL-700-2 | FGS 700-2 | SNG 700/2 | 0737-01 | FGE 70-2 | GS 700-2 | 100-70-03 | FCD 700 |

SPK silicon nitride ceramic/SiAlON

| TENSILE STRENGTH UTS (N/mm ²) | CUTTING SPEED v_c (m/min) | | CUTTING DEPTH a_p (mm) | FEED RATE f (mm) | | GRADE |
|---|-----------------------------|---------------|--------------------------|--------------------|---------------|----------|
| | RECOMMENDED VALUE | OVERALL RANGE | | RECOMMENDED VALUE | OVERALL RANGE | |
| 25 ∇ Roughing with continuous cut | | | | | | |
| 400 - 600 | 600 | 500 - 800 | 1.0 - 5.0 | 0.40 | 0.15 - 0.60 | SL 550 C |
| | 600 | 500 - 800 | 1.0 - 5.0 | 0.50 | 0.30 - 0.70 | SL 658 C |
| 700 | 500 | 400 - 700 | 1.0 - 5.0 | 0.40 | 0.15 - 0.60 | SL 550 C |
| | 600 | 400 - 700 | 1.0 - 5.0 | 0.50 | 0.30 - 0.70 | SL 658 C |
| 25 ∇ Roughing with an interrupted cut | | | | | | |
| 400 - 700 | 600 | 500 - 800 | 1.0 - 4.0 | 0.40 | 0.15 - 0.50 | SL 550 C |
| | 500 | 400 - 700 | 1.0 - 3.0 | 0.35 | 0.10 - 0.60 | SL 554 C |
| | 600 | 400 - 600 | 1.0 - 3.0 | 0.30 | 0.15 - 0.50 | SL 654 C |
| | 600 | 400 - 800 | 1.0 - 5.0 | 0.45 | 0.20 - 0.70 | SL 658 C |
| 12.5 ∇ Semi-finishing with continuous cut | | | | | | |
| 400 - 600 | 500 | 300 - 600 | 0.5 - 3.0 | 0.40 | 0.15 - 0.50 | SL 550 C |
| | 500 | 300 - 600 | 0.5 - 3.0 | 0.50 | 0.20 - 0.80 | SL 658 C |
| 700 | 500 | 300 - 600 | 0.5 - 3.0 | 0.35 | 0.15 - 0.60 | SL 550 C |
| | 500 | 300 - 600 | 0.5 - 3.0 | 0.40 | 0.20 - 0.80 | SL 658 C |
| 12.5 ∇ Semi-finishing with an interrupted cut | | | | | | |
| 400 - 700 | 500 | 400 - 600 | 0.5 - 3.0 | 0.35 | 0.15 - 0.50 | SL 550 C |
| | 400 | 400 - 600 | 0.5 - 3.0 | 0.35 | 0.10 - 0.50 | SL 554 C |
| | 400 | 400 - 600 | 0.5 - 3.0 | 0.30 | 0.15 - 0.50 | SL 654 C |
| | 500 | 400 - 700 | 0.5 - 3.0 | 0.40 | 0.20 - 0.80 | SL 658 C |


Cutting Data Recommendations for Turning Ductile Cast Iron

SPK mixed ceramic

| TENSILE STRENGTH UTS (N/mm ²) | CUTTING SPEED v_c (m/min) | | CUTTING DEPTH a_p (mm) | FEED RATE f (mm) | | GRADE |
|--|-----------------------------|---------------|--------------------------|--------------------|---------------|-------|
| | RECOMMENDED VALUE | OVERALL RANGE | | RECOMMENDED VALUE | OVERALL RANGE | |
| 6.3 / Finishing | | | | | | |
| 400 - 600 | 500 | 300 - 700 | 0.30 - 1.0 | 0.20 | 0.10 - 0.25 | SH 2 |
| | 600 | 300 - 800 | 0.30 - 1.0 | 0.20 | 0.10 - 0.25 | SH 4 |
| 700 | 500 | 300 - 600 | 0.25 - 0.5 | 0.15 | 0.08 - 0.25 | SH 2 |
| | 500 | 300 - 600 | 0.25 - 0.5 | 0.15 | 0.08 - 0.25 | SH 4 |
| 0.8 / Fine finishing | | | | | | |
| 400 - 600 | 600 | 400 - 700 | 0.25 - 0.5 | 0.15 | 0.10 - 0.20 | SH 2 |
| | 600 | 400 - 700 | 0.25 - 0.5 | 0.15 | 0.10 - 0.20 | SH 4 |
| 700 | 400 | 300 - 600 | 0.25 - 0.5 | 0.12 | 0.08 - 0.20 | SH 2 |
| | 500 | 300 - 600 | 0.25 - 0.5 | 0.12 | 0.08 - 0.20 | SH 4 |

Cutting Data Recommendations for Turning Chilled Cast Iron

SPK mixed ceramic

| HARDNESS Shore C | CUTTING SPEED v_c (m/min) | | CUTTING DEPTH a_p (mm) | FEED RATE f (mm) | | GRADE |
|--|-----------------------------|---------------|-----------------------------|----------------------|---------------|-------|
| | RECOMMENDED VALUE | OVERALL RANGE | | RECOMMENDED VALUE | OVERALL RANGE | |
| 12.5  Semi-finishing | | | | | | |
| 53 | 120 | 90 - 200 | 0.5 - 5.0 | 0.22 | 0.18 - 0.30 | SH 2 |
| 59 | 100 | 75 - 180 | 0.5 - 5.0 | 0.20 | 0.16 - 0.25 | SH 2 |
| 66 | 90 | 60 - 160 | 0.5 - 5.0 | 0.18 | 0.14 - 0.22 | SH 2 |
| 73 | 80 | 50 - 140 | 0.5 - 5.0 | 0.16 | 0.12 - 0.20 | SH 2 |
| | 90 | 50 - 140 | 0.5 - 5.0 | 0.18 | 0.12 - 0.20 | SH 4 |
| 79 | 70 | 45 - 120 | 0.5 - 5.0 | 0.16 | 0.10 - 0.17 | SH 2 |
| | 80 | 45 - 120 | 0.5 - 5.0 | 0.18 | 0.10 - 0.20 | SH 4 |
| 86 | 60 | 40 - 100 | 0.5 - 5.0 | 0.12 | 0.08 - 0.16 | SH 2 |
| | 70 | 40 - 100 | 0.5 - 5.0 | 0.14 | 0.08 - 0.16 | SH 4 |
| 93 | 50 | 30 - 80 | 0.5 - 5.0 | 0.10 | 0.06 - 0.15 | SH 2 |
| | 60 | 30 - 80 | 0.5 - 5.0 | 0.12 | 0.06 - 0.15 | SH 4 |

Cutting Data Recommendations for Turning Hardened Steel

SPK mixed ceramic

| HARDNESS (HRC) | CUTTING SPEED v_c (m/min) | | CUTTING DEPTH a_p (mm) | FEED RATE f (mm/rev) | | GRADE |
|--|-----------------------------|---------------|-----------------------------|------------------------|---------------|-------|
| | RECOMMENDED VALUE | OVERALL RANGE | | RECOMMENDED VALUE | OVERALL RANGE | |
| 0.8/ ∇ Fine finishing | | | | | | |
| 58 - 62 | 140 | 120 - 200 | 0.10 - 0.5 | 0.15 | 0.10 - 0.30 | SH 2 |
| 58 - 62 | 160 | 120 - 250 | 0.10 - 0.5 | 0.15 | 0.10 - 0.30 | SH 4 |

Designation System for Turning Inserts according to ISO 1832

| | | |
|---|------|--|
| V | 35° | |
| D | 55° | |
| E | 75° | |
| C | 80° | |
| M | 86° | |
| K | 55° | |
| B | 82° | |
| A | 85° | |
| R | | |
| S | 90° | |
| T | 60° | |
| W | 80° | |
| L | | |
| P | 108° | |
| H | 120° | |
| O | 135° | |

Insert shape

| | |
|---|--|
| | |
| N | 0° |
| A | 3° |
| B | 5° |
| C | 7° |
| P | 11° |
| D | 15° |
| E | 20° |
| F | 25° |
| G | 30° |
| O | Clearance angle which requires special data. |

Normal clearance angle α_n

| Inscribed circle d mm | RC, RN S | O 135° | T 60° | | | | | W 80° | Inscribed circle d mm | RB (Type MO) |
|-----------------------------|-----------------|---------------|--------------|----------|----------|----------|----------|--------------|-----------------------------|---------------------|
| | | | | C 80° | E 75° | D 55° | V 35° | | | |
| 3.97 | | | 06 | | | | | 6.0 | 06 | |
| 5.56 | | | 09 | | | | | 7.0 | 07 | |
| 6.35 | | | 11 | 06 | | 07 | | 8.0 | 08 | |
| 9.52 | 09 | | 16 | 09 | | 11 | 16 | 06 | 09 | |
| 10.00 | | | | | | 12 | | 10.0 | 10 | |
| 12.70 | 12 | 05 | 22 | 12 | 13 | 15 | 22 | 08 | 12 | |
| 15.88 | 15 | 06 | 27 | 16 | | | | 16.0 | 16 | |
| 19.05 | 19 | | 33 | | | | | 20.0 | 20 | |
| 25.40 | 25 | | 44 | | | | | 25.0 | 25 | |

Insert size

S

N

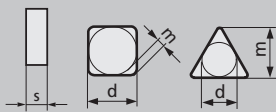
G

N

12

07

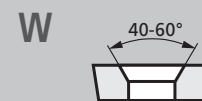
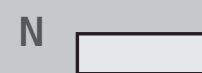
Tolerances



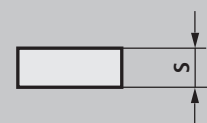
* Permissible deviations for the insert shape, depending on the insert size

| | S ± mm | d ± mm | m ± mm | Inscribed circle d mm | Tolerance class | | | |
|---|--------|------------|------------|--|------------------------------|------------------------------|------------------------------|------------------------------|
| | | | | | m ± mm | | d ± mm | |
| | | | | | M | U | J, K, L, M | U |
| A | 0.025 | 0.025 | 0.005 | 3.97 5.56 6.35 9.52 12.70 15.88 19.05 25.40 | 0.08 0.13 0.15 0.18 | 0.13 0.20 0.27 0.38 | 0.05 0.08 0.10 0.13 | 0.08 0.08 0.18 0.25 |
| C | 0.025 | 0.025 | 0.013 | | | | | |
| E | 0.025 | 0.025 | 0.025 | | | | | |
| F | 0.025 | 0.013 | 0.005 | | | | | |
| G | 0.130 | 0.025 | 0.025 | | | | | |
| H | 0.025 | 0.013 | 0.013 | | | | | |
| J | 0.025 | 0.05-0.13* | 0.005 | | | | | |
| K | 0.025 | 0.05-0.13* | 0.013 | | | | | |
| L | 0.025 | 0.05-0.13* | 0.025 | | | | | |
| M | 0.130 | 0.05-0.13* | 0.08-0.18* | | | | | |
| U | 0.130 | 0.08-0.25* | 0.13-0.38* | | | | | |

Insert type



Insert thickness



| | |
|----|------|
| 01 | 1.59 |
| 02 | 2.38 |
| 03 | 3.18 |
| T3 | 3.97 |
| 04 | 4.76 |
| 06 | 6.35 |
| 07 | 7.94 |
| 09 | 9.52 |
| 12 | 12.7 |



| | |
|----------------------------------|--|
| F Sharp | E Rounded |
| T Chamfered | S Chamfered and rounded |
| K Double chamfered | P Double chamfered and rounded |
| Corner design | |

Insert with IKS-PRO notch

Design variants

08 T 02020 -D0 95Z025

| Corner radius | | | | | | | |
|---------------------------|----------------|--------------------------|--------------|--|-----|--------------------------------------|--|
| Insert with corner radius | | Insert with cutting edge | | | | | |
| | | | | Approach angle of the main cutting edge κ_r | | Clearance angle α_n | |
| 00 | RN, RC | | | | | | |
| M0 | RB | | | | | | |
| 02 | 0.2 | | | | | | |
| 04 | 0.4 | | | | | | |
| 08 | 0.8 | A | 45° | N | 0° | | |
| 12 | 1.2 | D | 60° | C | 7° | | |
| 16 | 1.6 | E | 75° | P | 11° | | |
| 24 | 2.4 | F | 85° | D | 15° | | |
| 32 | 3.2 | P | 90° | E | 20° | | |
| 40 | 4.0 | Z | other angles | F | 25° | | |
| ZZ | Special design | | | | | | |

Chamfer design

















Chamfer width b_γ in 1/100 mm and angle γ_s without degree symbol

e.g.
0.10 x 20° = 01020
0.05 x 20° = 00520
















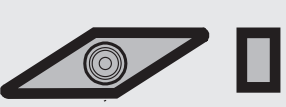
Designation key for ZZ geometries

| | |
|---|--|
| <p>Approach angle</p> <p>e.g. 85 = 85° 95 = 95°</p> | <p>Width of the ZZ chamfer</p> <p>e.g. 025 = 0.25 mm 050 = 0.50 mm</p> |
|---|--|

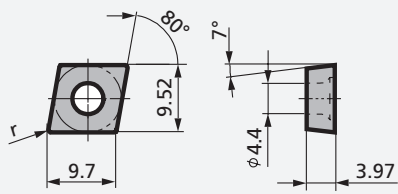
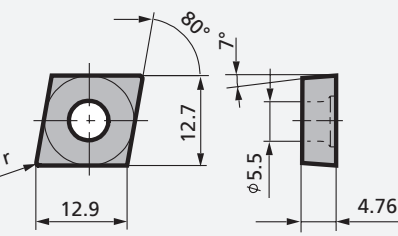
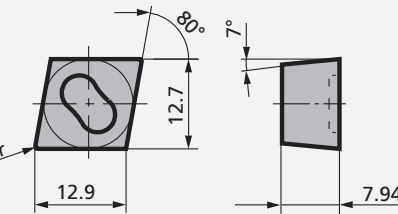
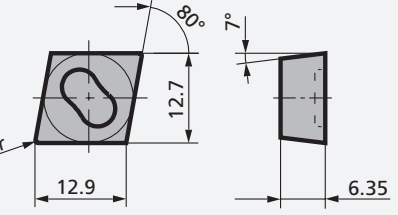
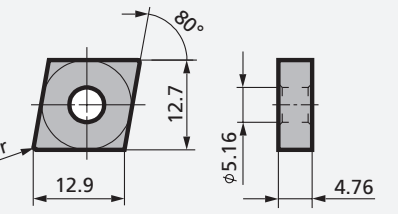
Contents: Ceramic Inserts for Turning

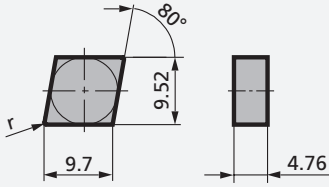
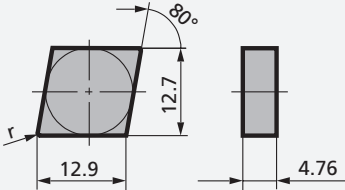
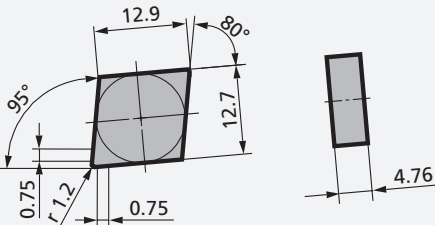
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| CCGW | CCGX, CCMX | CNGA, CNMA | CNGN |
|  |  |  |  |
| Page 20 | Page 20 | Page 20, 24 | Page 21-22 |
| CNGX, CNMX | CNGX -DO | DCMX | DNGA, DNMA |
|  |  |  |  |
| Page 23-25 | Page 23 | Page 26 | Page 26, 28 |
| DNGN | DNGX | DNGX -DO | ENGN |
|  |  |  |  |
| Page 26-27 | Page 27, 28 | Page 28 | Page 29 |
| RBGN | RCGN | RCGX | RNGN |
|  |  |  |  |
| Page 30-31 | Page 31 | Page 32 | Page 33-34 |



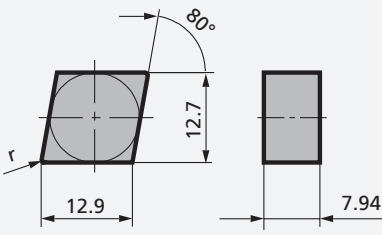
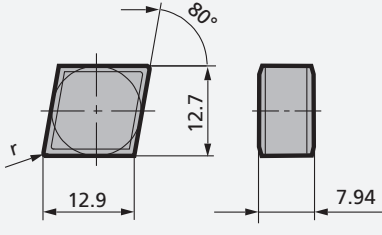
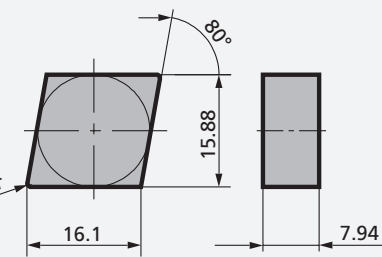
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| SCGN, SCUN | SCMX | SNGA, SNMA | SNGN, SNMN |
|  |  |  |  |
| Page 35, 37 | Page 37 | Page 37, 44 | Page 38-41, 44 |
| SNGX, SNMX | SNGX -DO | SPUN | TCGN, TCUN |
|  |  |  |  |
| Page 41, 43, 45 | Page 42-43 | Page 46 | Page 47 |
| TCGW | TNGA, TNMA | TNGN, TNMN | TPGN, TPUN |
|  |  |  |  |
| Page 47 | Page 47, 49 | Page 48-49 | Page 49-50 |
| VNGA | VNGN | VNGX | VNGX -DO |
|  |  |  |  |
| Page 51 | Page 51 | Page 51 | Page 51 |

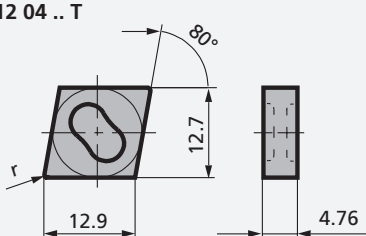
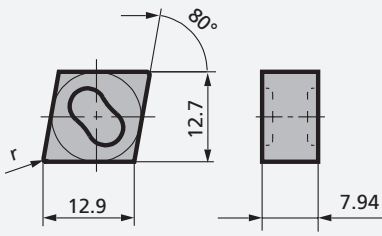
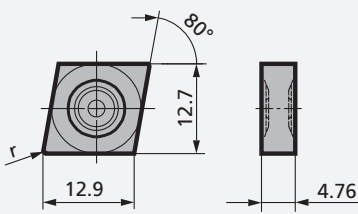
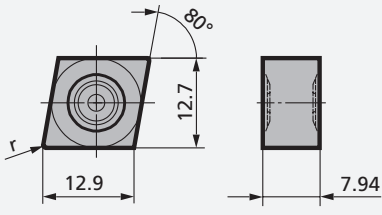
Ceramic Inserts for Turning

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| | CCGW 09 T3 08 T 00520 | SH 2 | 36.56.324.03.7 |
| | CCGW 09 T3 12 T 00520 | SH 2 | 36.56.327.03.7 |
| | CCGW 09 T3 04 T 01020 | SL 500 | 36.56.330.20.0 |
| | CCGW 09 T3 08 T 01020 | SL 500 | 36.56.324.20.0 |
| | | SL 550 C | 17.56.324.20.3 |
| | CCGW 09 T3 12 T 01020 | SL 500 | 36.56.327.20.0 |
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| CCGW 12 04 .. T  | CCGW 12 04 08 T 01020 | SL 500 | 36.56.328.20.0 |
| | | SL 550 C | 17.56.328.20.3 |
| | CCGW 12 04 12 T 01020 | SL 500 | 36.56.329.20.0 |
| | | SL 550 C | 17.56.329.20.3 |
| CCGX 12 07 .. T  | CCGX 12 07 16 T 02020 | SN 80 E | 36.52.027.04.4 |
| | | | |
| CCMX 12 06 .. T  | CCMX 12 06 08 T 02020 | SL 500 | 36.52.020.04.0 |
| | CCMX 12 06 12 T 02020 | SL 500 | 36.52.021.04.0 |
| | CCMX 12 06 16 T 02020 | SL 500 | 36.52.022.04.0 |
| CNGA 12 04 .. T  | CNGA 12 04 08 T 02020 | SH 2 | 36.56.100.04.7 |
| | CNGA 12 04 12 T 02020 | SH 2 | 36.56.101.04.7 |

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| CNGN 09 04 .. T  | CNGN 09 04 08 T 00520 | SL 500 | 36.50.273.03.0 |
| | CNGN 09 04 12 T 00520 | SL 500 | 36.50.274.03.0 |
| | CNGN 09 04 16 T 00520 | SL 500 | 36.50.275.03.0 |
| | | | |
| CNGN 12 04 .. T  | CNGN 12 04 04 T 00520 | SH 2 | 36.50.167.03.7 |
| | CNGN 12 04 08 T 00520 | SH 2 | 36.50.168.03.7 |
| | CNGN 12 04 12 T 00520 | SH 2 | 36.50.169.03.7 |
| | CNGN 12 04 16 T 00520 | SN 60 | 36.50.170.03.5 |
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| | CNGN 12 04 04 T 02020 | SH 2 | 36.50.167.04.7 |
| | CNGN 12 04 08 T 02020 | SH 2 | 36.50.168.04.7 |
| | | SL 500 | 36.50.168.04.0 |
| | | SL 506 | 19.50.168.04.1 |
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| | CNGN 12 04 12 T 02020 | SH 2 | 36.50.169.04.7 |
| | | SL 500 | 36.50.169.04.0 |
| | | SL 506 | 19.50.169.04.1 |
| | | SN 60 | 36.50.169.04.5 |
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| | CNGN 12 04 16 T 02020 | SH 2 | 36.50.170.04.7 |
| | SL 500 | 36.50.170.04.0 | |
| | SL 506 | 19.50.170.04.1 | |
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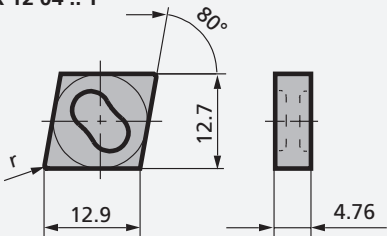
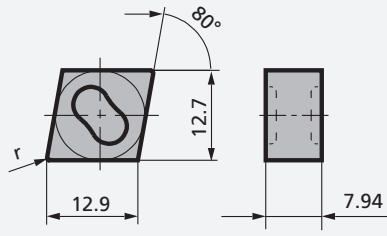
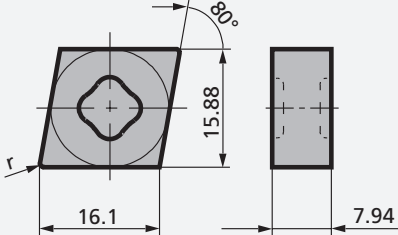
Ceramic Inserts for Turning

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| | | SH 4 | 19.50.023.04.0 |
| | | SL 500 | 36.50.023.04.0 |
| | | SN 80 E | 36.50.023.04.4 |
| | | SN 180 | 36.50.023.04.7 |
| | | | |
| | CNGN 12 07 16 T 02020 | SH 2 | 36.50.024.04.7 |
| | | SH 4 | 19.50.024.04.0 |
| | | SL 500 | 36.50.024.04.0 |
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| CNGN 12 07 30 T 02020 | SH 2 | 36.50.027.04.7 | |
| CNGN 12 07 .. P  | CNGN 12 07 12 P 85 | SH 2 | 36.50.023.85.7 |
| | CNGN 12 07 16 P 85 | SH 2 | 36.50.024.85.7 |
| CNGN 16 07 .. T  | CNGN 16 07 12 T 02020 | SN 60 | 36.50.038.04.5 |
| | CNGN 16 07 16 T 02020 | SH 2 | 36.50.042.04.7 |
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| | CNGN 16 07 16 T 03030 | SH 2 | 36.50.042.54.7 |

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| | CNGX 12 04 16 T 02020 | SL 500 | 36.50.227.04.0 |
| CNGX 12 07 .. T  | CNGX 12 07 08 T 00520 | SH 2 | 36.54.095.03.7 |
| | CNGX 12 07 12 T 00520 | SH 2 | 36.54.096.03.7 |
| | CNGX 12 07 08 T 02020 | SH 2 | 36.54.095.04.7 |
| | CNGX 12 07 12 T 02020 | SH 2 | 36.54.096.04.7 |
| | CNGX 12 07 16 T 02020 | SH 2 | 36.54.097.04.7 |
| CNGX 12 04 .. T - DO  | CNGX 12 04 12 T 02020 - DO | SL 606 | 19.50.226.04.8 |
| | CNGX 12 04 16 T 02020 - DO | SL 606 | 19.50.227.04.8 |
| CNGX 12 07 .. T - DO  | CNGX 12 07 08 T 02020 - DO | SH 4 | 19.50.030.04.7 |
| | | SL 506 | 19.50.030.04.1 |
| | | SL 508 | 19.50.030.04.2 |
| | CNGX 12 07 12 T 02020 - DO | SH 4 | 19.50.031.04.7 |
| | | SL 506 | 19.50.031.04.1 |
| | | SL 508 | 19.50.031.04.2 |
| | | SL 606 | 19.50.031.04.8 |
| | | SL 608 | 19.50.031.04.3 |
| | | SL 654 C | 19.50.031.04.5 |
| | | SL 658 C | 21.50.031.04.0 |
| | SN 180 | 13.50.031.04.7 | |

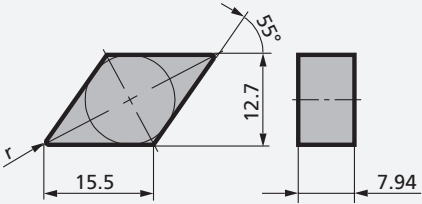
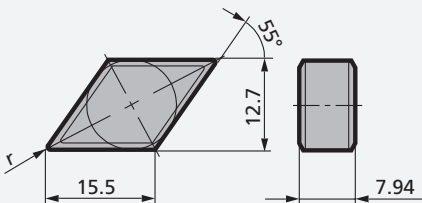
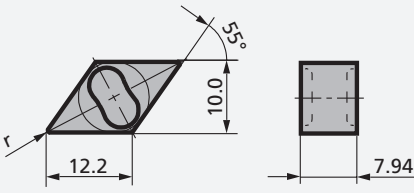
Ceramic Inserts for Turning

| INSERT | ISO | GRADE | SPK REF. NO. |
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| | | SL 508 | 19.50.032.04.2 |
| | | SL 606 | 19.50.032.04.8 |
| | | SL 608 | 19.50.032.04.3 |
| | | SL 654 C | 19.50.032.04.5 |
| | | SL 658 C | 21.50.032.04.0 |
| | | SN 180 | 13.50.032.04.7 |
| CNGX 16 07 .. T - DO | CNGX 16 07 12 T 02020 - DO | SL 508 | 19.50.081.04.2 |
| | CNGX 16 07 16 T 02020 - DO | SL 508 | 19.50.082.04.2 |
| | | SL 608 | 19.50.082.04.3 |
| | | SL 658 C | 21.50.082.04.0 |
| CNGX 19 07 .. T - DO | CNGX 19 07 16 T 02020 - DO | SL 658 C | 21.50.375.04.0 |
| CNMA 12 04 .. T | CNMA 12 04 08 T 02020 | SL 500 | 36.56.110.04.0 |
| | | SL 550 C | 17.56.110.04.3 |
| | CNMA 12 04 12 T 02020 | SL 500 | 36.56.111.04.0 |
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| CNMX 12 04 .. T  | CNMX 12 04 12 T 02020 | SL 408 | 13.54.228.04.4 |
| | CNMX 12 04 16 T 02020 | SL 406 | 13.54.229.04.3 |
| | | SL 408 | 13.54.229.04.4 |
| CNMX 12 07 .. T  | CNMX 12 07 08 T 02020 | SL 500 | 36.54.030.04.0 |
| | | SL 550 C | 17.54.030.04.3 |
| | | SN 60 | 36.54.030.04.5 |
| | | SN 80 E | 36.54.030.04.4 |
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| | | SL 554 C | 17.54.031.04.4 |
| | | SN 60 | 36.54.031.04.5 |
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| | CNMX 12 07 16 T 02020 | SL 406 | 13.54.032.04.3 |
| | | SL 408 | 13.54.032.04.4 |
| | | SL 500 | 36.54.032.04.0 |
| | | SL 550 C | 17.54.032.04.3 |
| | SL 554 C | 17.54.032.04.4 | |
| | SN 60 | 36.54.032.04.5 | |
| | SN 80 E | 36.54.032.04.4 | |
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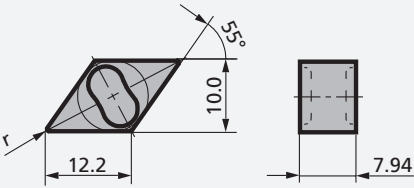
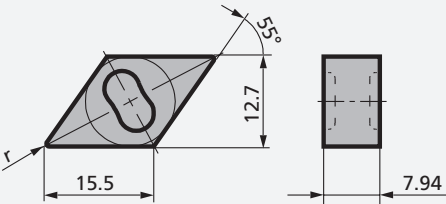
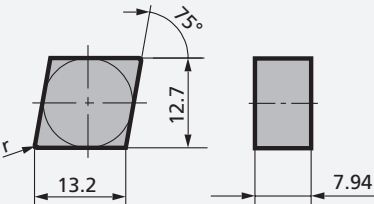
Ceramic Inserts for Turning

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| | DNGA 15 04 12 T 02020 | SH 2 | 36.56.211.04.7 |
| DNGA 15 06 .. T | DNGA 15 06 08 T 02020 | SH 2 | 36.52.236.04.7 |
| | DNGA 15 06 12 T 02020 | SH 2 | 36.52.237.04.7 |
| | DNGA 15 06 16 T 02020 | SH 2 | 36.52.238.04.7 |
| DNGN 12 04 .. T | DNGN 12 04 04 T 02020 | SH 2 | 36.50.196.04.7 |
| | DNGN 12 04 08 T 02020 | SH 2 | 36.50.197.04.7 |
| | DNGN 12 04 12 T 02020 | SH 2 | 36.50.198.04.7 |
| DNGN 12 07 .. T | DNGN 12 07 08 T 00520 | SH 2 | 36.50.091.03.7 |
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| | DNGN 12 07 08 T 02020 | SH 2 | 36.50.091.04.7 |
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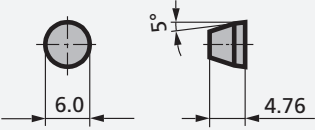
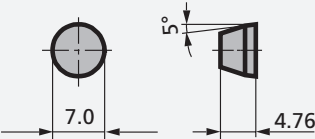
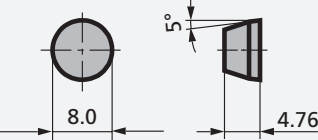
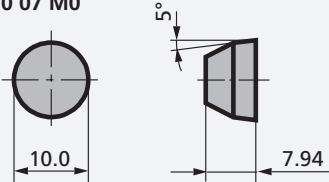
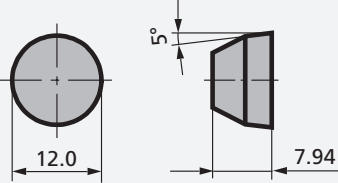
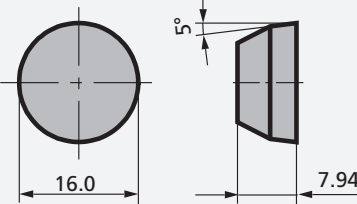
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| | DNGN 15 07 16 T 00520 | SH 4 | 19.50.079.03.7 |
| | DNGN 15 07 04 T 02020 | SH 2 | 36.50.076.04.7 |
| | | SN 60 | 36.50.076.04.5 |
| | DNGN 15 07 08 T 02020 | SH 4 | 19.50.077.04.7 |
| | | SN 60 | 36.50.077.04.5 |
| | | SN 80 E | 36.50.077.04.4 |
| | DNGN 15 07 12 T 02020 | SH 2 | 36.50.078.04.7 |
| | | SH 4 | 19.50.078.04.7 |
| | | SN 180 | 13.50.078.04.7 |
| | | SN 60 | 36.50.078.04.5 |
| | | SN 80 E | 36.50.078.04.4 |
| | DNGN 15 07 16 T 02020 | SH 2 | 36.50.079.04.7 |
| | | SH 4 | 19.50.079.04.7 |
| | | SN 180 | 13.50.079.04.7 |
| | SN 60 | 36.50.079.04.5 | |
| | SN 80 E | 36.50.079.04.4 | |
| DNGN 15 07 .. P  | DNGN 15 07 16 P 85 | SH 2 | 36.50.079.85.7 |
| DNGX 12 07 .. T  | DNGX 12 07 08 T 00520 | SH 2 | 36.54.106.03.7 |
| | DNGX 12 07 12 T 00520 | SH 2 | 36.54.107.03.7 |
| | DNGX 12 07 16 T 00520 | SH 2 | 36.54.108.03.7 |
| | DNGX 12 07 08 T 02020 | SH 2 | 36.54.106.04.7 |
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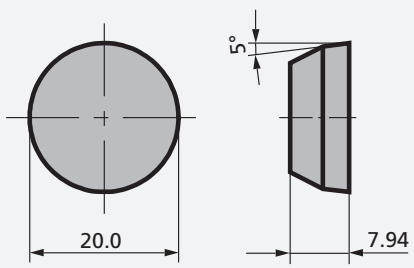
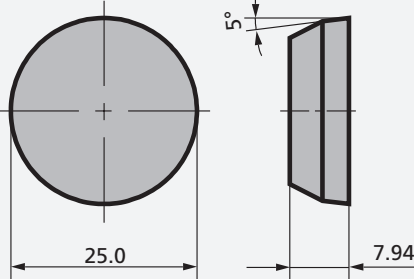
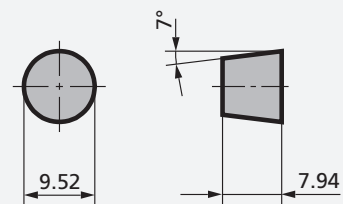
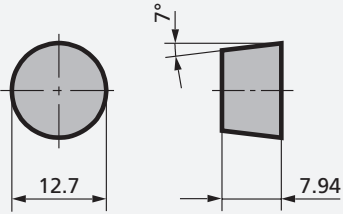
Ceramic Inserts for Turning

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| | | SL 654 C | 19.50.358.04.5 | |
| | | SL 658 C | 21.50.358.04.0 | |
| | DNGX 12 07 12 T 02020 - DO | SL 506 | 19.50.359.04.1 | |
| | | SL 654 C | 19.50.359.04.5 | |
| | | SL 658 C | 21.50.359.04.0 | |
| | DNGX 12 07 16 T 02020 - DO | SL 506 | 19.50.357.04.1 | |
| | | SL 654 C | 19.50.357.04.5 | |
| | | SL 658 C | 21.50.357.04.0 | |
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| | | DNGX 15 07 12 T 02020 | SH 2 | 36.54.121.04.7 |
| DNGX 15 07 16 T 02020 | | SH 2 | 36.54.122.04.7 | |
| DNGX 15 07 .. T - DO | DNGX 15 07 08 T 02020 - DO | SH 4 | 19.50.010.04.7 | |
| | DNGX 15 07 12 T 02020 - DO | SH 4 | 19.50.011.04.7 | |
| | | SL 506 | 19.50.011.04.1 | |
| | | SL 508 | 19.50.011.04.2 | |
| | | SL 654 C | 19.50.011.04.5 | |
| | | SL 658 C | 21.50.011.04.0 | |
| | | SN 180 | 13.50.011.04.7 | |
| | DNGX 15 07 16 T 02020 - DO | SH 4 | 19.50.012.04.7 | |
| | | SL 506 | 19.50.012.04.1 | |
| | | SL 508 | 19.50.012.04.2 | |
| | | SL 654 C | 19.50.012.04.5 | |
| | | SL 658 C | 21.50.012.04.0 | |
| | | SN 180 | 13.50.012.04.7 | |
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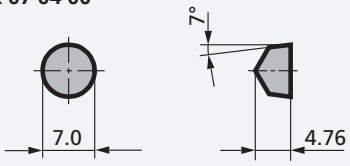
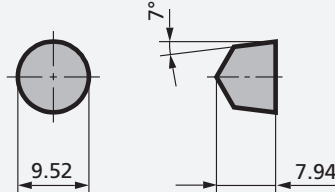
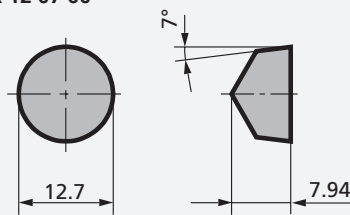
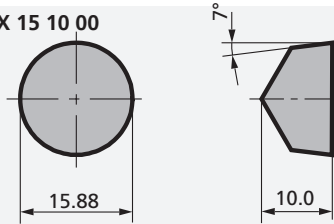
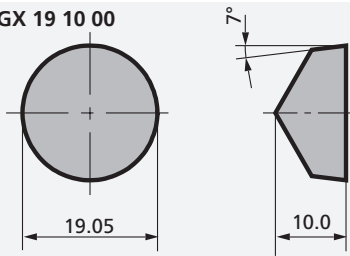
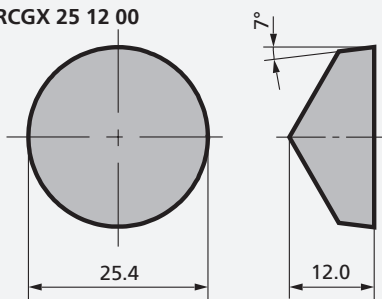
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| | | SN 60 | 36.54.002.04.5 |
| | | SN 80 E | 36.54.002.04.4 |
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| | | SN 60 | 36.54.003.04.5 |
| | | SN 80 E | 36.54.003.04.4 |
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| | | SN 60 | 36.54.004.04.5 |
| | | SN 80 E | 36.54.004.04.4 |
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| DNMX 15 07 12 T 02020 | | SL 406 | 13.54.011.04.3 |
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| | | SN 60 | 36.54.011.04.5 |
| | | SN 80 E | 36.54.011.04.4 |
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| | SN 80 E | 36.54.012.04.4 | |
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| | | SN 80 E | 36.50.018.04.4 |
| | ENGN 13 07 12 T 02020 | SH 2 | 36.50.019.04.7 |
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| | | SN 60 | 36.50.019.04.5 |
| | | SN 80 E | 36.50.019.04.4 |
| | ENGN 13 07 16 T 02020 | SH 2 | 36.50.020.04.7 |
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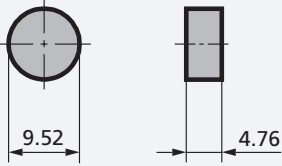
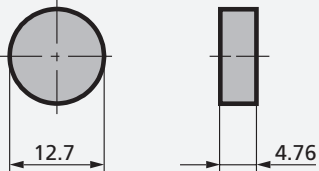
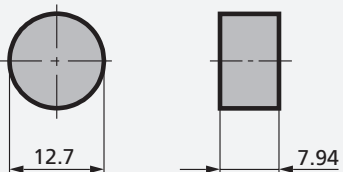
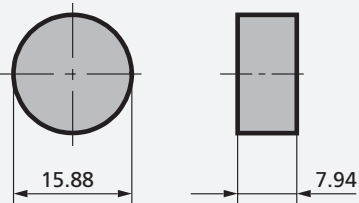
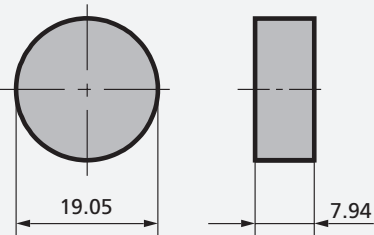
Ceramic Inserts for Turning

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| RBGN 07 04 M0  | RBGN 07 04 M0 S 05015 | SH 2 | 36.42.193.31.7 |
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| RBGN 08 04 M0  | RBGN 08 04 M0 P 86 | SH 2 | 36.42.194.86.7 |
| | RBGN 08 04 M0 S 05015 | SH 2 | 36.42.194.31.7 |
| RBGN 10 07 M0  | RBGN 10 07 M0 P 86 | SH 2 | 36.42.195.86.7 |
| | RBGN 10 07 M0 S 05015 | SH 2 | 36.42.195.31.7 |
| | RBGN 10 07 M0 T 02020 | SH 2 | 36.42.195.04.7 |
| | | SL 500 | 36.42.195.04.0 |
| RBGN 12 07 M0  | RBGN 12 07 M0 P 86 | SH 2 | 36.42.196.86.7 |
| | RBGN 12 07 M0 S 20015 | SH 2 | 36.42.196.26.7 |
| | RBGN 12 07 M0 T 02020 | SH 2 | 36.42.196.04.7 |
| | | SL 500 | 36.42.196.04.0 |
| RBGN 16 07 M0  | RBGN 16 07 M0 P 86 | SH 2 | 36.42.197.86.7 |
| | RBGN 16 07 M0 S 20015 | SH 2 | 36.42.197.26.7 |
| | RBGN 16 07 M0 T 02020 | SH 2 | 36.42.197.04.7 |

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| | RBGN 20 07 M0 S 20015 | SH 2 | 36.42.198.26.7 |
| RBGN 25 07 M0  | RBGN 25 07 M0 P 86 | SH 2 | 36.42.168.86.7 |
| | RBGN 25 07 M0 S 20015 | SH 2 | 36.42.168.26.7 |
| RCGN 09 07 00  | RCGN 09 07 00 S 20015 | SH 2 | 36.42.028.26.7 |
| | RCGN 09 07 00 T 02020 | SH 2 | 36.42.028.04.7 |
| | | SN 80 E | 36.42.028.04.4 |
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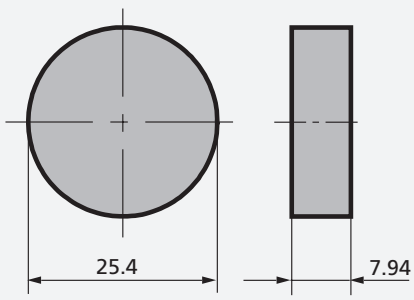
Ceramic Inserts for Turning

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| | RCGX 09 07 00 T 02020 | SH 2 | 36.42.103.04.7 |
| | | SL 500 | 36.42.103.04.0 |
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| RCGX 12 07 00  | RCGX 12 07 00 P 86 | SH 2 | 36.42.104.86.7 |
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| | | SL 500 | 36.42.104.04.0 |
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| RCGX 15 10 00  | RCGX 15 10 00 P 86 | SH 2 | 36.42.105.86.7 |
| | RCGX 15 10 00 S 20015 | SH 2 | 36.42.105.26.7 |
| | RCGX 15 10 00 T 02020 | SN 80 E | 36.42.105.04.4 |
| RCGX 19 10 00  | RCGX 19 10 00 P 86 | SH 2 | 36.42.106.86.7 |
| | RCGX 19 10 00 S 20015 | SH 2 | 36.42.106.26.7 |
| | RCGX 19 10 00 T 02020 | SN 60 | 36.42.106.04.5 |
| | | SN 80 E | 36.42.106.04.4 |
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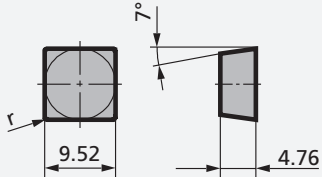
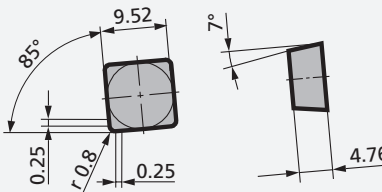
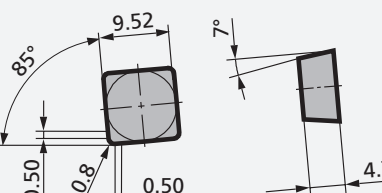
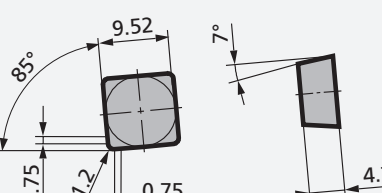
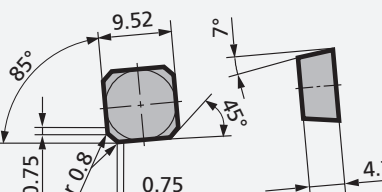
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| RNGN 12 04 00  | RNGN 12 04 00 T 02020 | SH 2 | 36.40.027.04.7 |
| | | SL 500 | 36.40.027.04.0 |
| | | SN 60 | 36.40.027.04.5 |
| RNGN 12 07 00  | RNGN 12 07 00 P 85 | SH 2 | 36.40.002.85.7 |
| | RNGN 12 07 00 S 20015 | SH 2 | 36.40.002.27.7 |
| | RNGN 12 07 00 T 00520 | SH 2 | 36.40.002.03.7 |
| | RNGN 12 07 00 T 02020 | SH 2 | 36.40.002.04.7 |
| | | SL 500 | 36.40.002.04.0 |
| | | SN 60 | 36.40.002.04.5 |
| | | SN 80 E | 36.40.002.04.4 |
| RNGN 15 07 00  | RNGN 15 07 00 P 85 | SH 2 | 36.40.023.85.7 |
| | RNGN 15 07 00 S 20015 | SH 2 | 36.40.023.27.7 |
| RNGN 19 07 00  | RNGN 19 07 00 P 85 | SH 2 | 36.40.005.85.7 |
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Ceramic Inserts for Turning

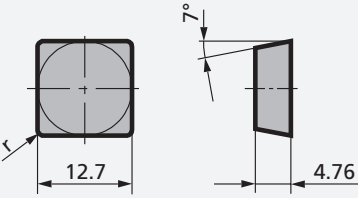
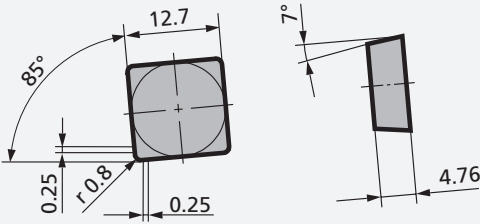
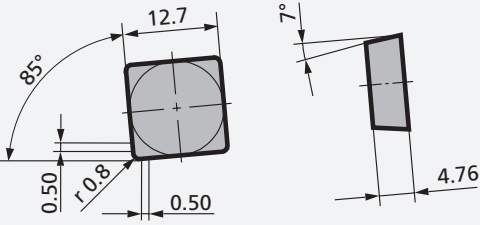
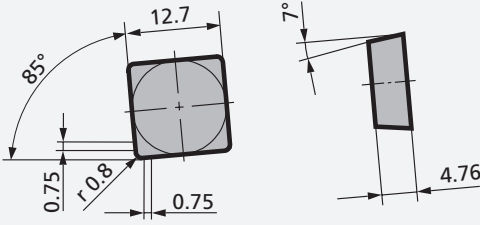
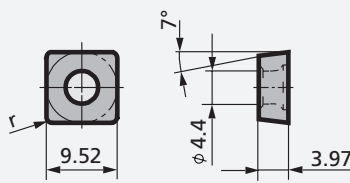
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|---------------|--------------------|-------|----------------|
| RNGN 25 07 00 | RNGN 25 07 00 P 85 | SH 2 | 36.40.038.85.7 |

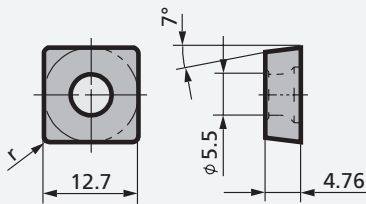
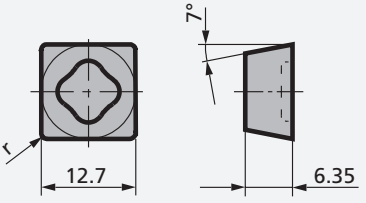
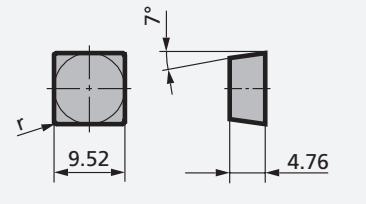
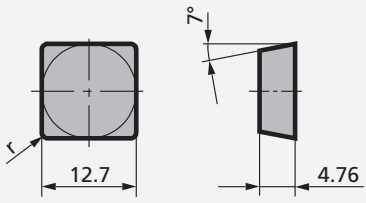
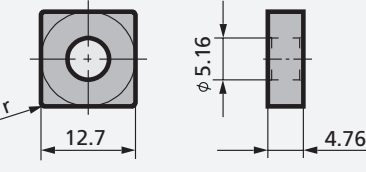


The technical drawing shows two views of the ceramic insert. The left view is a circular top view with a diameter dimensioned as 25.4. The right view is a side view showing a rectangular profile with a width dimensioned as 7.94. Both views include centerlines to indicate the axis of symmetry.

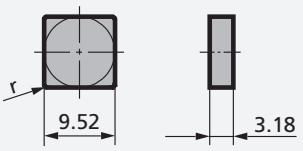
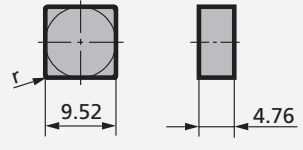
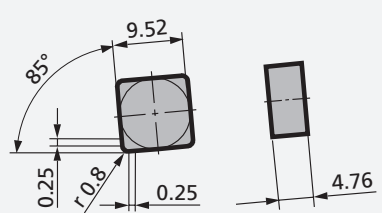
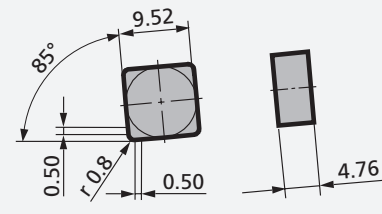
| INSERT | ISO | GRADE | SPK REF. NO. |
|--|------------------------------------|--------|----------------|
| SCGN 09 04 .. T  | SCGN 09 04 12 T 00520 | SL 500 | 36.12.093.03.0 |
| | | SL 506 | 19.12.093.03.1 |
| | | SN 60 | 36.12.093.03.5 |
| | | | |
| SCGN 09 04 08 . - 85Z025  | SCGN 09 04 08 E - 85Z025 | SL 500 | 36.12.299.70.0 |
| | | SL 506 | 19.12.299.70.1 |
| | SCGN 09 04 08 F - 85Z025 | SL 500 | 36.12.299.06.0 |
| | | SL 506 | 19.12.299.06.1 |
| | SCGN 09 04 08 S 00520 - 85Z025 | SL 500 | 36.12.299.73.0 |
| | | SL 506 | 19.12.299.73.1 |
| SCGN 09 04 08 F - 85Z050  | SCGN 09 04 08 F - 85Z050 | SL 500 | 36.12.312.06.0 |
| | | SL 506 | 19.12.312.06.1 |
| SCGN 09 04 12 T - 85Z075  | SCGN 09 04 12 T 00520 - 85Z075 | SL 500 | 36.12.368.03.0 |
| | | SL 506 | 19.12.368.03.1 |
| SCGN 09 04 AC T - 85Z075 R08  | SCGN 09 04 AC T 00520 - 85Z075 R08 | SL 500 | 36.12.366.03.0 |
| | | SL 506 | 19.12.366.03.1 |

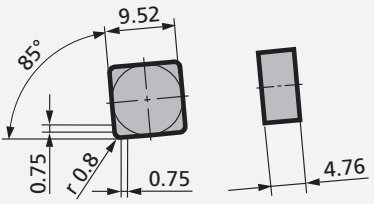
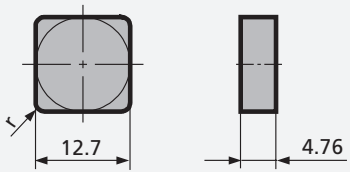
Ceramic Inserts for Turning

| INSERT | ISO | GRADE | SPK REF. NO. |
|--|--------------------------------|----------------|----------------|
| SCGN 12 04 .. T  | SCGN 12 04 08 T 00520 | SH 2 | 36.12.098.03.7 |
| | | SL 506 | 19.12.098.03.1 |
| | | SN 60 | 36.12.098.03.5 |
| | SCGN 12 04 12 T 00520 | SH 2 | 36.12.099.03.7 |
| | | SL 506 | 19.12.099.03.1 |
| | | SN 60 | 36.12.099.03.5 |
| SCGN 12 04 08 . - 85Z025  | SCGN 12 04 08 F - 85Z025 | SL 500 | 36.12.301.06.0 |
| | | SL 506 | 19.12.301.06.1 |
| | SCGN 12 04 08 T 00520 - 85Z025 | SL 500 | 36.12.301.03.0 |
| | | SL 506 | 19.12.301.03.1 |
| SCGN 12 04 08 F - 85Z050  | SCGN 12 04 08 F - 85Z050 | SL 500 | 36.12.306.06.0 |
| | | SL 506 | 19.12.306.06.1 |
| SCGN 12 04 08 T - 85Z075  | SCGN 12 04 08 T 00520 - 85Z075 | SL 500 | 36.12.370.03.0 |
| | | SL 506 | 19.12.370.03.1 |
| SCGW 09 T3 .. T  | SCGW 09 T3 04 T 00520 | SH 2 | 36.16.518.03.7 |
| | SCGW 09 T3 08 T 00520 | SH 2 | 36.16.511.03.7 |
| | SCGW 09 T3 04 T 01020 | SL 500 | 36.16.518.20.0 |
| | SCGW 09 T3 08 T 01020 | SL 500 | 36.16.511.20.0 |
| | | SL 550 C | 17.16.511.20.3 |
| | SCGW 09 T3 12 T 01020 | SL 500 | 36.16.515.20.0 |
| | SL 550 C | 17.16.515.20.3 | |

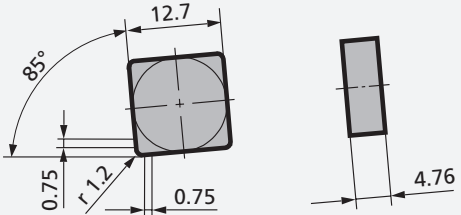
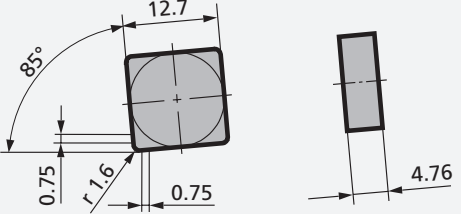
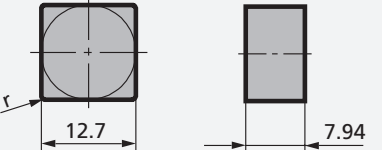
| INSERT | ISO | GRADE | SPK REF. NO. |
|---|-----------------------|----------|----------------|
| SCGW 12 04 .. T  | SCGW 12 04 08 T 01020 | SL 500 | 36.16.512.20.0 |
| | | SL 550 C | 17.16.512.20.3 |
| | SCGW 12 04 12 T 01020 | SL 500 | 36.16.516.20.0 |
| | | SL 550 C | 17.16.516.20.3 |
| SCMX 12 06 .. T  | SCMX 12 06 08 T 00520 | SL 500 | 36.14.656.03.0 |
| | SCMX 12 06 12 T 02020 | SL 500 | 36.14.657.04.0 |
| SCUN 09 04 .. T  | SCUN 09 04 12 T 00520 | SL 500 | 36.12.593.03.0 |
| | | SN 60 | 36.12.593.03.5 |
| | SCUN 09 04 16 T 00520 | SL 500 | 36.12.594.03.0 |
| | | SN 60 | 36.12.594.03.5 |
| SCUN 12 04 .. T  | SCUN 12 04 08 T 00520 | SH 2 | 36.12.598.03.7 |
| | | SN 60 | 36.12.598.03.5 |
| | SCUN 12 04 12 T 00520 | SH 2 | 36.12.599.03.7 |
| | | SL 500 | 36.12.599.03.0 |
| | | SN 60 | 36.12.599.03.5 |
| | SCUN 12 04 16 T 00520 | SH 2 | 36.12.600.03.7 |
| | | SN 60 | 36.12.600.03.5 |
| | SCUN 12 04 16 T 02020 | SL 500 | 36.12.600.04.0 |
| SNGA 12 04 .. T  | SNGA 12 04 08 T 02020 | SH 2 | 36.16.101.04.7 |
| | SNGA 12 04 12 T 02020 | SH 2 | 36.16.102.04.7 |

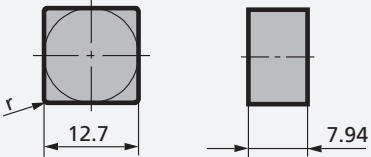
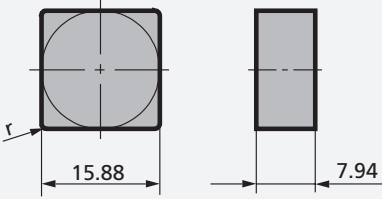
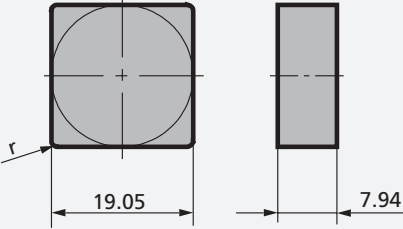
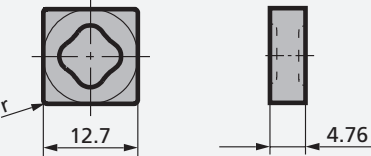
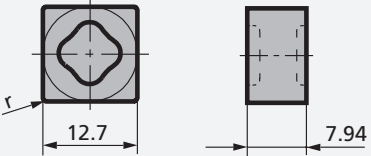
Ceramic Inserts for Turning

| INSERT | ISO | GRADE | SPK REF. NO. |
|--|--------------------------------|---------|----------------|
| SNGN 09 03 .. T  | SNGN 09 03 04 T 00520 | SN 60 | 36.10.053.03.5 |
| | SNGN 09 03 08 T 00520 | SH 2 | 36.10.054.03.7 |
| | | SN 60 | 36.10.054.03.5 |
| | SNGN 09 03 04 T 02020 | SN 60 | 36.10.053.04.5 |
| | SNGN 09 03 08 T 02020 | SL 500 | 36.10.054.04.0 |
| | | SN 80 E | 36.10.054.04.4 |
| SNGN 09 04 .. T  | SNGN 09 04 12 T 00520 | SH 2 | 36.10.050.03.7 |
| | | SH 4 | 19.10.050.03.7 |
| | | SL 500 | 36.10.050.03.0 |
| | | SL 506 | 19.10.050.03.1 |
| | SNGN 09 04 08 T 02020 | SH 2 | 36.10.049.04.7 |
| | | SN 60 | 36.10.049.04.5 |
| | SNGN 09 04 12 T 02020 | SH 4 | 19.10.050.04.7 |
| | | SL 500 | 36.10.050.04.0 |
| | | SL 506 | 19.10.050.04.1 |
| | | SN 60 | 36.10.050.04.5 |
| | | SN 80 E | 36.10.050.04.4 |
| | SNGN 09 04 16 T 02020 | SL 500 | 36.10.052.04.0 |
| | | SL 506 | 19.10.052.04.1 |
| | | SN 60 | 36.10.052.04.5 |
| SNGN 09 04 08 . - 85Z025  | SNGN 09 04 08 F - 85Z025 | SL 500 | 36.10.335.06.0 |
| | | SL 506 | 19.10.335.06.1 |
| | SNGN 09 04 08 T 05010 - 85Z025 | SN 60 | 36.10.335.16.5 |
| SNGN 09 04 08 . - 85Z050  | SNGN 09 04 08 F - 85Z050 | SL 500 | 36.10.346.06.0 |
| | | SL 506 | 19.10.346.06.1 |
| | SNGN 09 04 08 T 05010 - 85Z050 | SN 60 | 36.10.346.16.5 |
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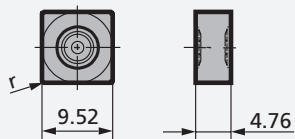
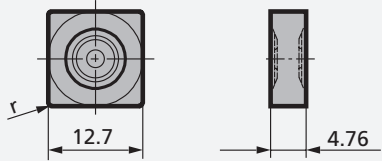
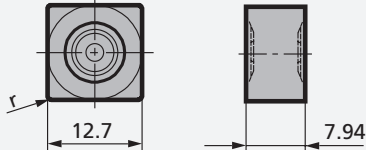
| INSERT | ISO | GRADE | SPK REF. NO. |
|--|--------------------------------|----------------|----------------|
| SNGN 09 04 08 T - 85Z075  | SNGN 09 04 08 T 05010 - 85Z075 | SN 60 | 36.10.419.16.5 |
| | | | |
| SNGN 12 04 .. T  | SNGN 12 04 08 T 00520 | SH 2 | 36.10.009.03.7 |
| | | SN 60 | 36.10.009.03.5 |
| | SNGN 12 04 12 T 00520 | SH 2 | 36.10.058.03.7 |
| | | SN 60 | 36.10.058.03.5 |
| | SNGN 12 04 16 T 00520 | SH 2 | 36.10.059.03.7 |
| | | SN 60 | 36.10.059.03.5 |
| | SNGN 12 04 04 T 02020 | SN 60 | 36.10.057.04.5 |
| | SNGN 12 04 08 T 02020 | SH 2 | 36.10.009.04.7 |
| | | SH 4 | 19.10.009.04.7 |
| | | SL 500 | 36.10.009.04.0 |
| | | SL 506 | 19.10.009.04.1 |
| | | SN 60 | 36.10.009.04.5 |
| | SNGN 12 04 12 T 02020 | SH 2 | 36.10.058.04.7 |
| | | SH 4 | 19.10.058.04.7 |
| | | SL 500 | 36.10.058.04.0 |
| | | SL 506 | 19.10.058.04.1 |
| | | SL 550 C | 17.10.058.04.3 |
| | | SN 60 | 36.10.058.04.5 |
| | SNGN 12 04 16 T 02020 | SN 60 | 36.10.059.03.5 |
| | | SH 2 | 36.10.059.04.7 |
| | SL 500 | 36.10.059.04.0 | |
| | SL 506 | 19.10.059.04.1 | |
| | SN 60 | 36.10.059.04.5 | |

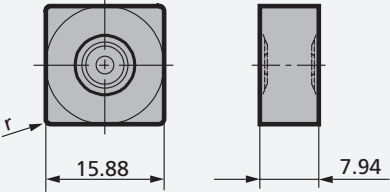
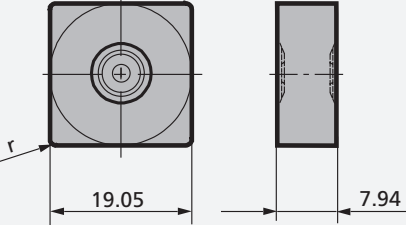
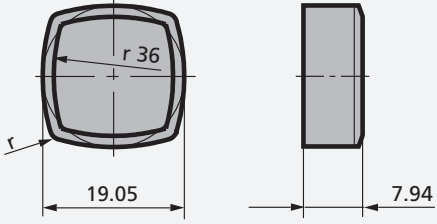
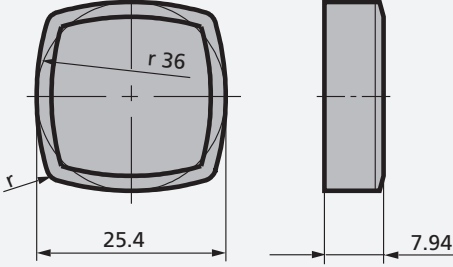
Ceramic Inserts for Turning

| INSERT | ISO | GRADE | SPK REF. NO. |
|---|--------------------------------|----------------|----------------|
| SNGN 12 04 12 T - 85Z075  | SNGN 12 04 12 T 00520 - 85Z075 | SL 500 | 36.10.417.03.0 |
| | | SL 506 | 19.10.417.03.1 |
| | SNGN 12 04 12 T 05010 - 85Z075 | SN 60 | 36.10.417.16.5 |
| | | | |
| SNGN 12 04 16 T - 85Z075  | SNGN 12 04 16 T 00520 - 85Z075 | SL 500 | 36.10.418.03.0 |
| | | SL 506 | 19.10.418.03.1 |
| SNGN 12 07 .. T  | SNGN 12 07 08 T 00520 | SH 2 | 36.10.021.03.7 |
| | SNGN 12 07 12 T 00520 | SH 2 | 36.10.022.03.7 |
| | | SN 60 | 36.10.022.03.5 |
| | SNGN 12 07 25 T 00520 | SN 60 | 36.10.069.03.5 |
| | SNGN 12 07 04 T 02020 | SH 2 | 36.10.017.04.7 |
| | | SN 60 | 36.10.017.04.5 |
| | SNGN 12 07 08 T 02020 | SH 2 | 36.10.021.04.7 |
| | | SH 4 | 19.10.021.04.7 |
| | | SL 500 | 36.10.021.04.0 |
| | | SL 506 | 19.10.021.04.1 |
| | | SN 180 | 13.10.021.04.7 |
| | | SN 60 | 36.10.021.04.5 |
| | | SN 80 E | 36.10.021.04.4 |
| | SNGN 12 07 12 T 02020 | SH 2 | 36.10.022.04.7 |
| | | SH 4 | 19.10.022.04.7 |
| | | SL 500 | 36.10.022.04.0 |
| | | SL 506 | 19.10.022.04.1 |
| | | SL 550 C | 17.10.022.04.3 |
| | | SN 180 | 13.10.022.04.7 |
| | | SN 60 | 36.10.022.04.5 |
| | SN 80 E | 36.10.022.04.4 | |

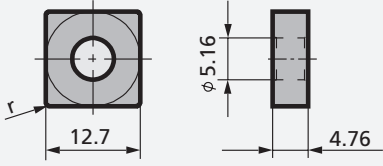
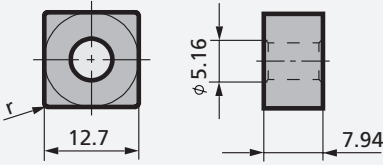
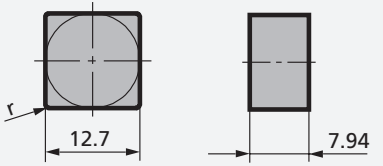
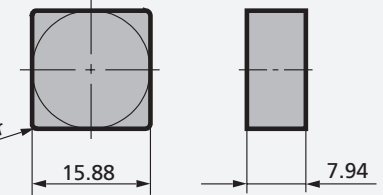
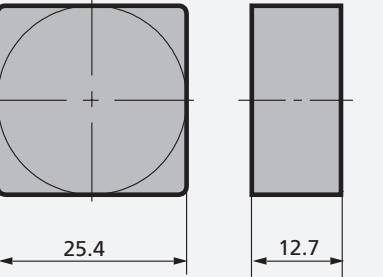
| INSERT | ISO | GRADE | SPK REF. NO. |
|---|-----------------------|----------|----------------|
| SNGN 12 07 .. T  | SNGN 12 07 16 T 02020 | SH 2 | 36.10.023.04.7 |
| | | SH 4 | 19.10.023.04.7 |
| | | SL 500 | 36.10.023.04.0 |
| | | SL 506 | 19.10.023.04.1 |
| | | SL 550 C | 17.10.023.04.3 |
| | | SN 180 | 13.10.023.04.7 |
| | | SN 60 | 36.10.023.04.5 |
| | | SN 80 E | 36.10.023.04.4 |
| SNGN 15 07 .. T  | SNGN 15 07 12 T 02020 | SN 180 | 13.10.041.04.7 |
| | | SN 60 | 36.10.041.04.5 |
| | | SN 80 E | 36.10.041.04.4 |
| | SNGN 15 07 16 T 02020 | SH 2 | 36.10.042.04.7 |
| | | SN 60 | 36.10.042.04.5 |
| | | SN 80 E | 36.10.042.04.4 |
| | SNGN 15 07 20 T 02020 | SH 2 | 36.10.111.04.7 |
| | | SN 60 | 36.10.111.04.5 |
| | | SN 80 E | 36.10.111.04.4 |
| SNGN 19 07 ..  | SNGN 19 07 20 P 85 | SH 2 | 36.10.101.85.7 |
| | SNGN 19 07 20 S 20015 | SH 2 | 36.10.101.27.7 |
| | SNGN 19 07 20 T 02020 | SH 2 | 36.10.101.04.7 |
| SNGX 12 04 .. T  | SNGX 12 04 08 T 02020 | SL 500 | 36.10.304.04.0 |
| | SNGX 12 04 12 T 02020 | SL 500 | 36.10.305.04.0 |
| | SNGX 12 04 16 T 02020 | SL 500 | 36.10.306.04.0 |
| SNGX 12 07 .. T  | SNGX 12 07 08 T 02020 | SL 500 | 36.10.304.04.0 |
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| | SNGX 12 07 16 T 02020 | SL 500 | 36.10.306.04.0 |

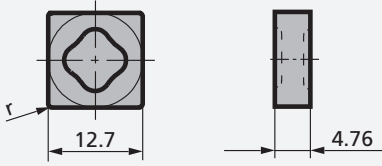
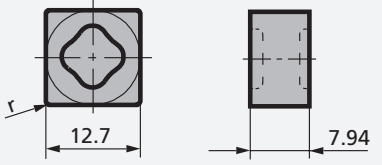
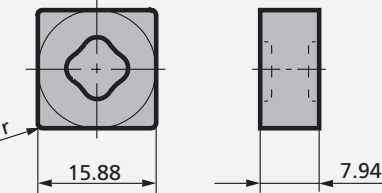
Ceramic Inserts for Turning

| INSERT | ISO | GRADE | SPK REF. NO. |
|--|----------------------------|----------------|----------------|
| SNGX 09 04 .. T - DO  | SNGX 09 04 12 T 02020 - DO | SH 4 | 19.10.471.04.7 |
| | | | |
| SNGX 12 04 .. T - DO  | SNGX 12 04 08 T 02020 - DO | SH 4 | 19.10.304.04.7 |
| | SNGX 12 04 12 T 02020 - DO | SH 4 | 19.10.305.04.7 |
| | | SL 606 | 19.10.305.04.8 |
| | | | |
| SNGX 12 07 .. T - DO  | SNGX 12 07 08 T 02020 - DO | SH 4 | 19.10.161.04.7 |
| | | SL 506 | 19.10.161.04.1 |
| | | SL 508 | 19.10.161.04.2 |
| | SNGX 12 07 12 T 02020 - DO | SH 4 | 19.10.162.04.7 |
| | | SL 506 | 19.10.162.04.1 |
| | | SL 508 | 19.10.162.04.2 |
| | | SL 606 | 19.10.162.04.8 |
| | | SL 608 | 19.10.162.04.3 |
| | | SL 654 C | 19.10.162.04.5 |
| | | SL 658 C | 21.10.162.04.0 |
| | | SN 180 | 13.10.162.04.7 |
| | SNGX 12 07 16 T 02020 - DO | SH 4 | 19.10.163.04.7 |
| | | SL 506 | 19.10.163.04.1 |
| | | SL 508 | 19.10.163.04.2 |
| | | SL 606 | 19.10.163.04.8 |
| | | SL 608 | 19.10.163.04.3 |
| | | SL 654 C | 19.10.163.04.5 |
| | SL 658 C | 21.10.163.04.0 | |
| | SN 180 | 13.10.163.04.7 | |

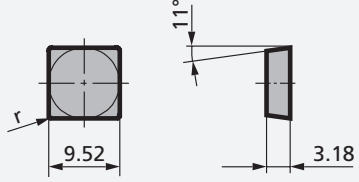
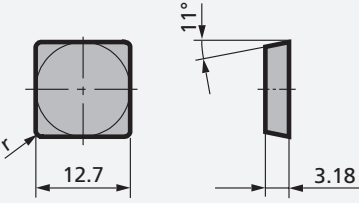
| INSERT | ISO | GRADE | SPK REF. NO. |
|---|----------------------------|----------|----------------|
| SNGX 15 07 .. T - DO  | SNGX 15 07 12 T 02020 - DO | SL 508 | 19.10.131.04.2 |
| | SNGX 15 07 16 T 02020 - DO | SL 508 | 19.10.132.04.2 |
| | | SL 606 | 19.10.132.04.8 |
| | | SL 608 | 19.10.132.04.3 |
| | | SL 658 C | 21.10.132.04.0 |
| SNGX 19 07 .. T - DO  | SNGX 19 07 16 T 02020 - DO | SL 658 C | 21.10.462.04.0 |
| SNGX 19 07 .. S  | SNGX 19 07 20 S 20015 | SH 2 | 36.10.132.26.7 |
| SNGX 25 07 .. S  | SNGX 25 07 20 S 20015 | SH 2 | 36.71.127.26.7 |

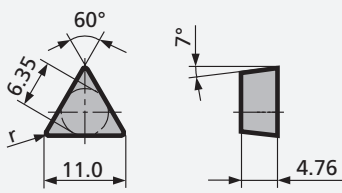
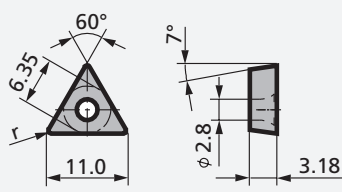
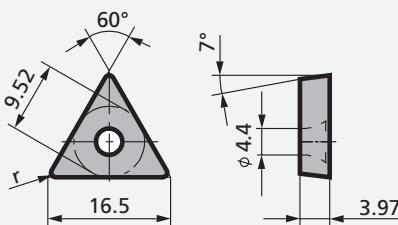
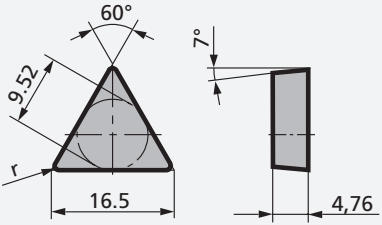
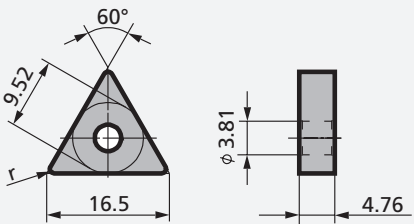
Ceramic Inserts for Turning

| INSERT | ISO | GRADE | SPK REF. NO. |
|---|-----------------------|---------|----------------|
| SNMA 12 04 .. T  | SNMA 12 04 08 T 02020 | SL 500 | 36.16.046.04.0 |
| | SNMA 12 04 12 T 02020 | SL 500 | 36.16.047.04.0 |
| | SNMA 12 04 16 T 02020 | SL 500 | 36.16.048.04.0 |
| | | | |
| SNMA 12 07 .. T  | SNMA 12 07 16 T 02020 | SN 80 E | 36.16.033.04.4 |
| | | | |
| SNMN 12 07 .. T  | SNMN 12 07 08 T 02020 | SN 60 | 36.14.002.04.5 |
| | SNMN 12 07 12 T 02020 | SN 60 | 36.14.003.04.5 |
| | | SN 80 E | 36.14.003.04.4 |
| | SNMN 12 07 16 T 02020 | SN 60 | 36.14.004.04.5 |
| | | SN 80 E | 36.14.004.04.4 |
| SNMN 15 07 .. T  | SNMN 15 07 12 T 02020 | SN 60 | 36.14.041.04.5 |
| | | SN 80 E | 36.14.041.04.4 |
| | SNMN 15 07 16 T 02020 | SN 60 | 36.14.042.04.5 |
| | | SN 80 E | 36.14.042.04.4 |
| SNMN 25 12 .. T  | SNMN 25 12 25 T 02020 | SN 80 E | 36.14.032.04.4 |
| | SNMN 25 12 25 T 03030 | SN 80 E | 36.14.032.54.4 |

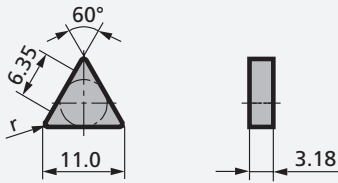
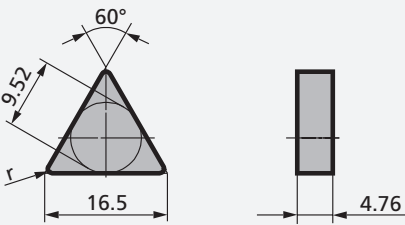
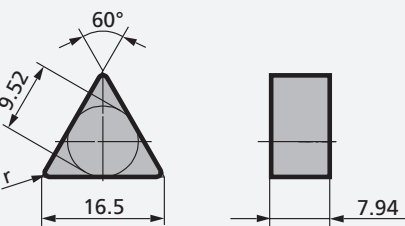
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|---|-----------------------|----------|----------------|
| SNMX 12 04 .. T  | SNMX 12 04 12 T 02020 | SL 406 | 13.14.270.04.3 |
| | | SL 408 | 13.14.270.04.3 |
| | SNMX 12 04 16 T 02020 | SL 406 | 13.14.271.04.3 |
| | | SL 408 | 13.14.271.04.3 |
| | | | |
| | | | |
| SNMX 12 07 .. T  | SNMX 12 07 08 T 02020 | SL 500 | 36.14.161.04.0 |
| | SNMX 12 07 12 T 02020 | SL 500 | 36.14.162.04.0 |
| | | SL 550 C | 17.14.162.04.3 |
| | | SL 554 C | 17.14.162.04.4 |
| | | SN 60 | 36.14.162.04.5 |
| | | SN 80 E | 36.14.162.04.4 |
| | | SL 406 | 13.14.452.04.3 |
| | | SL 408 | 13.14.452.04.4 |
| | SNMX 12 07 16 T 02020 | SL 500 | 36.14.163.04.0 |
| | | SL 550 C | 17.14.163.04.3 |
| | | SL 554 C | 17.14.163.04.4 |
| | | SN 80 E | 36.14.163.04.4 |
| | | SL 406 | 13.14.453.04.3 |
| | | SL 408 | 13.14.453.04.4 |
| SNMX 15 07 .. T  | SNMX 15 07 12 T 02020 | SL 500 | 36.14.131.04.0 |
| | | SL 550 C | 17.14.131.04.3 |
| | | SL 554 C | 17.14.131.04.4 |
| | | SN 80 E | 36.14.131.04.4 |
| | SNMX 15 07 16 T 02020 | SL 500 | 36.14.132.04.0 |
| | | SL 550 C | 17.14.132.04.3 |
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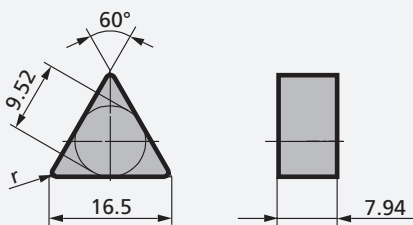
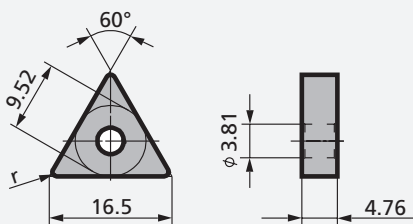
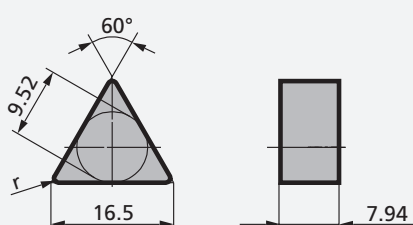
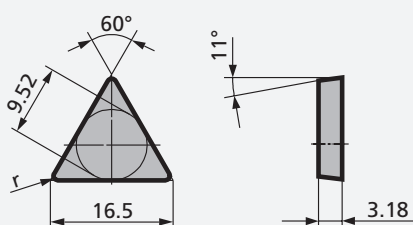
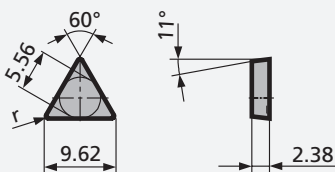
Ceramic Inserts for Turning

| INSERT | ISO | GRADE | SPK REF. NO. | |
|---|-----------------------|-------|----------------|--|
| SPUN 09 03 .. T  | SPUN 09 03 04 T 00520 | SH 2 | 36.12.639.03.7 | |
| | | SN 60 | 36.12.639.03.5 | |
| | SPUN 09 03 08 T 00520 | SH 2 | 36.12.640.03.7 | |
| | | SN 60 | 36.12.640.03.5 | |
| | | | | |
| | | | | |
| SPUN 12 03 .. T  | SPUN 12 03 04 T 00520 | SH 2 | 36.12.653.03.7 | |
| | | SN 60 | 36.12.653.03.5 | |
| | SPUN 12 03 08 T 00520 | SH 2 | 36.12.654.03.7 | |
| | | SN 60 | 36.12.654.03.5 | |
| | SPUN 12 03 12 T 00520 | SH 2 | 36.12.655.03.7 | |
| | | SN 60 | 36.12.655.03.5 | |

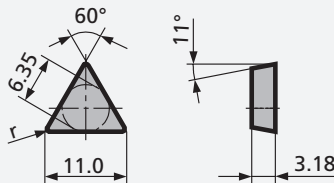
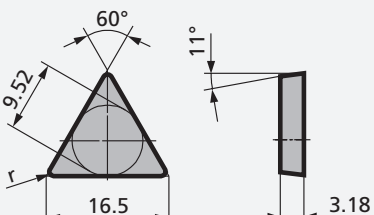
| INSERT | ISO | GRADE | SPK REF. NO. |
|---|-----------------------|--------|----------------|
| TCGN 11 04 .. T  | TCGN 11 04 16 T 00520 | SL 500 | 36.32.226.03.0 |
| | | SL 506 | 19.32.226.03.1 |
| TCGW 11 03 .. T  | TCGW 11 03 04 T 01020 | SL 500 | 36.36.115.20.0 |
| | TCGW 11 03 08 T 01020 | SL 500 | 36.36.116.20.0 |
| TCGW 16 T3 .. T  | TCGW 16 T3 04 T 01020 | SL 500 | 36.36.117.20.0 |
| | TCGW 16 T3 08 T 01020 | SL 500 | 36.36.118.20.0 |
| TCUN 16 04 .. T  | TCUN 16 04 08 T 00520 | SH 2 | 36.32.570.03.7 |
| | | SN 60 | 36.32.570.03.5 |
| | TCUN 16 04 12 T 00520 | SH 2 | 36.32.571.03.7 |
| | | SN 60 | 36.32.571.03.5 |
| | TCUN 16 04 16 T 00520 | SH 2 | 36.32.572.03.7 |
| | | SN 60 | 36.32.572.03.5 |
| TNGA 16 04 .. T  | TNGA 16 04 08 T 02020 | SH 2 | 36.36.071.04.7 |
| | TNGA 16 04 12 T 02020 | SH 2 | 36.36.072.04.7 |

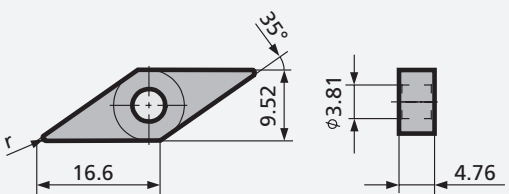
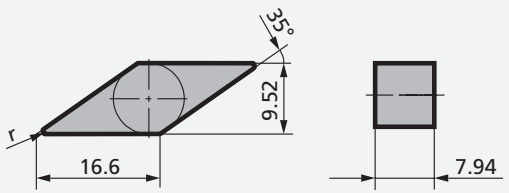
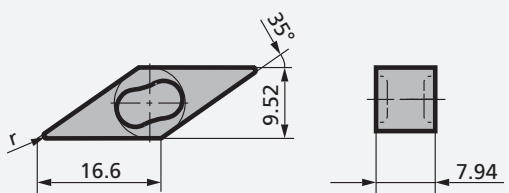
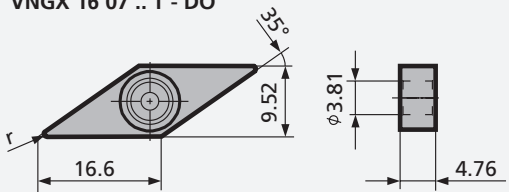
Ceramic Inserts for Turning

| INSERT | ISO | GRADE | SPK REF. NO. |
|---|-----------------------|----------------|----------------|
| TNGN 11 03 .. T  | TNGN 11 03 08 T 00520 | SH 2 | 36.30.013.03.7 |
| | TNGN 11 03 12 T 00520 | SH 2 | 36.30.033.03.7 |
| | | SN 60 | 36.30.033.03.5 |
| | TNGN 11 03 08 T 02020 | SH 2 | 36.30.013.04.7 |
| | TNGN 11 03 12 T 02020 | SH 2 | 36.30.033.04.7 |
| | | | |
| TNGN 16 04 .. T  | TNGN 16 04 04 T 00520 | SH 2 | 36.30.014.03.7 |
| | TNGN 16 04 08 T 00520 | SH 2 | 36.30.010.03.7 |
| | TNGN 16 04 12 T 00520 | SH 2 | 36.30.004.03.7 |
| | TNGN 16 04 16 T 00520 | SH 2 | 36.30.016.03.7 |
| | TNGN 16 04 04 T 02020 | SH 2 | 36.30.014.04.7 |
| | | SN 60 | 36.30.014.04.5 |
| | TNGN 16 04 08 T 02020 | SH 2 | 36.30.010.04.7 |
| | | SN 60 | 36.30.010.04.5 |
| | TNGN 16 04 12 T 02020 | SH 2 | 36.30.004.04.7 |
| | | SL 500 | 36.30.004.04.0 |
| | | SL 506 | 19.30.004.04.1 |
| | | SN 60 | 36.30.004.04.5 |
| | TNGN 16 04 16 T 02020 | SH 2 | 36.30.016.04.7 |
| | | SL 500 | 36.30.016.04.0 |
| | | SL 506 | 19.30.016.04.1 |
| | SN 60 | 36.30.016.04.5 | |
| TNGN 16 07 .. T  | TNGN 16 07 04 T 02020 | SH 2 | 36.30.015.04.7 |
| | | SN 180 | 13.30.015.04.7 |
| | | SN 60 | 36.30.015.04.5 |
| | | SN 80 E | 36.30.015.04.4 |
| | TNGN 16 07 08 T 02020 | SH 2 | 36.30.011.04.7 |
| | | SN 180 | 13.30.011.04.7 |
| | | SN 60 | 36.30.011.04.5 |
| | | SN 80 E | 36.30.011.04.4 |
| | TNGN 16 07 12 T 02020 | SH 2 | 36.30.006.04.7 |
| | | SN 180 | 13.30.006.04.7 |
| | | SN 60 | 36.30.006.04.5 |
| | | SN 80 E | 36.30.006.04.4 |

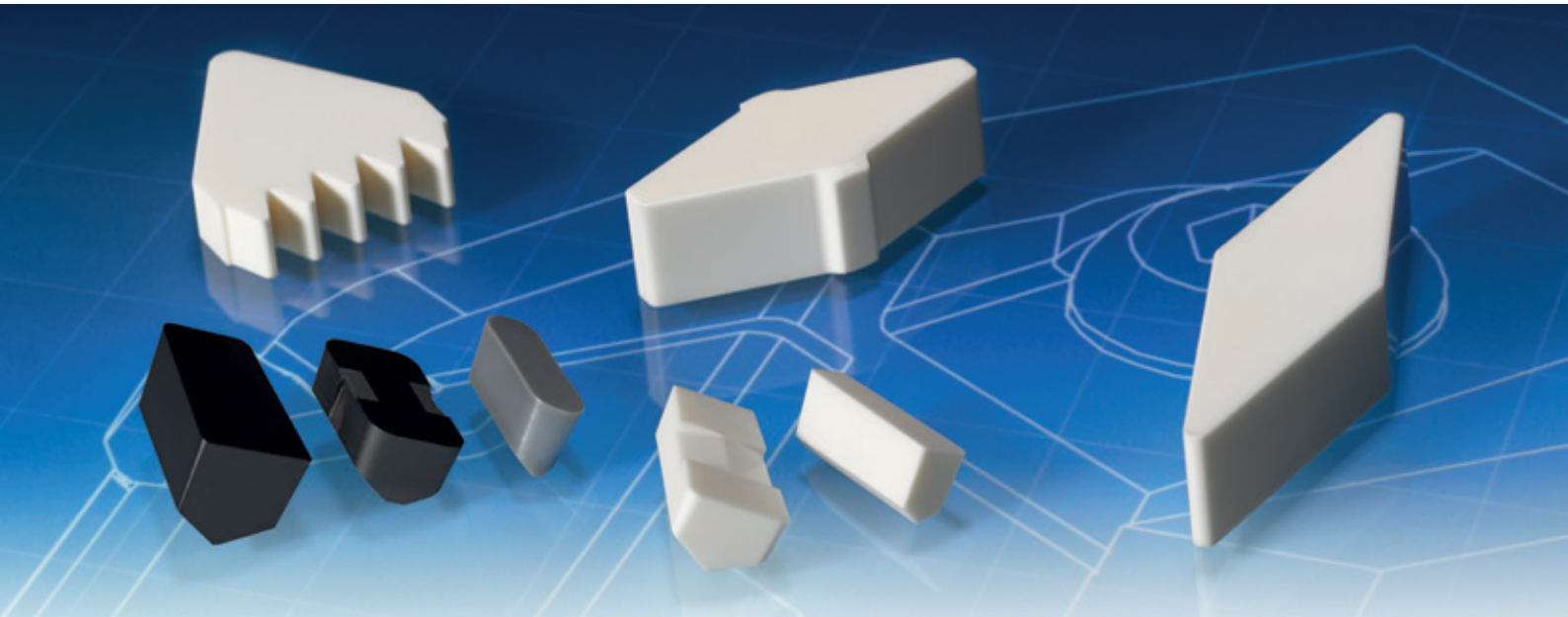
| INSERT | ISO | GRADE | SPK REF. NO. |
|---|-----------------------|---------|----------------|
| TNGN 16 07 .. T  | TNGN 16 07 16 T 02020 | SH 2 | 36.30.017.04.7 |
| | | SN 180 | 13.30.017.04.7 |
| | | SN 60 | 36.30.017.04.5 |
| | | SN 80 E | 36.30.017.04.4 |
| TNMA 16 04 .. T  | TNMA 16 04 08 T 02020 | SL 500 | 36.36.030.04.0 |
| | TNMA 16 04 12 T 02020 | SL 500 | 36.36.031.04.0 |
| TNMN 16 07 .. T  | TNMN 16 07 08 T 02020 | SN 60 | 36.34.051.04.5 |
| | TNMN 16 07 12 T 02020 | SN 60 | 36.34.052.04.5 |
| | TNMN 16 07 16 T 02020 | SN 60 | 36.34.053.04.5 |
| TPGN 16 03 .. T  | TPGN 16 03 12 T 01020 | SL 500 | 36.32.117.20.0 |
| | | SL 506 | 19.32.117.20.1 |
| TPUN 09 02 .. T  | TPUN 09 02 04 T 00520 | SH 2 | 36.32.601.03.7 |
| | TPUN 09 02 08 T 00520 | SH 2 | 36.32.602.03.7 |

Ceramic Inserts for Turning

| INSERT | ISO | GRADE | SPK REF. NO. | |
|---|--|-----------------------|----------------|----------------|
| TPUN 11 03 .. T  | TPUN 11 03 04 T 00520 | SH 2 | 36.32.607.03.7 | |
| | | SN 60 | 36.32.607.03.5 | |
| | TPUN 11 03 08 T 00520 | SH 2 | 36.32.608.03.7 | |
| | | SL 500 | 36.32.608.03.0 | |
| | | SN 60 | 36.32.608.03.5 | |
| | TPUN 11 03 12 T 00520 | SH 2 | 36.32.609.03.7 | |
| | | SL 500 | 36.32.609.03.0 | |
| | | SL 506 | 19.32.609.03.1 | |
| | | SN 60 | 36.32.609.03.5 | |
| | TPUN 16 03 .. T  | TPUN 16 03 04 T 00520 | SH 2 | 36.32.615.03.7 |
| | | | SN 60 | 36.32.615.03.5 |
| | | TPUN 16 03 08 T 00520 | SH 2 | 36.32.616.03.7 |
| | | SL 500 | 36.32.616.03.0 | |
| | | SL 506 | 19.32.616.03.1 | |
| | | SN 60 | 36.32.616.03.5 | |
| TPUN 16 03 12 T 00520 | | SH 2 | 36.32.617.03.7 | |
| | | SL 500 | 36.32.617.03.0 | |
| | | SL 506 | 19.32.617.03.1 | |
| | | SN 60 | 36.32.617.03.5 | |
| TPUN 16 03 16 T 00520 | | SH 2 | 36.32.618.03.7 | |
| | | SL 500 | 36.32.618.03.0 | |
| | SL 506 | 19.32.618.03.1 | | |
| | SN 60 | 36.32.618.03.5 | | |

| INSERT | ISO | GRADE | SPK REF. NO. |
|--|----------------------------|----------------|----------------|
| VNGA 16 04 .. T  | VNGA 16 04 04 T 02020 | SH 2 | 36.56.246.04.7 |
| | VNGA 16 04 08 T 02020 | SH 2 | 36.56.247.04.7 |
| | VNGA 16 04 12 T 02020 | SH 2 | 36.56.248.04.7 |
| | VNGA 16 04 16 T 02020 | SH 2 | 36.56.249.04.7 |
| VNGN 16 07 .. T  | VNGN 16 07 04 T 02020 | SH 2 | 36.50.176.04.7 |
| | VNGN 16 07 08 T 02020 | SH 2 | 36.50.177.04.7 |
| | VNGN 16 07 12 T 02020 | SH 2 | 36.50.178.04.7 |
| | VNGN 16 07 16 T 02020 | SH 2 | 36.50.179.04.7 |
| VNGX 16 07 .. T  | VNGX 16 07 08 T 00520 | SN 80 E | 36.50.235.03.4 |
| | VNGX 16 07 12 T 00520 | SL 500 | 36.50.236.03.0 |
| | | SN 80 E | 36.50.236.03.4 |
| | | SL 500 | 36.50.236.04.0 |
| | | SL 550 C | 17.50.236.04.3 |
| | | SN 80 E | 36.50.236.04.4 |
| | VNGX 16 07 16 T 02020 | SL 500 | 36.50.237.04.0 |
| | SL 550 C | 17.50.237.04.3 | |
| VNGX 16 07 .. T - DO  | VNGX 16 07 12 T 02020 - DO | SL 506 | 19.50.236.04.1 |
| | | SL 508 | 19.50.236.04.2 |
| | VNGX 16 07 16 T 02020 - DO | SL 506 | 19.50.237.04.1 |





Cutting Data Recommendations for Grooving

| MATERIAL | HARDNESS (HB) | CUTTING SPEED v_c (m/min) | | FEED RATE f (mm) | | GRADE |
|----------------|---------------|-----------------------------|---------------|--------------------|---------------|---------|
| | | RECOMMENDED VALUE | OVERALL RANGE | RECOMMENDED VALUE | OVERALL RANGE | |
| GREY CAST IRON | 140 - 220 | 400 | 200 - 800 | 0.12 | 0.08 - 0.20 | SN 60 |
| | | 400 | 200 - 800 | 0.15 | 0.08 - 0.20 | SN 80 E |
| | | 500 | 300 - 1000 | 0.15 | 0.08 - 0.20 | SL 500 |
| | | 600 | 300 - 1200 | 0.15 | 0.08 - 0.25 | SL 608 |
| | | 600 | 400 - 1000 | 0.12 | 0.08 - 0.20 | SH 2 |
| | 230 - 280 | 300 | 150 - 600 | 0.10 | 0.08 - 0.15 | SN 60 |
| | | 300 | 150 - 600 | 0.10 | 0.08 - 0.15 | SN 80 E |
| | | 400 | 300 - 800 | 0.10 | 0.08 - 0.15 | SL 500 |
| | | 600 | 300 - 900 | 0.12 | 0.08 - 0.20 | SL 608 |
| | | 500 | 300 - 900 | 0.10 | 0.08 - 0.16 | SH 2 |

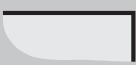
| MATERIAL | HARDNESS (HRC) | CUTTING SPEED v_c (m/min) | | FEED RATE f (mm) | | GRADE |
|----------------|----------------|-----------------------------|---------------|--------------------|---------------|-------|
| | | RECOMMENDED VALUE | OVERALL RANGE | RECOMMENDED VALUE | OVERALL RANGE | |
| HARDENED STEEL | 45-55 | 120 | 50 - 180 | 0.08 | 0.06 - 0.12 | SH 2 |
| | 50-60 | 150 | 80 - 200 | 0.08 | 0.06 - 0.15 | SH 4 |

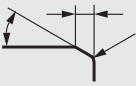


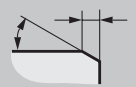
Designation System for Grooving Inserts

| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---------------------|--|--|----------|--------------------|----------|----|---|----|---|----|---|-----|---|--|----------|--|---|---|--------|---|----------|---|--------|---|----------|---|----------|---|--------|---|---------|
| G | | <table border="1"> <tr><td>N</td><td>0°</td></tr> <tr><td>A</td><td>3°</td></tr> <tr><td>B</td><td>5°</td></tr> <tr><td>C</td><td>7°</td></tr> <tr><td>P</td><td>11°</td></tr> <tr><td>O</td><td>Clearance angle which requires special data.</td></tr> </table> | N | 0° | A | 3° | B | 5° | C | 7° | P | 11° | O | Clearance angle which requires special data. | N | | <table border="1"> <tr><td>A</td><td>≤ 5 mm</td></tr> <tr><td>B</td><td>≤ 5.5 mm</td></tr> <tr><td>C</td><td>≤ 6 mm</td></tr> <tr><td>D</td><td>≤ 6.5 mm</td></tr> <tr><td>E</td><td>≤ 7.5 mm</td></tr> <tr><td>F</td><td>≤ 8 mm</td></tr> <tr><td>G</td><td>≤ 10 mm</td></tr> </table> | A | ≤ 5 mm | B | ≤ 5.5 mm | C | ≤ 6 mm | D | ≤ 6.5 mm | E | ≤ 7.5 mm | F | ≤ 8 mm | G | ≤ 10 mm |
| N | 0° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | 3° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | 5° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | 7° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P | 11° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| O | Clearance angle which requires special data. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| A | ≤ 5 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| B | ≤ 5.5 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| C | ≤ 6 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| D | ≤ 6.5 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E | ≤ 7.5 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| F | ≤ 8 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G | ≤ 10 mm | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Single-edge | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| L | | | P | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Double-edge | | | X | Special design | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Insert shape | | Normal clearance angle α_n | | Insert type | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| G | B | M | P | 12 | A | | | | | | | | | | | | | | | | | | | | | | | | | | |


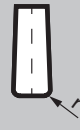
| Tolerance | | | Insert size | |
|-----------|-----------|----------|--------------|---------|
| | Height | Length | Groove width | |
| | | | | |
| M | ± 0.13 mm | ± 0.1 mm | 12 | 12.0 mm |
| | | | 15 | 15.0 mm |

F 
Sharp

S 
Chamfered and rounded

T 
Chamfered

Corner design

| Left radius | | Right radius | |
|-------------|---------|--------------|---------|
| L0.8 | r=0.8mm | R0.8 | r=0.8mm |
| L1.5 | r=1.5mm | R1.5 | r=1.5mm |
| L2 | r=2.0mm | R2 | r=2.0mm |
| .. | .. | .. | .. |

Edge radii

0400

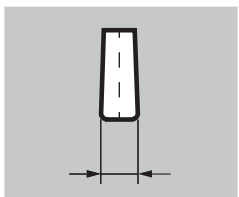
T

- N

L2R2

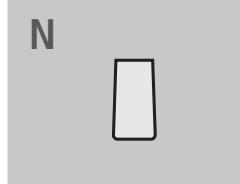
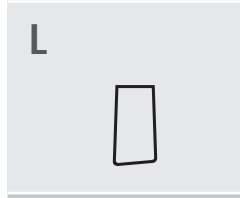
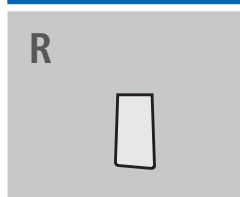
- RAG

Groove width



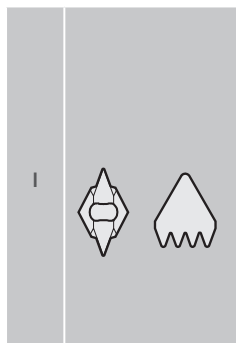
| | |
|------|------|
| 0400 | 4 mm |
| 0500 | 5 mm |
| 0600 | 6 mm |
| 0700 | 7 mm |
| 0800 | 8 mm |
| 0900 | 9 mm |
| .. | .. |

Cutting direction

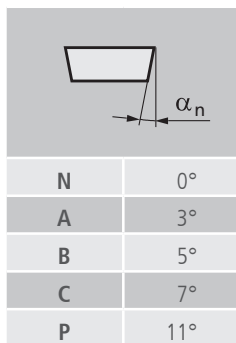


Type Grooving system

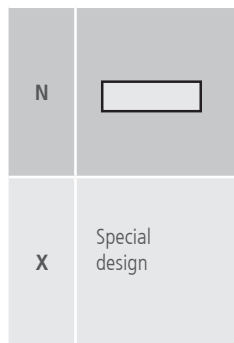
Designation System for Poly-V Grooving Inserts



Insert shape



Normal clearance angle α_n



Insert type

I

N

M

N

12

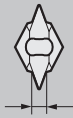
Tolerances

| | S = ± mm | d = ± mm | m = ± mm | Inscribed circle | Tolerance class | | | |
|---|----------|------------|------------|------------------|-----------------|------|----------|------|
| A | 0,025 | 0,025 | 0,005 | d mm | d = ± mm | | m = ± mm | |
| C | 0,025 | 0,025 | 0,013 | | d mm | U | M, N | U |
| E | 0,025 | 0,025 | 0,025 | | d = ± mm | | m = ± mm | |
| F | 0,025 | 0,013 | 0,005 | 3,97 | 0,05 | 0,08 | 0,08 | 0,13 |
| G | 0,130 | 0,025 | 0,025 | 5,56 | | | | |
| H | 0,025 | 0,013 | 0,013 | 6,35 | 0,08 | 0,13 | 0,13 | 0,2 |
| J | 0,025 | 0,05-0,13* | 0,005 | 9,52 | | | | |
| K | 0,025 | 0,05-0,13* | 0,013 | 12,70 | 0,1 | 0,18 | 0,15 | 0,27 |
| L | 0,025 | 0,05-0,13* | 0,025 | 15,88 | | | | |
| M | 0,130 | 0,05-0,13* | 0,08-0,18* | 19,05 | 0,13 | 0,25 | 0,18 | 0,38 |
| U | 0,130 | 0,08-0,25* | 0,13-0,38* | 25,40 | | | | |


* Permissible deviations for the insert shape, depending on the insert size

Insert size

| | |
|----|----------|
| | |
| 09 | 9.52 mm |
| 12 | 12.70 mm |
| 15 | 15.88 mm |



| | |
|-----|--------|
| 023 | 2.3 mm |
| 036 | 3.6 mm |
| 047 | 4.7 mm |
| 094 | 9.4 mm |



| | |
|-----|---------|
| 111 | 11.1 mm |
| 147 | 14.7 mm |
| 182 | 18.2 mm |
| 218 | 21.8 mm |

Insert width

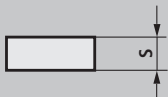
| | |
|---|-----------------|
| J | 6 cutting edges |
| K | 5 cutting edges |
| L | 4 cutting edges |
| M | 3 cutting edges |
| | 1 cutting edge |

Profile type
Poly-V profile DIN 7867

Number of cutting edges
Poly-V profile DIN 7867



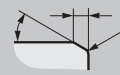
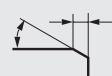
A 147 T - K 4 - 04

Insert thickness



| | |
|---|----------|
| A | ≤ 5 mm |
| B | ≤ 5.5 mm |
| C | ≤ 6 mm |
| D | ≤ 6.5 mm |
| E | ≤ 7.5 mm |
| F | ≤ 8 mm |
| G | ≤ 10 mm |

Corner design

| | |
|---|---|
| E |  |
| F |  |
| S |  |
| T |  |













Radius Tooth interior

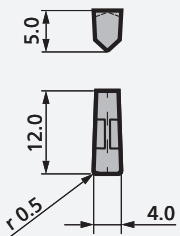
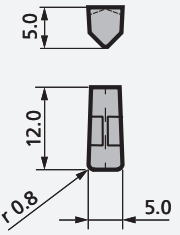
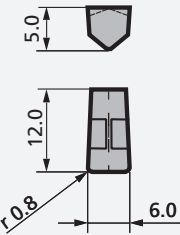
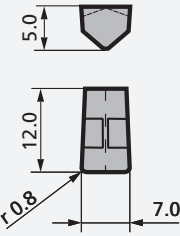
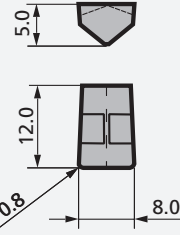


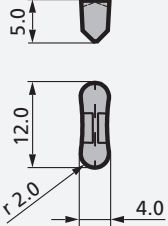
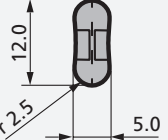
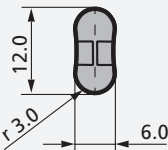
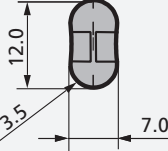
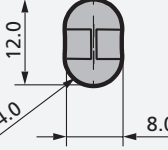
| | |
|----|--------|
| 04 | 0.4 mm |
|----|--------|



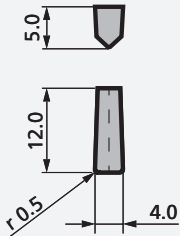
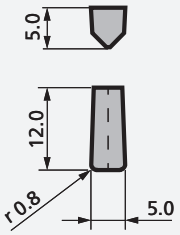
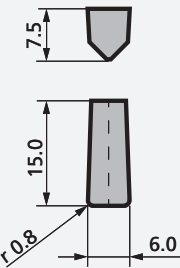
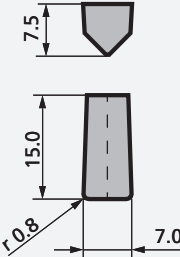
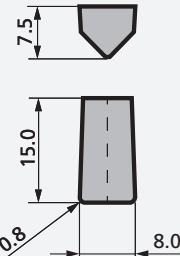
Contents: Ceramic Inserts for Grooving

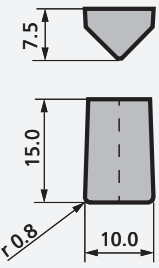
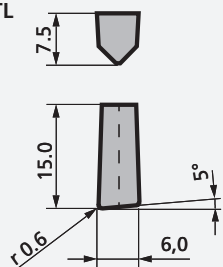
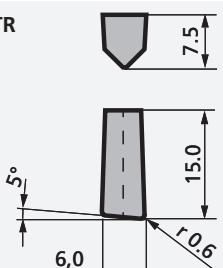
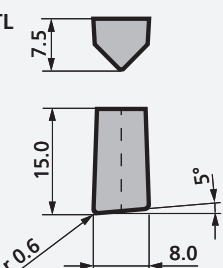
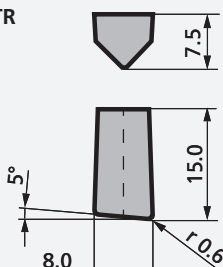
| | | | |
|---|---|--|---|
| GBMP - RAG | LBMP - RAG | GBMP | GBMP TL, GBMP TR |
|  |  |  |  |
| Page 62 | Page 63 | Page 64-65 | Page 65 |
| LBMP | NBMN | Poly-V profile INMX | Poly-V profile INMN |
|  |  |  |  |
| Page 66-67 | Page 68 | Page 69 | Page 70-71 |
| Profile KP1 | Profile KP2 | Profile P1 | Profile P2 |
|  |  |  |  |
| Page 72 | Page 73 | Page 74 | Page 75 |

| INSERT | DESIGNATION | GRADE | SPK REF. NO. |
|--|--|--------|----------------|
| GBMP 12 A 0400 - RAG  | GBMP 12 A 0400 T00520 - N L0.5R0.5 - RAG | SH 2 | 36.23.505.03.7 |
| | | SL 500 | 36.23.505.03.0 |
| | | SL 608 | 19.23.505.03.3 |
| | | SN 60 | 36.23.505.03.5 |
| GBMP 12 A 0500 - RAG  | GBMP 12 A 0500 T00520 - N L0.8R0.8 - RAG | SH 2 | 36.23.506.03.7 |
| | | SL 500 | 36.23.506.03.0 |
| | | SL 608 | 19.23.506.03.3 |
| | | SN 60 | 36.23.506.03.5 |
| GBMP 12 A 0600 - RAG  | GBMP 12 A 0600 T00520 - N L0.8R0.8 - RAG | SH 2 | 36.23.507.03.7 |
| | | SL 500 | 36.23.507.03.0 |
| | | SL 608 | 19.23.507.03.3 |
| | | SN 60 | 36.23.507.03.5 |
| GBMP 12 A 0700 - RAG  | GBMP 12 A 0700 T00520 - N L0.8R0.8 - RAG | SH 2 | 36.23.508.03.7 |
| | | SL 500 | 36.23.508.03.0 |
| | | SL 608 | 19.23.508.03.3 |
| | | SN 60 | 36.23.508.03.5 |
| GBMP 12 A 0800 - RAG  | GBMP 12 A 0800 T00520 - N L0.8R0.8 - RAG | SH 2 | 36.23.509.03.7 |
| | | SL 500 | 36.23.509.03.0 |
| | | SL 608 | 19.23.509.03.3 |
| | | SN 60 | 36.23.509.03.5 |

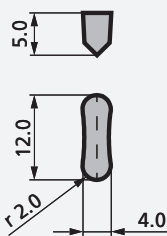
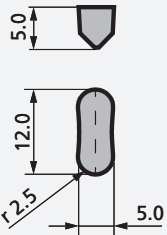
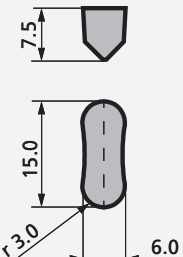
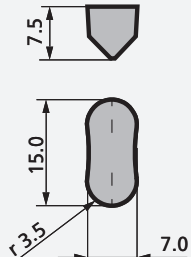
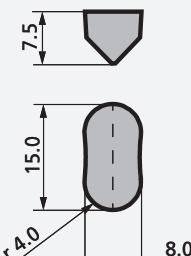
| INSERT | DESIGNATION | GRADE | SPK REF. NO. |
|--|--|--------|----------------|
| LBMP 12 A 0400 - RAG  | LBMP 12 A 0400 T00520 - N L2R2 - RAG | SH 2 | 36.23.500.03.7 |
| | | SL 500 | 36.23.500.03.0 |
| | | SL 608 | 19.23.500.03.3 |
| | | SN 60 | 36.23.500.03.5 |
| | | | |
| LBMP 12 A 0500 - RAG  | LBMP 12 A 0500 T00520 - N L2.5R2.5 - RAG | SH 2 | 36.23.501.03.7 |
| | | SL 500 | 36.23.501.03.0 |
| | | SL 608 | 19.23.501.03.3 |
| | | SN 60 | 36.23.501.03.5 |
| | | | |
| LBMP 12 A 0600 - RAG  | LBMP 12 A 0600 T00520 - N L3R3 - RAG | SH 2 | 36.23.502.03.7 |
| | | SL 500 | 36.23.502.03.0 |
| | | SL 608 | 19.23.502.03.3 |
| | | SN 60 | 36.23.502.03.5 |
| | | | |
| LBMP 12 A 0700 - RAG  | LBMP 12 A 0700 T00520 - N L3.5R3.5 - RAG | SH 2 | 36.23.503.03.7 |
| | | SL 500 | 36.23.503.03.0 |
| | | SL 608 | 19.23.503.03.3 |
| | | SN 60 | 36.23.503.03.5 |
| | | | |
| LBMP 12 A 0800 - RAG  | LBMP 12 A 0800 T00520 - N L4R4 - RAG | SH 2 | 36.23.504.03.7 |
| | | SL 500 | 36.23.504.03.0 |
| | | SL 608 | 19.23.504.03.3 |
| | | SN 60 | 36.23.504.03.5 |
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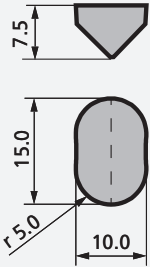
Ceramic Inserts for Grooving

| INSERT | DESIGNATION | GRADE | SPK REF. NO. |
|---|-----------------------|---------|----------------|
| GBMP 12 A 040  | GBMP 12 A 040 S 05015 | SH 2 | 36.22.100.31.7 |
| | GBMP 12 A 040 T 00520 | SH 2 | 36.22.100.03.7 |
| | | SL 500 | 36.22.100.03.0 |
| | | SN 60 | 36.22.100.03.5 |
| GBMP 12 A 050  | GBMP 12 A 050 S 05015 | SH 2 | 36.22.101.31.7 |
| | GBMP 12 A 050 T 00520 | SH 2 | 36.22.101.03.7 |
| | | SL 500 | 36.22.101.03.0 |
| | | SN 60 | 36.22.101.03.5 |
| GBMP 15 E 060  | GBMP 15 E 060 S 05015 | SH 2 | 36.70.768.31.7 |
| | GBMP 15 E 060 T 00520 | SH 2 | 36.70.768.03.7 |
| | | SL 500 | 36.70.768.03.0 |
| | | SN 60 | 36.70.768.03.5 |
| | | SN 80 E | 36.70.768.03.4 |
| GBMP 15 E 070  | GBMP 15 E 070 T 00520 | SH 2 | 36.70.769.03.7 |
| | | SL 500 | 36.70.769.03.0 |
| | | SN 60 | 36.70.769.03.5 |
| | | SN 80 E | 36.70.769.03.4 |
| GBMP 15 E 080  | GBMP 15 E 080 T 00520 | SH 2 | 36.70.770.03.7 |
| | | SL 500 | 36.70.770.03.0 |
| | | SN 60 | 36.70.770.03.5 |
| | | SN 80 E | 36.70.770.03.4 |

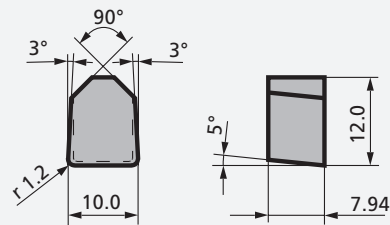
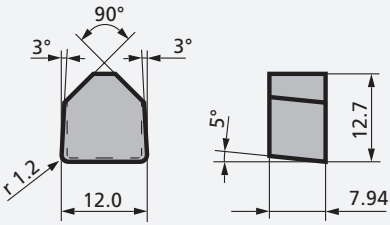
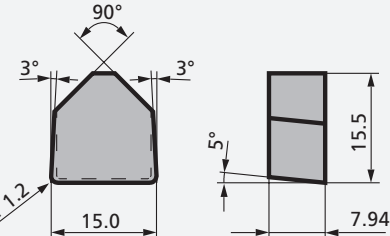
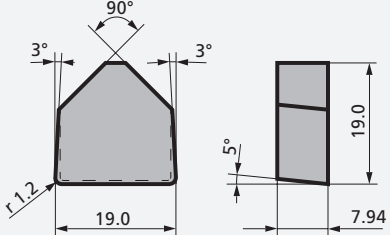
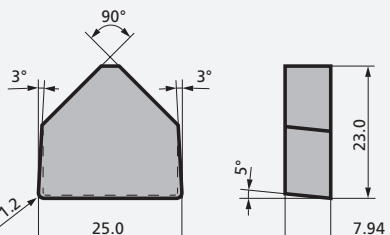
| INSERT | DESIGNATION | GRADE | SPK REF. NO. |
|--|------------------------|---------|----------------|
| GBMP 15 E 100  | GBMP 15 E 100 T 00520 | SH 2 | 36.70.900.03.7 |
| | | SL 500 | 36.70.900.03.0 |
| | | SN 60 | 36.70.900.03.5 |
| | | SN 80 E | 36.70.900.03.4 |
| GBMP 15 E 060 TL  | GBMP 15 E 060 TL 00520 | SN 60 | 36.70.786.03.5 |
| | | | |
| GBMP 15 E 060 TR  | GBMP 15 E 060 TR 00520 | SN 60 | 36.70.787.03.5 |
| | | | |
| GBMP 15 E 080 TL  | GBMP 15 E 080 TL 00520 | SN 60 | 36.70.651.03.5 |
| | | | |
| GBMP 15 E 080 TR  | GBMP 15 E 080 TR 00520 | SN 60 | 36.70.661.03.5 |
| | | | |

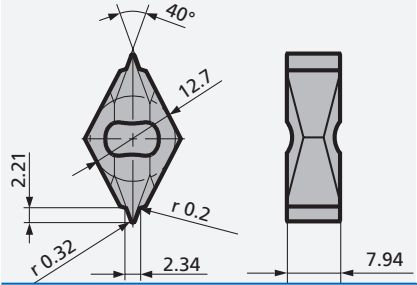
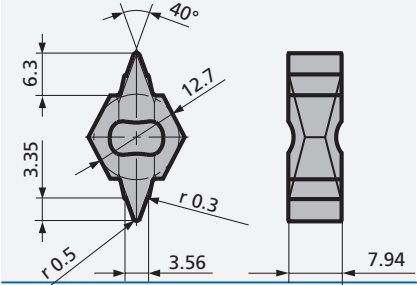
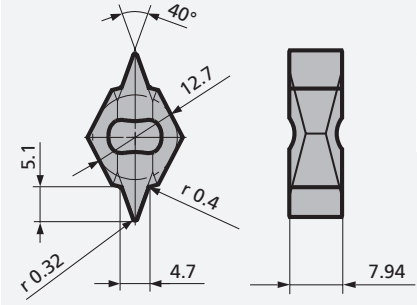
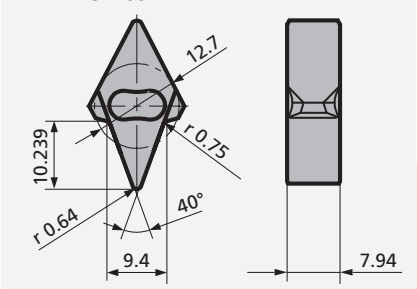
Ceramic Inserts for Grooving

| INSERT | DESIGNATION | GRADE | SPK REF. NO. |
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| LBMP 12 A 040  | LBMP 12 A 040 S 05015 | SH 2 | 36.22.107.31.7 |
| | LBMP 12 A 040 T 00520 | SH 2 | 36.22.107.03.7 |
| | | SL 500 | 36.22.107.03.0 |
| | | SN 60 | 36.22.107.03.5 |
| LBMP 12 A 050  | LBMP 12 A 050 S 05015 | SH 2 | 36.22.108.31.7 |
| | LBMP 12 A 050 T 00520 | SH 2 | 36.22.108.03.7 |
| | | SL 500 | 36.22.108.03.0 |
| | | SN 60 | 36.22.108.03.5 |
| LBMP 15 E 060  | LBMP 15 E 060 S 05015 | SH 2 | 36.70.903.31.7 |
| | LBMP 15 E 060 T 00520 | SH 2 | 36.70.903.03.7 |
| | | SL 500 | 36.70.903.03.0 |
| | | SN 60 | 36.70.903.03.5 |
| LBMP 15 E 070  | LBMP 15 E 070 T 00520 | SL 500 | 36.70.872.03.0 |
| | | SN 60 | 36.70.872.03.5 |
| LBMP 15 E 080  | LBMP 15 E 080 T 00520 | SL 500 | 36.70.825.03.0 |
| | | SN 60 | 36.70.825.03.5 |

| INSERT | DESIGNATION | GRADE | SPK REF. NO. |
|---|-----------------------|--------|----------------|
| LBMP 15 E 100  | LBMP 15 E 100 T 00520 | SN 60 | 36.70.904.03.5 |
| | | SL 500 | 36.70.904.03.0 |
| | | | |
| | LBMP 15 E 100 T 02020 | SL 500 | 36.70.904.04.0 |

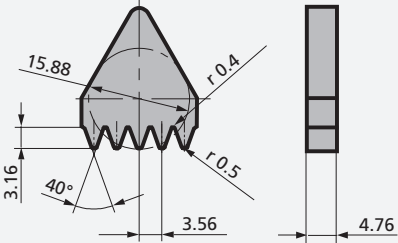
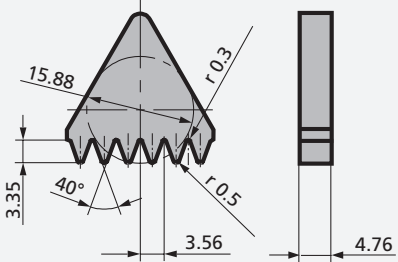
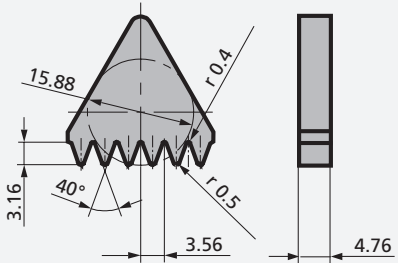
Ceramic Inserts for Grooving

| INSERT | DESIGNATION | GRADE | SPK REF. NO. |
|---|-----------------------|---------|----------------|
| NBMN 12 F 100  | NBMN 12 F 100 T 02020 | SH 2 | 36.22.267.04.7 |
| | | SN 80 E | 36.22.267.04.4 |
| NBMN 12 F 120  | NBMN 12 F 120 T 02020 | SH 2 | 36.22.268.04.7 |
| | | SN 80 E | 36.22.268.04.4 |
| NBMN 15 F 150  | NBMN 15 F 150 T 02020 | SH 2 | 36.22.269.04.7 |
| | | SN 80 E | 36.22.269.04.4 |
| NBMN 19 F 190  | NBMN 19 F 190 T 02020 | SH 2 | 36.22.270.04.7 |
| | | SN 80 E | 36.22.270.04.4 |
| NBMN 24 F 250  | NBMN 24 F 250 T 02020 | SH 2 | 36.22.271.04.7 |
| | | SN 80 E | 36.22.271.04.4 |

| INSERT | DESIGNATION | GRADE | SPK REF. NO. |
|--|----------------------------|-------|----------------|
| <p>INMX 25 F 023 - J1</p>  | INMX 25 F 023 T 00520 - J1 | SN 60 | 36.71.419.03.5 |
| <p>INMX 25 F 036 - K1</p>  | INMX 25 F 036 T 00520 - K1 | SN 60 | 36.71.412.03.5 |
| <p>INMX 25 F 047 - L1</p>  | INMX 25 F 047 T 00520 - L1 | SN 60 | 36.71.340.03.5 |
| <p>INMX 25 F 094 - M1</p>  | INMX 25 F 094 T 00520 - M1 | SN 60 | 36.71.418.03.5 |

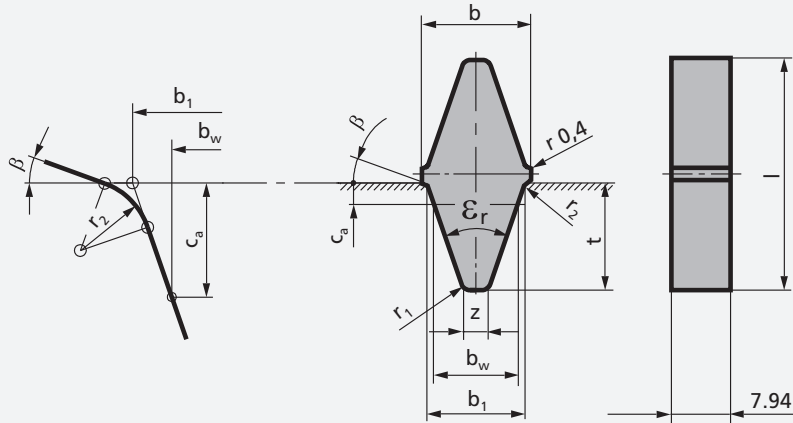
Ceramic Inserts for Grooving

| INSERT | DESIGNATION | GRADE | SPK REF. NO. |
|----------------------------------|-------------------------|-------|----------------|
| INMN 09 A 111 - K3 | INMN 09 A 111 F - K3 | SN 60 | 36.71.454.06.5 |
| INMN 09 A 111 - K3-04 | INMN 09 A 111 E - K3-04 | SN 60 | 36.71.501.69.5 |
| INMN 12 A 147 - K4 | INMN 12 A 147 F - K4 | SN 60 | 36.71.455.06.5 |
| INMN 12 A 147 - K4-04 | INMN 12 A 147 E - K4-04 | SN 60 | 36.71.502.69.5 |
| INMN 15 A 182 - K5 | INMN 15 A 182 E - K5 | SN 60 | 36.71.507.69.5 |

| INSERT | DESIGNATION | GRADE | SPK REF. NO. |
|---|-------------------------|-------|----------------|
| <p>INMN 15 A 182 - K5-04</p>  | INMN 15 A 182 E - K5-04 | SN 60 | 36.71.519.69.5 |
| <p>INMN 15 A 218 - K6</p>  | INMN 15 A 218 E - K6 | SN 60 | 36.71.508.69.5 |
| <p>INMN 15 A 218 - K6-04</p>  | INMN 15 A 218 E - K6-04 | SN 60 | 36.71.520.69.5 |

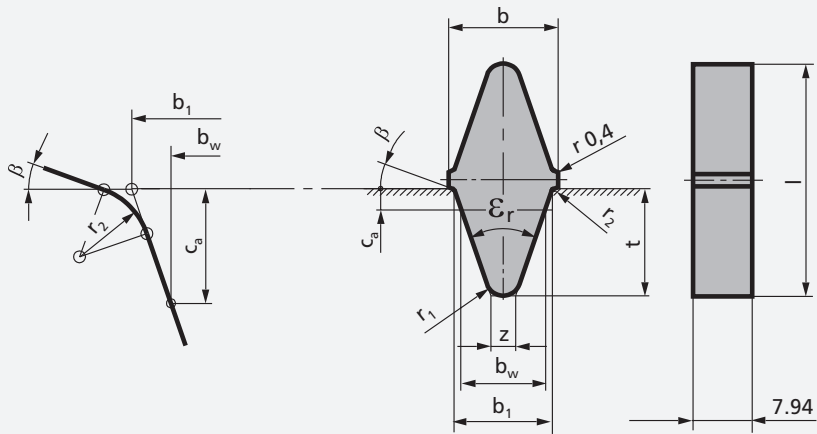
Ceramic Inserts for Grooving

Profile KP 1



| INSERT | GRADE | SPK REF. NO. | Dimensions (mm) | | | | | | | | | | |
|---------------|----------|--------------|-----------------|----------------|-------|----------------|------|-------|------|------|----------------|----------------|-----|
| | | | b _w | b ₁ | t | c _a | b | l | t | β | r ₁ | r ₂ | |
| KP1 - 34° SPA | DIN 2211 | SN 60 | 36.71.258.04.5 | 11.0 | 12.7 | 14.0 | 2.8 | 14.5 | 32.0 | 4.14 | 20° | 1.0 | 1.0 |
| KP1 - 34° SPB | DIN 2211 | SN 60 | 36.71.259.04.5 | 14.0 | 16.3 | 18.0 | 3.5 | 18.5 | 40.0 | 5.29 | 20° | 1.5 | 1.0 |
| KP1 - 34° SPC | DIN 2211 | SN 60 | 36.71.260.04.5 | 19.0 | 22.0 | 24.0 | 4.8 | 24.5 | 52.0 | 7.32 | 20° | 2.0 | 1.0 |
| KP1 - 34° SPZ | DIN 2211 | SN 60 | 36.71.257.04.5 | 8.5 | 9.7 | 11.0 | 2.0 | 11.5 | 26.0 | 2.97 | 20° | 1.0 | 1.0 |
| KP1 - 36° | | SN 60 | 36.71.169.04.5 | 9.75 | 10.20 | 11.9 | 0.75 | 12.50 | 27.3 | 2.40 | 20° | 0.8 | 0.8 |
| KP1 - 36° | | SN 60 | 36.71.190.04.5 | 9.70 | 10.34 | 12.0 | 1.0 | 13.35 | 28.0 | 2.55 | 20° | 1.0 | 1.6 |
| KP1 - 36° | | SN 60 | 36.71.195.04.5 | 12.70 | 13.60 | 15.5 | 1.50 | 17.00 | 35.0 | 3.60 | 20° | 1.0 | 1.5 |
| KP1 - 36° | | SN 60 | 36.71.275.04.5 | - | 10.80 | 13.2 | - | 14.00 | 31.0 | 2.20 | 20° | 0.5 | 1.5 |
| KP1 - 38° SPA | DIN 2211 | SN 60 | 36.71.262.04.5 | 11.0 | 12.9 | 14.3 | 2.8 | 14.5 | 32.0 | 3.06 | 20° | 1.0 | 1.0 |
| KP1 - 38° SPB | DIN 2211 | SN 60 | 36.71.263.04.5 | 14.0 | 16.3 | 18.0 | 3.5 | 18.5 | 40.0 | 3.90 | 20° | 1.5 | 1.0 |
| KP1 - 38° SPC | DIN 2211 | SN 60 | 36.71.264.04.5 | 19.0 | 22.0 | 24.0 | 4.8 | 24.5 | 52.0 | 5.47 | 20° | 2.0 | 1.0 |
| KP1 - 38° SPZ | DIN 2211 | SN 60 | 36.71.214.04.5 | 8.5 | 9.7 | 11.0 | 2.0 | 11.5 | 25.5 | 2.17 | 20° | 1.0 | 1.0 |
| KP1 - 38° | | SN 60 | 36.71.215.04.5 | 11.0 | 12.7 | 13.0 | 2.50 | 16.0 | 29.5 | 3.72 | 20° | 1.0 | 1.0 |
| KP1 - 38° | | SN 60 | 36.71.246.04.5 | 12.86 | 12.9 | 14.8 | - | 16.5 | 34.0 | 2.69 | 20° | 1.5 | 1.0 |

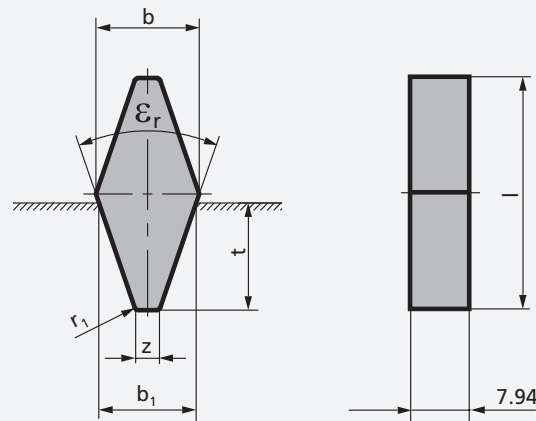
Profile KP 2



| INSERT | GRADE | SPK REF. NO. | Dimensions (mm) | | | | | | | | | |
|-----------|-------|----------------|-----------------|-------|------|-------|------|------|------|---------|-------|-------|
| | | | b_w | b_1 | t | c_a | b | l | t | β | r_1 | r_2 |
| KP2 - 36° | SN 60 | 36.71.192.04.5 | 12.7 | 13.3 | 15.5 | 1.0 | 16.3 | 35.0 | 3.24 | 30° | 2.2 | 1.6 |

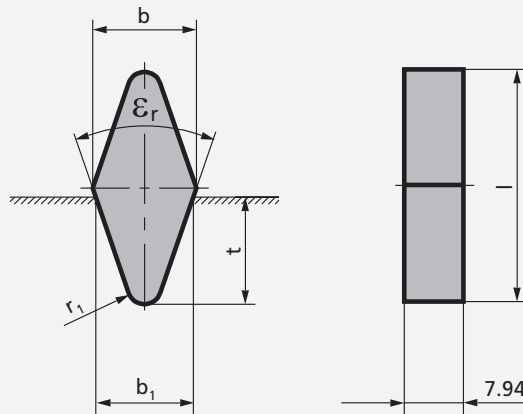
Ceramic Inserts for Grooving

Profile P 1



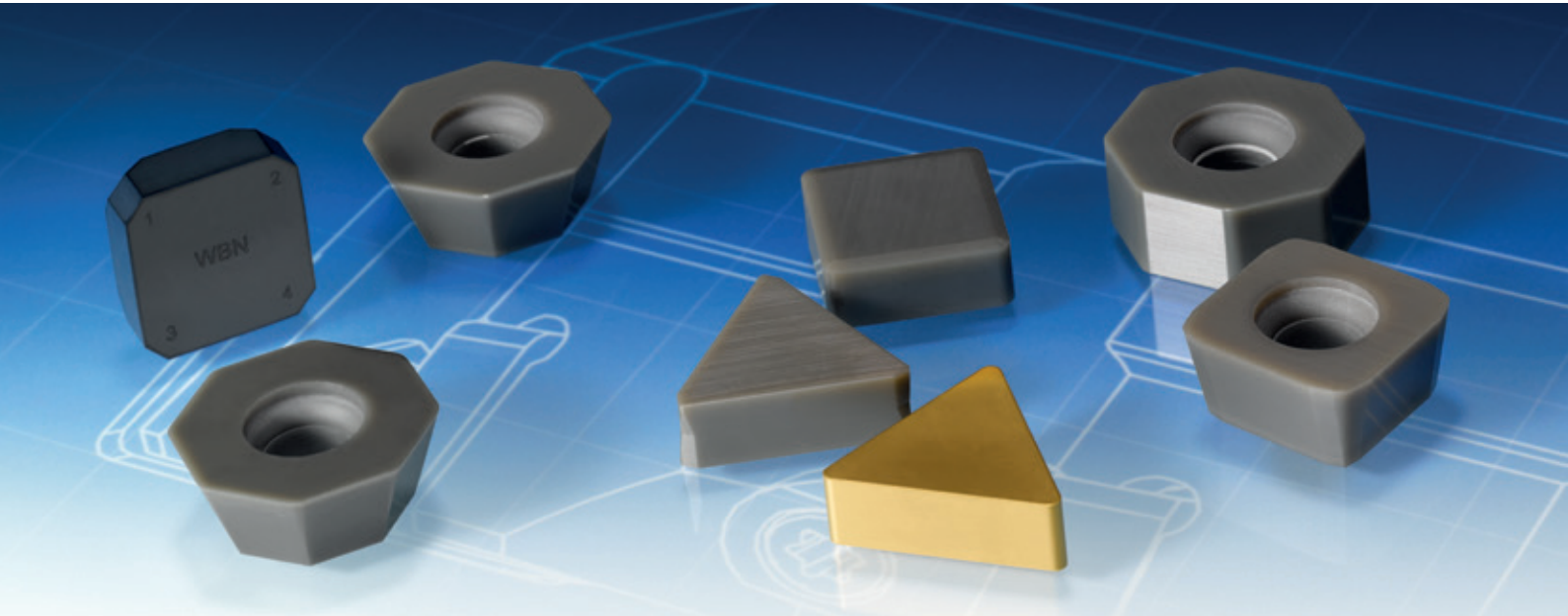
| INSERT | GRADE | SPK REF. NO. | Dimensions (mm) | | | | | |
|-----------------------|-------|----------------|-----------------|-------|-------|------|------|----------------|
| | | | b _w | t | b | l | z | r ₁ |
| P1 - 30° | Sn 60 | 36.70.750.04.5 | 16,0 | 21,0 | 17,07 | 46,0 | 4,75 | 1,0 |
| P1 - 34° SPA DIN 2211 | SN 60 | 36.70.697.04.5 | 12,7 | 14,0 | 13,82 | 32,0 | 4,04 | 1,0 |
| P1 - 34° SPB DIN 2211 | SN 60 | 36.70.714.04.5 | 16,3 | 18,0 | 17,52 | 40,0 | 5,29 | 1,5 |
| P1 - 34° SPC DIN 2211 | SN 60 | 36.70.716.04.5 | 22,0 | 24,0 | 23,22 | 52,0 | 7,32 | 2,0 |
| P1 - 34° SPZ DIN 2211 | SN 60 | 36.70.699.04.5 | 9,7 | 11,0 | 10,92 | 26,0 | 2,97 | 1,0 |
| P1 - 34° | SN 60 | 36.70.620.04.5 | 17,0 | 16,0 | 18,22 | 36,0 | 7,22 | 1,5 |
| P1 - 34° | SN 60 | 36.70.669.04.5 | 13,0 | 15,0 | 14,22 | 34,0 | 3,83 | 1,0 |
| P1 - 34° | SN 60 | 36.70.718.04.5 | 18,6 | 20,0 | 19,82 | 44,0 | 6,37 | 2,0 |
| P1 - 34° | SN 60 | 36.70.735.04.5 | 10,0 | 12,0 | 11,22 | 28,0 | 2,66 | 1,0 |
| P1 - 34° | SN 60 | 36.70.739.04.5 | 17,0 | 18,0 | 18,22 | 40,0 | 5,99 | 1,5 |
| P1 - 36° | SN 60 | 36.70.418.04.5 | 12,7 | 14,0 | 16,6 | 40 | 3,60 | 1,0 |
| P1 - 36° | SN 60 | 36.70.710.04.5 | 9,7 | 11,5 | 11,0 | 27 | 2,22 | 0,5 |
| P1 - 36° | SN 60 | 36.70.726.04.5 | 22,0 | 20,5 | 23,3 | 45 | 8,68 | 1,5 |
| P1 - 36° | SN 60 | 36.70.738.04.5 | 13,0 | 15,0 | 14,3 | 34 | 3,25 | 1,0 |
| P1 - 38° SPA DIN 2211 | SN 60 | 36.70.698.04.5 | 12,7 | 14,0 | 14,08 | 32,0 | 3,06 | 1,0 |
| P1 - 38° SPB DIN 2211 | SN 60 | 36.70.715.04.5 | 16,3 | 18,0 | 17,68 | 40,0 | 3,91 | 1,5 |
| P1 - 38° SPC DIN 2211 | SN 60 | 36.70.717.04.5 | 22,0 | 24,0 | 23,38 | 52,0 | 5,47 | 2,0 |
| P1 - 38° SPZ DIN 2211 | SN 60 | 36.70.700.04.5 | 9,7 | 11,0 | 11,07 | 26,0 | 2,12 | 1,0 |
| P1 - 38° | SN 60 | 36.70.492.04.5 | 13,3 | 13,00 | 14,68 | 30,0 | 4,35 | 1,0 |
| P1 - 38° | SN 60 | 36.70.610.04.5 | 14,5 | 16,50 | 15,86 | 37,0 | 3,12 | 1,0 |
| P1 - 38° | SN 60 | 36.70.621.04.5 | 17,0 | 16,00 | 18,38 | 36,0 | 5,98 | 1,0 |
| P1 - 38° | SN 60 | 36.70.709.04.5 | 12,6 | 14,75 | 14,04 | 33,5 | 2,51 | 0,5 |
| P1 - 38° | SN 60 | 36.70.719.04.5 | 18,6 | 20,00 | 19,98 | 44,0 | 4,83 | 2,0 |
| P1 - 38° | SN 60 | 36.70.833.04.5 | 15,7 | 17,50 | 17,10 | 39,0 | 3,66 | 0,8 |
| P1 - 40° | SN 60 | 36.70.795.04.5 | 15,2 | 15,2 | 16,69 | 34,5 | 4,14 | 0,5 |

Profile P 2












| INSERT | GRADE | SPK REF. NO. | Dimensions (mm) | | | | |
|----------|-------|----------------|-----------------|------|-------|------|----------------|
| | | | b ₁ | t | b | l | r ₁ |
| P2 - 30° | SN 60 | 36.70.638.04.5 | 10.5 | 15.0 | 11.56 | 34.0 | 1.6 |
| P2 - 30° | SN 60 | 36.70.729.04.5 | 10.5 | 17.5 | 11.56 | 38.5 | 0.8 |
| P2 - 36° | SN 60 | 36.70.493.04.5 | 9.8 | 11.5 | 11.1 | 27.0 | 1.8 |
| P2 - 36° | SN 60 | 36.70.630.04.5 | 13.8 | 18.0 | 15.2 | 40.0 | 1.5 |
| P2 - 36° | SN 60 | 36.70.832.04.5 | 13.0 | 15.5 | 14.3 | 35.0 | 2.0 |





Cutting Data Recommendations for Milling Grey Cast Iron

| MATERIAL NO. | HARDNESS (HB) |  |  |  |  |  |  |  |  |  |
|--------------|---------------|---|---|---|---|---|---|---|---|---|
| | | DIN | EN | AFNOR | B.S. | SS | UNE | UNI | AISI/SAE | JIS |
| 0.6015 | 190 | GG-15 | GJL-150 | Ft 15 D | Grade 150 | 0115-00 | FG 15 | G 15 | No 25 B | FC 150 |
| 0.6020 | 210 | GG-20 | GJL-200 | Ft 20 D | Grade 220 | 0120-00 | | G 20 | No 30 B | FC 200 |
| 0.6025 | 240 | GG-25 | GJL-250 | Ft 25 D | Grade 260 | 0125-00 | FG 25 | G 25 | No 35 B | FC 250 |
| 0.6030 | 260 | GG-30 | GJL-300 | Ft 30 D | Grade 300 | 0130-00 | FG 30 | G 30 | No 45 B | FC 300 |
| 0.6035 | 280 | GG-35 | GJL-350 | Ft 35 D | Grade 350 | 0135-00 | FG 35 | G 35 | No 50 B | FC 350 |

Cutting speed and feed rate

| HARDNESS (HB) | CUTTING SPEED V_c (m/min) | | FEED RATE f_z (mm/t) | | | GRADE |
|---------------|-----------------------------|---------------|------------------------|------------------|------------------|-------|
| | RECOMMENDED VALUE | OVERALL RANGE | RECOMMENDED VALUE | OVERALL RANGE | | |
| | | | | $K_r = 45^\circ$ | $K_r = 75^\circ$ | |

Rough milling · $a_p < 5$ mm

| | | | | | | | |
|-----------|------|------------|------|-------------|-------------|-------------|----------|
| 190 - 210 | 1500 | 800 - 2000 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 808 |
| | 1600 | 800 - 2000 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 858 C |
| 220 - 240 | 1200 | 500 - 1500 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 808 |
| | 1200 | 500 - 1500 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 858 C |
| 250 - 280 | 800 | 300 - 1200 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 808 |
| | 800 | 300 - 1200 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 858 C |

Rough milling · $a_p < 2$ mm

| | | | | | | | |
|-----------|------|------------|------|-------------|-------------|-------------|----------|
| 190 - 210 | 1500 | 800 - 2000 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 500 |
| | 1500 | 800 - 2000 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 854 C |
| | 1500 | 800 - 2000 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 858 C |
| 220 - 240 | 1200 | 500 - 1500 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 500 |
| | 1200 | 500 - 1500 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 854 C |
| | 1200 | 500 - 1500 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 858 C |
| 250 - 280 | 800 | 300 - 1200 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 500 |
| | 800 | 300 - 1200 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 854 C |
| | 800 | 300 - 1200 | 0.16 | 0.12 - 0.30 | 0.10 - 0.20 | 0.08 - 0.20 | SL 858 C |

Finishing · $a_p = 0.5 - 1.0$ mm

| | | | | | | | |
|-----------|------|------------|------|-------------|-------------|-------------|----------|
| 190 - 210 | 1500 | 800 - 2000 | 0.12 | 0.10 - 0.20 | 0.10 - 0.15 | 0.08 - 0.15 | SL 854 C |
| 220 - 240 | 1200 | 500 - 1500 | 0.12 | 0.10 - 0.20 | 0.10 - 0.15 | 0.08 - 0.15 | SL 854 C |
| 250 - 280 | 800 | 300 - 1200 | 0.12 | 0.10 - 0.20 | 0.10 - 0.15 | 0.08 - 0.15 | SL 854 C |

Finish milling · $a_p = 0.1 - 0.5$ mm

| | | | | | | | |
|-----------|-----|-----------|------|-------------|-------------|-------------|------|
| 190 - 210 | 700 | 200 - 900 | 0.10 | 0.08 - 0.20 | 0.08 - 0.25 | 0.05 - 0.12 | SH 2 |
| 220 - 240 | 500 | 200 - 700 | 0.10 | 0.08 - 0.20 | 0.08 - 0.25 | 0.05 - 0.12 | SH 2 |
| 250 - 280 | 400 | 200 - 500 | 0.10 | 0.08 - 0.20 | 0.08 - 0.25 | 0.05 - 0.12 | SH 2 |

Cutting Data Recommendations for Milling Ductile Cast Iron

| MATERIAL NO. | UTS (N/mm ²) | D | EU | F | GB | S | E | I | USA | J |
|--------------|-----------------------------|--------|------------|------------|------------|---------|-----------|-----------|-----------|---------|
| | | DIN | EN | AFNOR | B.S. | SS | UNE | UNI | AISI/SAE | JIS |
| 0.7040 | 400 | GGG-40 | GJS-400-15 | FGS 400-12 | SNG 420/12 | 0717-02 | FGE 38-17 | GS 370-17 | 60-40-18 | FCD 400 |
| 0.7050 | 500 | GGG-50 | GJS-500-7 | FGS 500-7 | SNG 500/7 | 0727-02 | FGE 50-7 | GS 500-7 | 65-45-12 | FCD 500 |
| 0.7060 | 600 | GGG-60 | GJS-600-3 | FGS 600-3 | SNG 600/3 | 0732-03 | FGE 60-2 | GS 600-2 | 80-55-06 | FCD 600 |
| 0.7070 | 700 | GGG-70 | GJS-700-2 | FGS 700-2 | SNG 700/2 | 0737-01 | FGE 70-2 | GS 700-2 | 100-70-03 | FCD 700 |

Cutting speed and feed rate

| TENSILE STRENGTH | CUTTING SPEED v_c (m/min) | | FEED RATE f_z (mm/t) | | | GRADE | |
|--|-----------------------------|---------------|------------------------|------------------|------------------|------------------|----------|
| | RECOMMENDED VALUE | OVERALL RANGE | RECOMMENDED VALUE | OVERALL RANGE | | | |
| UTS (N/mm ²) | | | | $K_r = 45^\circ$ | $K_r = 75^\circ$ | $K_r = 88^\circ$ | |
| 12.5/√ Rough milling · $ap < 5$ mm | | | | | | | |
| 400 - 500 | 800 | 600 - 1000 | 0.16 | 0.15 - 0.30 | 0.12 - 0.25 | 0.08 - 0.20 | SL 808 |
| | 800 | 600 - 1000 | 0.16 | 0.15 - 0.30 | 0.12 - 0.25 | 0.08 - 0.20 | SL 858 C |
| 500 - 700 | 700 | 500 - 800 | 0.16 | 0.15 - 0.30 | 0.12 - 0.25 | 0.08 - 0.20 | SL 808 |
| | 700 | 500 - 800 | 0.16 | 0.15 - 0.30 | 0.12 - 0.25 | 0.08 - 0.20 | SL 858 C |
| 6.3/√ Rough milling · $ap < 2$ mm | | | | | | | |
| 400 - 500 | 800 | 600 - 1000 | 0.16 | 0.15 - 0.30 | 0.12 - 0.25 | 0.08 - 0.20 | SL 854 C |
| | 800 | 600 - 1000 | 0.16 | 0.15 - 0.30 | 0.12 - 0.25 | 0.08 - 0.20 | SL 858 C |
| 400 - 700 | 700 | 500 - 800 | 0.16 | 0.15 - 0.30 | 0.12 - 0.25 | 0.08 - 0.20 | SL 854 C |
| | 700 | 500 - 800 | 0.16 | 0.15 - 0.30 | 0.12 - 0.25 | 0.08 - 0.20 | SL 858 C |
| 3.2/√ Finishing · $ap < 0.5 - 1.0$ mm | | | | | | | |
| 400 - 500 | 800 | 600 - 1000 | 0.16 | 0.10 - 0.20 | 0.10 - 0.15 | 0.08 - 0.15 | SL 854 C |
| 500 - 700 | 700 | 600 - 1000 | 0.16 | 0.10 - 0.20 | 0.10 - 0.15 | 0.08 - 0.15 | SL 854 C |

Designation System for Milling Inserts according to ISO 1832

| | | |
|---|------|--|
| R | | |
| S | 90° | |
| T | 60° | |
| H | 120° | |
| O | 135° | |

Insert shape

| | |
|---|--|
| | |
| N | 0° |
| A | 3° |
| B | 5° |
| C | 7° |
| P | 11° |
| D | 15° |
| E | 20° |
| F | 25° |
| G | 30° |
| O | Clearance angle which requires special data. |

Normal clearance angle α_n

| Inscribed circle | | | | | |
|------------------|--------|--------|--------|-------|-------|
| d mm | H 120° | O 135° | RC, RN | S 90° | T 60° |
| 3.97 | | | | | 06 |
| 5.56 | | | | | 09 |
| 6.35 | | | | | 11 |
| 9.52 | | | 09 | 09 | 16 |
| 12.70 | | | 12 | 12 | 22 |
| 13.50 | | 05 | | 13 | |
| 15.88 | 09 | | 15 | 15 | 27 |
| 16.20 | 10 | | | | |
| 16.50 | | 06 | | | |
| 19.05 | | | 19 | 19 | 33 |
| 25.40 | | | 25 | 25 | 44 |

Insert size

S

N

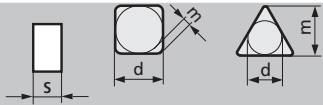
C

N

12

04

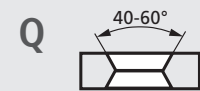
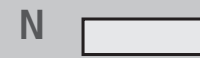
Tolerances



* Permissible deviations for the insert shape, depending on the insert size

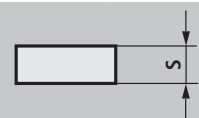
| | S = ± mm | d = ± mm | m = ± mm | Inscribed circle | Tolerance class | | | |
|---|----------|------------|------------|------------------|-----------------|------|----------|------|
| | | | | | J, K, L, M | U | M, N | U |
| | | | | d mm | d = ± mm | | m = ± mm | |
| A | 0,025 | 0,025 | 0,005 | 3,97 | 0,05 | 0,08 | 0,08 | 0,13 |
| C | 0,025 | 0,025 | 0,013 | | | | | |
| E | 0,025 | 0,025 | 0,025 | | | | | |
| F | 0,025 | 0,013 | 0,005 | | | | | |
| G | 0,130 | 0,025 | 0,025 | | | | | |
| H | 0,025 | 0,013 | 0,013 | | | | | |
| J | 0,025 | 0,05-0,13* | 0,005 | | | | | |
| K | 0,025 | 0,05-0,13* | 0,013 | | | | | |
| L | 0,025 | 0,05-0,13* | 0,025 | | | | | |
| M | 0,130 | 0,05-0,13* | 0,08-0,18* | | | | | |
| U | 0,130 | 0,08-0,25* | 0,13-0,38* | 25,40 | 0,13 | 0,25 | 0,18 | 0,38 |

Insert type

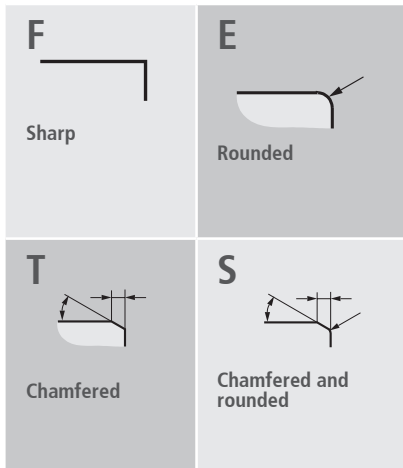


X Special design

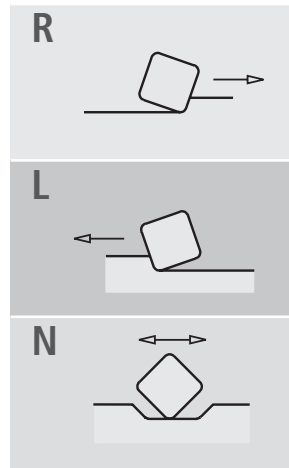
Insert thickness



| | |
|----|-------|
| 01 | 1,59 |
| 02 | 2,38 |
| 03 | 3,18 |
| T3 | 3,97 |
| 04 | 4,76 |
| 05 | 5,56 |
| 06 | 6,35 |
| 07 | 7,94 |
| 09 | 9,52 |
| 12 | 12,70 |



Corner design



Cutting direction

| Approach angle κ_r | Length of ZZ chamfer |
|---------------------------|----------------------|
| 43 = 43° | 125 = 1.25 mm |
| 47 = 47° | 150 = 1.50 mm |
| 75 = 75° | 240 = 2.40 mm |
| 88 = 88° | |

Designation key for ZZ geometries

AN

T

N

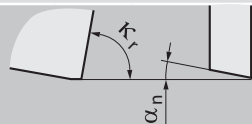
01020

- 88Z240

Corner radius

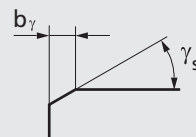
Insert with corner radius

Insert with cutting edge



| 00 | RN, RC | Approach angle of the main cutting edge κ_r | | Clearance angle α_n | |
|----|--------|--|--------------|----------------------------|-----|
| M0 | RB | | | | |
| 02 | 0.2 | | | | |
| 04 | 0.4 | | | | |
| 08 | 0.8 | A | 45° | N | 0° |
| 12 | 1.2 | D | 60° | C | 7° |
| 16 | 1.6 | E | 75° | P | 11° |
| 24 | 2.4 | F | 85° | D | 15° |
| 32 | 3.2 | P | 90° | E | 20° |
| 40 | 4.0 | Z | other angles | F | 25° |












Chamfer design



Chamfer width w_γ in 1/100 mm and angle γ_s without degree symbol

e.g.
 $0.10 \times 20^\circ = 01020$
 $0.05 \times 20^\circ = 00520$

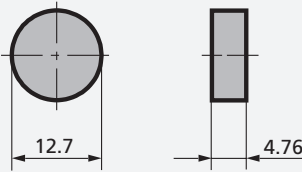
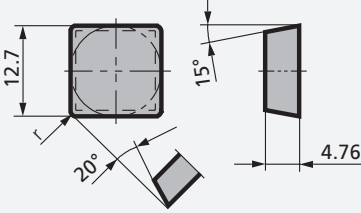
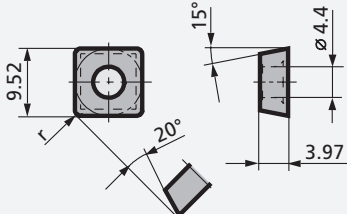
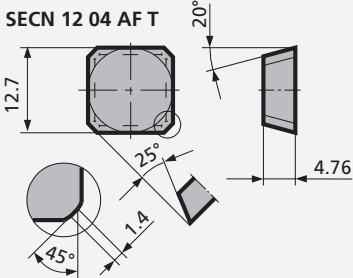
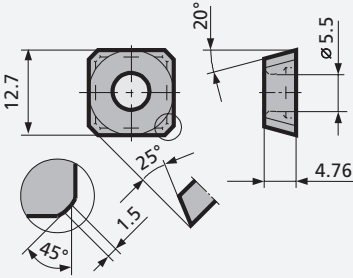
Contents: Ceramic Inserts for Milling

| | | | |
|---|---|--|--|
| HNGX | ODHW, OEHX, OPHX | ONHQ | OPHN |
|  |  |  |  |
| Page 83 | Page 83-84 | Page 84 | Page 84 |
| RNGN | SNCN, SNFN, SNGN, SNHX | SDCN, SECN, SOCN, SPCN, SPGN, SPHN, SPKN | SDHW, SEHW |
|  |  |  |  |
| Page 85 | Page 86-88 | Page 85-90 | Page 85 |
| SPHX | TNCN | TPCN | |
|  |  |  | |
| Page 89 | Page 91 | Page 91 | |

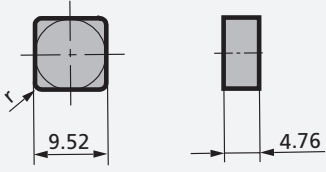
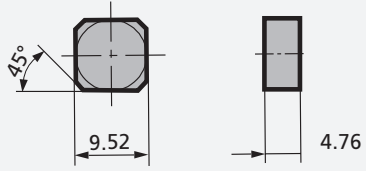
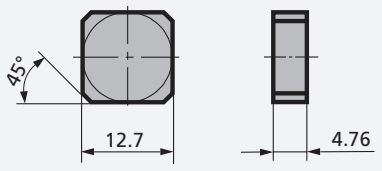
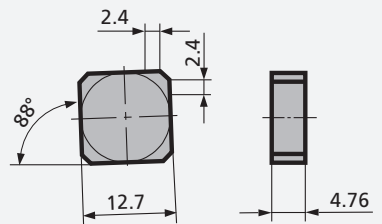
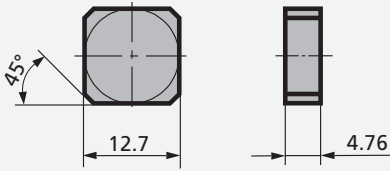
| INSERT | ISO | GRADE | SPK REF. NO. |
|-------------------------------------|-------------------------------|--------|----------------|
| HNGX 10 05 .. T | HNGX 10 05 12 T01020 | SL 500 | 36.60.123.20.0 |
| | | SL 808 | 17.60.123.20.1 |
| | HNGX 10 05 16 T01020 | SL 500 | 36.60.124.20.0 |
| | | SL 808 | 17.60.124.20.1 |
| | | | |
| | | | |
| HNGX 10 05 16 T - 47Z125 | HNGX 10 05 16 T01020 - 47Z125 | SL 500 | 36.60.120.20.0 |
| | HNGX 10 05 16 T03020 - 47Z125 | SL 808 | 17.60.120.23.1 |
| ODHW 05 04 .. T | ODHW 05 04 08 T 01020 | SL 500 | 36.76.001.20.0 |
| | ODHW 05 04 12 T 01020 | SL 500 | 36.76.002.20.0 |
| ODHW 06 05 .. T | ODHW 06 05 16 T 01020 | SL 500 | 36.76.003.20.0 |
| | | | |
| OEHX 06 06 .. T | OEHX 06 06 16 T 01020 | SL 808 | 17.76.016.20.1 |
| | | | |

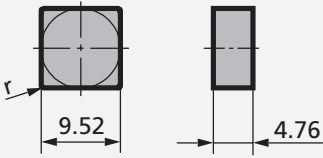
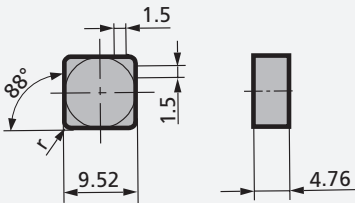
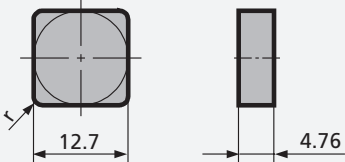
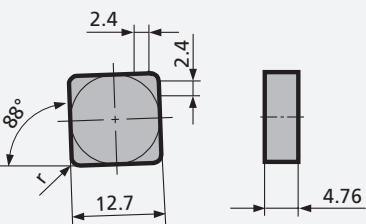
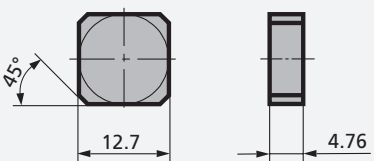
Ceramic Inserts for Milling

| INSERT | ISO | GRADE | SPK REF. NO. |
|--|--------------------------------|--------|----------------|
| <p>ONHQ 06 06 .. T</p> | ONHQ 06 06 16 T 01020 | SL 808 | 17.76.017.20.1 |
| <p>OPHN 05 04 .. T</p> | OPHN 05 04 12 T 01020 | SL 500 | 36.72.001.20.0 |
| <p>OPHX 06 06 .. T</p> | OPHX 06 06 16 T 01020 | SL 808 | 17.76.014.20.1 |
| <p>OPHX 06 06 08 T - 43Z150</p> | OPHX 06 06 08 T 01020 - 43Z150 | SL 808 | 17.76.015.20.1 |

| INSERT | ISO | GRADE | SPK REF. NO. |
|---|-----------------------|--------|----------------|
| RNGN 12 04 00 T 03015  | RNGN 12 04 00 T 03015 | SH 2 | 36.40.027.35.7 |
| SDCN 12 04 .. T - 20  | SDCN 12 04 08 T - 20 | SL 500 | 36.12.340.20.0 |
| | | SL 808 | 17.12.340.20.1 |
| | SDCN 12 04 12 T - 20 | SL 500 | 36.12.341.20.0 |
| | | SL 808 | 17.12.341.20.1 |
| SDHW 09 T3 .. T  | SDHW 09 T3 12 T 01020 | SL 500 | 36.16.505.20.0 |
| SECN 12 04 AF T  | SECN 12 04 AF T 01020 | SL 500 | 36.12.357.20.0 |
| | | | |
| SEHW 12 04 AF T  | SEHW 12 04 AF T 01020 | SL 500 | 36.16.519.20.0 |

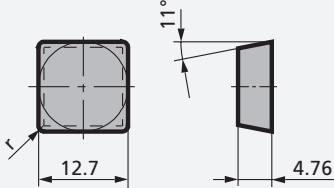
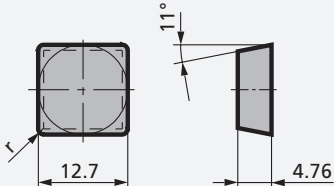
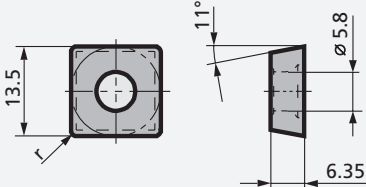
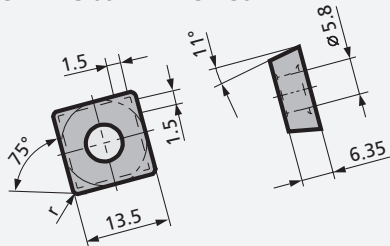
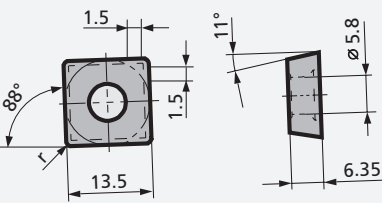
Ceramic Inserts for Milling

| INSERT | ISO | GRADE | SPK REF. NO. |
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| SNCN 09 04 .. T  | SNCN 09 04 04 T 00520 | SL 808 | 17.10.454.03.1 |
| SNCN 09 04 ZN T  | SNCN 09 04 ZN T 00520 | SL 500 | 36.10.445.03.0 |
| | | SL 808 | 17.10.445.03.1 |
| | | SL 854 C | 17.10.445.03.9 |
| SNCN 12 04 ZN T  | SNCN 12 04 ZN T 00520 | SL 500 | 36.10.409.03.0 |
| | | SL 808 | 17.10.409.03.1 |
| | | SL 854 C | 17.10.409.03.9 |
| SNCN 12 04 ZN T - 88Z240  | SNCN 12 04 ZN T 01020 - 88Z240 | SL 500 | 36.10.493.20.0 |
| | | SL 808 | 17.10.493.20.1 |
| SNFN 12 04 AN T  | SNFN 12 04 AN T 03015 | SH 2 | 36.10.223.35.7 |

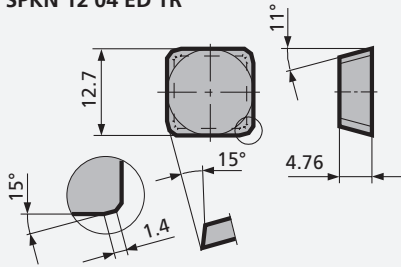
| INSERT | ISO | GRADE | SPK REF. NO. |
|--|--------------------------------|----------|----------------|
| SNGN 09 04 .. T  | SNGN 09 04 12 T 01020 | SL 500 | 36.10.050.20.0 |
| | SNGN 09 04 12 T 03015 | SH 2 | 36.10.050.35.7 |
| SNGN 09 04 04 T - 88Z150  | SNGN 09 04 04 T 01020 - 88Z150 | SL 808 | 17.10.490.20.1 |
| SNGN 12 04 .. T  | SNGN 12 04 08 T 01020 | SL 500 | 36.10.009.20.0 |
| | | SL 808 | 17.10.009.20.1 |
| | | SL 854 C | 17.10.009.20.9 |
| | SNGN 12 04 12 T 01020 | SL 500 | 36.10.058.20.0 |
| | | SL 808 | 17.10.058.20.1 |
| | | SL 854 C | 17.10.058.20.9 |
| | | SL 858 C | 21.10.058.20.1 |
| | SNGN 12 04 12 T 03015 | SH 2 | 36.10.058.35.7 |
| SNGN 12 04 08 T - 88Z240  | SNGN 12 04 08 T 01020 - 88Z240 | SL 500 | 36.10.503.20.0 |
| | | SL 808 | 17.10.503.20.1 |
| SNGN 12 04 AN T  | SNGN 12 04 AN T 01020 | SL 500 | 36.10.232.20.0 |
| | | SL 808 | 17.10.232.20.1 |

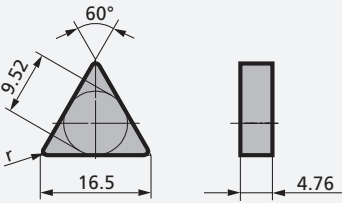
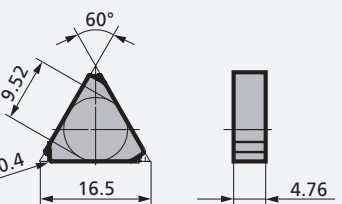
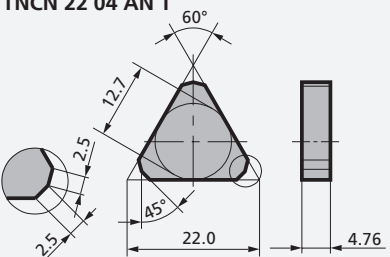
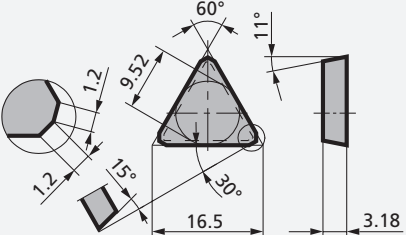
Ceramic Inserts for Milling

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| SNGN 12 04 EN T | SNGN 12 04 EN T 01020 | SL 500 | 36.10.261.20.0 |
| SNHX 12 04 .. T 125 | SNHX 12 04 12 T 125 | SH 2 | 36.10.266.99.7 |
| SOCN 12 04 .. T - 25 | SOCN 12 04 16 T - 25 | SL 500 SL 808 | 36.12.314.20.0 17.12.314.20.1 |
| SPCN 12 04 .. T - 15 | SPCN 12 04 16 T - 15 | SL 500 SL 808 | 36.12.325.20.0 17.12.325.20.1 |
| SPGN 12 03 .. T | SPGN 12 03 12 T 02020 | SL 500 | 36.12.155.20.0 |

| INSERT | ISO | GRADE | SPK REF. NO. |
|--|--------------------------------|--------|----------------|
| SPGN 12 04 .. T  | SPGN 12 04 12 T 02020 | SL 500 | 36.12.163.20.0 |
| | | SL 808 | 17.12.163.20.1 |
| SPHN 12 04 .. T  | SPHN 12 04 16 T 01020 | SL 500 | 36.12.869.20.0 |
| | | | |
| SPHX 13 06 .. T  | SPHX 13 06 12 T 01020 | SL 808 | 17.16.535.20.1 |
| | | | |
| SPHX 13 06 12 T - 75Z150  | SPHX 13 06 12 T 01020 - 75Z150 | SL 808 | 17.16.537.20.1 |
| | | | |
| SPHX 13 06 12 T - 88Z150  | SPHX 13 06 12 T 01020 - 88Z150 | SL 808 | 17.16.536.20.1 |
| | | | |

Ceramic Inserts for Milling

| INSERT | ISO | GRADE | SPK REF. NO. |
|---|------------------------|--------|----------------|
| <p data-bbox="124 434 309 459">SPKN 12 04 ED TR</p>  | SPKN 12 04 ED TR 01020 | SL 500 | 36.12.246.20.0 |

| INSERT | ISO | GRADE | SPK REF. NO. |
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| TNCN 16 04 .. T  | TNCN 16 04 04 T 01020 | SL 808 | 17.30.190.20.1 |
| | | SL 854 C | 17.30.190.20.9 |
| | TNCN 16 04 08 T 01020 | SL 808 | 17.30.191.20.1 |
| | | SL 854 C | 17.30.191.20.9 |
| | TNCN 16 04 12 T 01020 | SL 808 | 17.30.192.20.1 |
| | | SL 854 C | 17.30.192.20.9 |
| TNCN 16 04 PC T  | TNCN 16 04 PC T 01020 | SL 808 | 17.30.209.20.1 |
| TNCN 22 04 AN T  | TNCN 22 04 AN T 01020 | SL 500 | 36.30.100.20.0 |
| | | SL 854 C | 17.30.100.20.9 |
| TPCN 16 03 PD TN  | TPCN 16 03 PD TN 01020 | SL 500 | 36.32.182.20.0 |



Notes



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A series of horizontal dotted lines for taking notes, spanning the width of the page.



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