

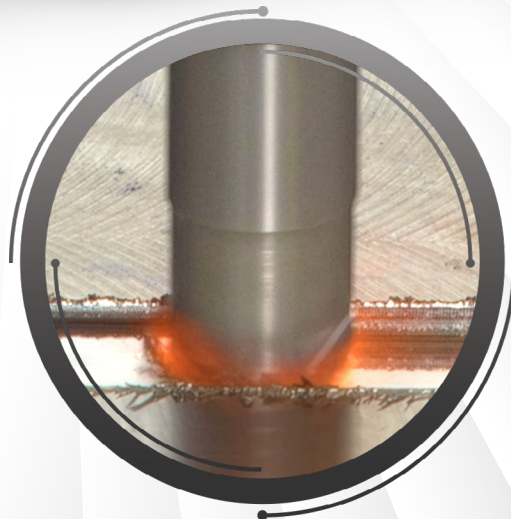
**YOU**

INTELLIGENTLY?

MACHINING

# HARD PART MILLING CERAMIC ENDMILLS

Metric Catalog







THE STANDARDS INSTITUTION OF ISRAEL



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## Quality Standard

ISCAR has been certified by the prestigious Standards Institution, as being in full compliance to ensure delivery of the finest quality goods. Quality control facilities include the metallurgical laboratory, raw metal testing, an online testing procedure and a machining center for tool performance testing and final product inspection. Only the finest products are packaged for entry into ISCAR's inventory.



# CERAMIC MILLING





## Heat-Resistant Super Alloys (HRSA) and Cast Iron Materials Overview

### Guidelines for Success

- Minimize overhang and have ridged set-ups
- Keep cutter engagement to 1/2 to 5/8 of the cutter diameter
- Reduce feed upon entrance and exit of the cut by 25%
- Use air blast without coolant
- Use helical interpolation to ramp down into a cavity
- Increase feed rates in corners to compensate for heat loss
- Use climb milling
- Use shrink fit holders whenever possible
- Safety first-do not exceed Cutting Speed
- As DOC gets smaller speed should accelerate to compensate for heat loss
- Adjust speed to maximize plastic deformation

### Target Industries

- mold shops
- tool & die
- food processing
- forging
- mining

### Application Materials

- tool steels
- mold steels
- chilled irons
- powdered metal
- stellite
- weld overlays





## Ceramic Milling Tools Overview

### FRN

- A high-performance milling cutter line designed to handle machining operations on aerospace components, cast iron, and heat-resistant super alloys.
- Utilizes round-shaped inserts, providing excellent performance and versatility across different materials.
- Introducing IS15 and IS45, a new SiAlON grade, which delivers exceptional performance specifically for high-speed machining high-temperature alloys.

#### Recommend Cutting Conditions

| Workpiece Material |                             | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |     |     |      | Feed (mm/t) |      |     |      |      | Depth of Cut (mm) |
|--------------------|-----------------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|-----|-----|------|-------------|------|-----|------|------|-------------------|
|                    |                             |       |     |     | 50                    | 200 | 350 | 500 | 650 | 800 | 950 | 1100 | 0.05        | 0.08 | 0.1 | 0.12 | 0.15 |                   |
| S                  | heat-resistant super alloys | IS15  | •   |     |                       |     |     |     |     |     |     |      |             |      |     |      |      | ~ 4.0             |
|                    |                             | IS45  | •   |     |                       |     |     |     |     |     |     |      |             |      |     |      |      | ~ 4.0             |

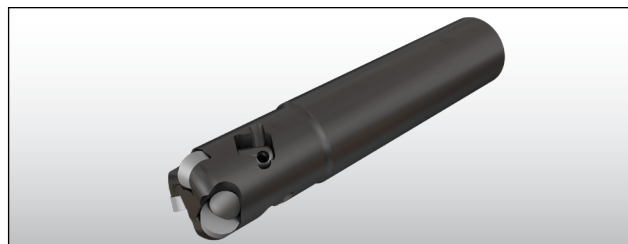
| K | Workpiece Material | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      | Feed (mm/t) |     |      |     |      |     | Depth of Cut (mm) |
|---|--------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-------------|-----|------|-----|------|-----|-------------------|
|   |                    |       |     |     | 450                   | 500 | 650 | 800 | 950 | 1100 | 1200 | 0.07        | 0.1 | 0.15 | 0.2 | 0.25 | 0.3 |                   |
|   | gray cast iron     | IS45  | •   |     |                       |     |     |     |     |      |      |             |     |      |     |      |     | ~ 4.0             |
|   | ductile cast iron  | IS45  | •   |     |                       |     |     |     |     |      |      |             |     |      |     |      |     | ~ 4.0             |





**ERP**

- A high-performance milling cutter line designed for milling faces, cavities, pockets, complex-shaped surfaces, close-to-shoulder milling, and ramping down including helical and circular interpolation.

**Recommend Cutting Conditions**

| S | Workpiece Material          | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      | Feed (mm/t) |      |     |      |      | Depth of Cut (mm) |
|---|-----------------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-------------|------|-----|------|------|-------------------|
|   |                             |       |     |     | 350                   | 500 | 650 | 800 | 950 | 1100 | 1200 | 0.05        | 0.08 | 0.1 | 0.12 | 0.15 |                   |
|   | heat-resistant super alloys | IS14  | •   |     |                       |     |     |     | □   |      |      |             |      | □   |      |      | ~ 1.50            |
|   |                             | IS15  | •   |     |                       |     |     |     | □   |      |      |             |      | □   |      |      | ~ 1.50            |
|   |                             | IS45  | •   |     |                       |     |     |     | □   |      |      |             |      | □   |      |      | ~ 1.50            |

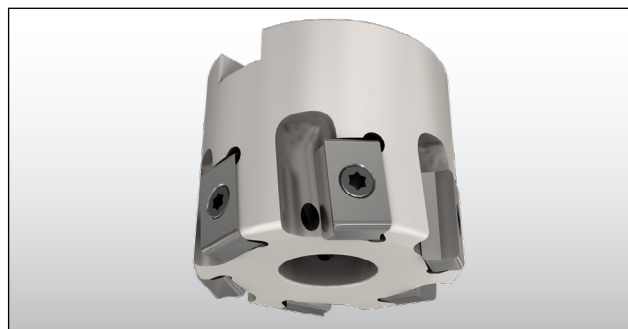
| K | Workpiece Material | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      | Feed (mm/t) |     |      |     |          | Depth of Cut (mm) |
|---|--------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-------------|-----|------|-----|----------|-------------------|
|   |                    |       |     |     | 450                   | 500 | 650 | 800 | 950 | 1100 | 1200 | 0.07        | 0.1 | 0.15 | 0.2 | 0.25 0.3 |                   |
|   | gray ductile       | IS45  | •   |     |                       |     |     |     | □   |      |      |             |     | □    |     |          | ~ 1.50            |
|   | ductile cast iron  | IS45  | •   |     |                       |     |     |     | □   |      |      |             |     | □    |     |          | ~ 1.50            |





## T488 FLN

- Enhanced productivity due to the fine pitch of the inserts and the ability to achieve a large depth of cut (DOC).
- T488 LNHU insert incorporates a chipbreaker design to effectively reduce tool pressure, improving performance.
- The precision insert provides four indexable cutting edges, ensuring productive machining and efficient utilization of the cutting material.

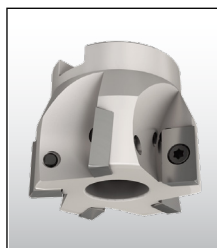


### Recommended Cutting Conditions

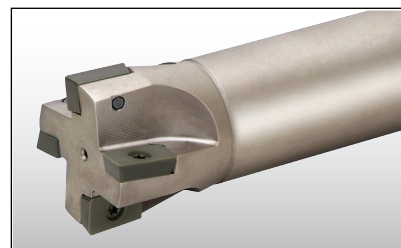
|   | Workpiece Material | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      | Feed (mm/t) |     |      |     |      |     | Depth of Cut (mm) |
|---|--------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-------------|-----|------|-----|------|-----|-------------------|
|   |                    |       |     |     | 350                   | 500 | 650 | 800 | 950 | 1100 | 1250 | 0.05        | 0.1 | 0.15 | 0.2 | 0.25 | 0.3 |                   |
| K | gray cast iron     | IS26  | •   | •   |                       |     |     |     |     |      |      |             |     |      |     |      |     | ~ 8.0             |
|   |                    | IS45  | •   | o   |                       |     |     |     |     |      |      |             |     |      |     |      |     | ~ 8.0             |
|   | ductile cast iron  | IS45C | •   | o   |                       |     |     |     |     |      |      |             |     |      |     |      |     | ~ 8.0             |

## E90-AP16/F90-AP016

- Enables precise 90-degree shoulder milling operations.
- Offers a wide range of cutter diameters, including small options as small as  $\phi 20$  mm, providing flexibility for various milling needs.



F90-AP16



E90-AP16

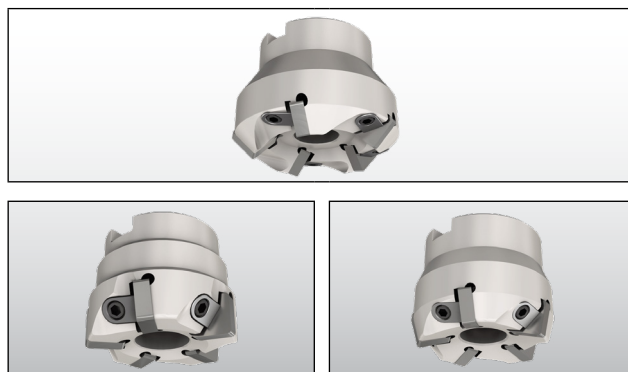
### Recommended Cutting Conditions

|   | Workpiece Material | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      | Feed (mm/t) |     |      |     |      |     | Depth of Cut (mm) |
|---|--------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-------------|-----|------|-----|------|-----|-------------------|
|   |                    |       |     |     | 350                   | 500 | 650 | 800 | 950 | 1100 | 1250 | 0.05        | 0.1 | 0.15 | 0.2 | 0.25 | 0.3 |                   |
| K | gray cast iron     | IS26  | •   | o   |                       |     |     |     |     |      |      |             |     |      |     |      |     | ~ 8.0             |
|   |                    | IS45  | •   | •   |                       |     |     |     |     |      |      |             |     |      |     |      |     | ~ 8.0             |
|   | ductile cast iron  | IS45C | •   | o   |                       |     |     |     |     |      |      |             |     |      |     |      |     | ~ 8.0             |



**F45SN/F75SN/F88SN**

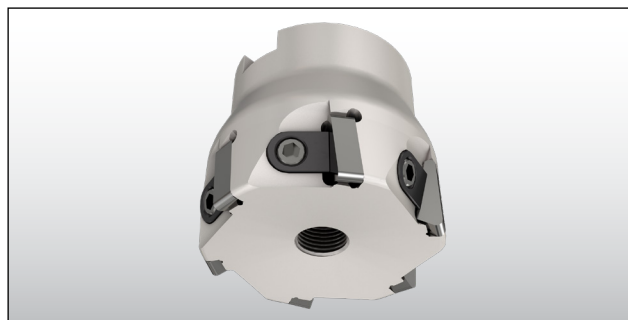
- Highly cost-effective 8-corner inserts that offer excellent value for money.
- Versatile usage with 45, 75, 88 degree angle milling cutters.
- Ceramics inserts with chipformer and wiper options are also offered, providing additional versatility and efficiency.

**Recommended Cutting Conditions**

|   | Workpiece Material | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      | Feed (mm/t) |     |      |     |      |     | Depth of Cut (mm) |
|---|--------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-------------|-----|------|-----|------|-----|-------------------|
|   |                    |       |     |     | 350                   | 500 | 650 | 800 | 950 | 1100 | 1250 | 0.05        | 0.1 | 0.15 | 0.2 | 0.25 | 0.3 |                   |
| K | gray cast iron     | IS26  | •   | •   |                       | □   |     |     |     |      |      |             | □   |      |     |      |     | ~ 6.0             |
|   |                    | IS45  | •   | o   |                       | □   |     |     |     |      |      |             | □   |      |     |      |     | ~ 6.0             |
|   | ductile cast iron  | IS45C | •   | o   |                       | □   |     |     |     |      |      |             | □   |      |     |      |     | ~ 6.0             |

**F90TN**

- Economical and multifunctional.
- TNGN 1604 style inserts with 6 cutting edges.
- Low cutting force.
- Offers both economic value and multifunctionality.
- Equipped with TNGN 1604 style inserts that boast six cutting edges, maximizing efficiency and tool life.
- Delivers low cutting force, resulting in reduced tool wear and improved machining performance.

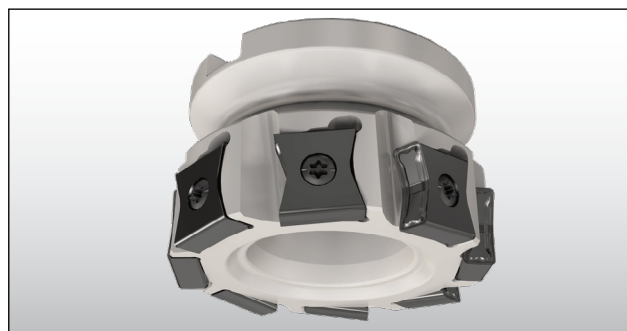
**Recommended Cutting Conditions**

|   | Workpiece Material | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      | Feed (mm/t) |     |      |     |      |     | Depth of Cut (mm) |
|---|--------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-------------|-----|------|-----|------|-----|-------------------|
|   |                    |       |     |     | 350                   | 500 | 650 | 800 | 950 | 1100 | 1250 | 0.05        | 0.1 | 0.15 | 0.2 | 0.25 | 0.3 |                   |
| K | gray cast iron     | IS26  | •   | •   |                       | □   |     |     |     |      |      |             | □   |      |     |      |     | ~ 6.0             |
|   |                    | IS45  | •   | o   |                       | □   |     |     |     |      |      |             | □   |      |     |      |     | ~ 6.0             |
|   | ductile cast iron  | IS45C | •   | o   |                       | □   |     |     |     |      |      |             | □   |      |     |      |     | ~ 6.0             |



## F90LN-N15

- 90° face mills carrying neutral tangential clamp inserts with 4 R.H and 4 L.H cutting edges.
- Provide efficient cutting performance in cast iron milling applications.

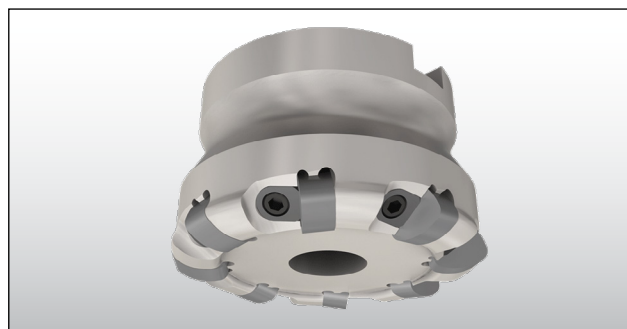


### Recommended Cutting Conditions

|   | Workpiece Material | Grade    | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      | Feed (mm/t) |     |      |     |      |     | Depth of Cut (mm) |
|---|--------------------|----------|-----|-----|-----------------------|-----|-----|-----|-----|------|-------------|-----|------|-----|------|-----|-------------------|
|   |                    |          |     |     | 250                   | 400 | 550 | 700 | 850 | 1000 | 0.05        | 0.1 | 0.15 | 0.2 | 0.25 | 0.3 |                   |
| K | gray cast iron     | IS8/IS26 | •   | o   |                       |     |     |     |     |      |             |     |      |     |      |     | ~ 5.0             |
|   | ductile cast iron  | IS8/IS26 | •   | o   |                       |     |     |     |     |      |             |     |      |     |      |     | ~ 5.0             |

## FFN

- A high-performance milling cutter line designed to handle machining operations on heat-resistant super alloy and cast iron materials.
- The use of milling cutters with ceramic inserts significantly increases both the cutting speed and feed speed, thereby considerably reducing machining time and enhancing productivity.



### Recommended Cutting Conditions

| S | Workpiece Material          | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      |     | Feed (mm/t) |     |      |     |      |       | Depth of Cut (mm) |
|---|-----------------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-----|-------------|-----|------|-----|------|-------|-------------------|
|   |                             |       |     |     | 350                   | 500 | 650 | 800 | 950 | 1100 | 1250 | 0.1 | 0.15        | 0.2 | 0.25 | 0.3 | 0.35 |       |                   |
|   | heat-resistant super alloys | IS35  | ●   | ○   |                       |     |     |     |     |      |      |     |             |     |      |     |      | ~ 2.0 |                   |

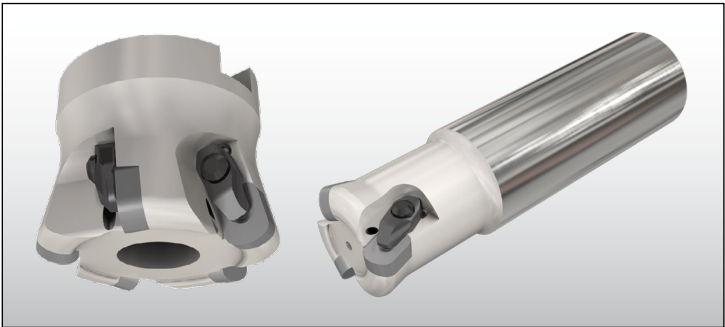
### Recommended Cutting Conditions

| K | Workpiece Material | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      |     | Feed (mm/t) |     |      |     |      |       | Depth of Cut (mm) |
|---|--------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-----|-------------|-----|------|-----|------|-------|-------------------|
|   |                    |       |     |     | 350                   | 500 | 650 | 800 | 950 | 1100 | 1250 | 0.1 | 0.15        | 0.2 | 0.25 | 0.3 | 0.35 |       |                   |
|   | gray cast iron     | IS35  | •   | o   |                       |     |     |     |     |      |      |     |             |     |      |     |      |       | ~ 2.0             |
|   | ductile cast iron  | IS35  | •   | o   |                       |     |     |     |     |      |      |     |             |     |      |     |      | ~ 2.0 |                   |



EFN

- A high-performance milling cutter line designed to handle machining operations on heat-resistant super alloy and cast iron materials.
- The tool design utilizes an upper-clamp concept for insert clamping. Both the top and bottom surfaces of the insert feature a dimple.



Recommended Cutting Conditions

| S | Workpiece Material          | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      | Feed (mm/t) |      |     |      |     |      | Depth of Cut (mm) |
|---|-----------------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-------------|------|-----|------|-----|------|-------------------|
|   |                             |       |     |     | 350                   | 500 | 650 | 800 | 950 | 1100 | 1250 | 0.1         | 0.15 | 0.2 | 0.25 | 0.3 | 0.35 |                   |
|   | heat-resistant super alloys | IS35  | •   | o   |                       |     |     |     |     |      |      |             |      |     |      |     |      | ~ 1.0             |

Recommended Cutting Conditions

| K | Workpiece Material | Grade | Dry | Wet | Cutting Speed (m/min) |     |     |     |     |      |      | Feed (mm/t) |      |     |      |     |      | Depth of Cut (mm) |
|---|--------------------|-------|-----|-----|-----------------------|-----|-----|-----|-----|------|------|-------------|------|-----|------|-----|------|-------------------|
|   |                    |       |     |     | 350                   | 500 | 650 | 800 | 950 | 1100 | 1250 | 0.1         | 0.15 | 0.2 | 0.25 | 0.3 | 0.35 |                   |
|   | gray cast iron     | IS35  | •   | o   |                       |     |     |     |     |      |      |             |      |     |      |     |      | ~ 1.0             |
|   | ductile cast iron  | IS35  | •   | o   |                       |     |     |     |     |      |      |             |      |     |      |     |      | ~ 1.0             |





## Milling with ISCAR Grades by Application Type

### General Guidelines for Successful Milling

- Select the best grade for the application.
- Select cutter diameter 15 times greater than the workpiece width.
- Eliminate overhang to increase stability.
- Choose the strongest nose radius.
- No coolant use compressed air.
- Check clamp and part rigidity.



### Guidelines for Successful Milling by Material:

#### Heat Resistant Alloy / PH Stainless Steel

- Down or climb milling where the chip thins upon exit is the preferred method for HNBA materials.
- Reduce feed rate 50% upon entrance and exit.
- Do not recut side walls as this can cause work hardening.
- Use balanced shell mill adapter or shrink fit for end-mills.
- As DOC gets thinner the feed must be increased to compensate for heat loss.
- Use RPG geometries if tool pressure is a problem.
- E002, E004 edge preparation recommended.

#### Cast Iron / Ductile Cast Iron

- Parts that are cast are more difficult to machine than forged decrease feed rates by 25%.
- Maximize feed rates for gray cast irons.

### Troubleshooting

| Workpiece Material   | Insert Composition | Grade                 | Problem          | Solution |      |          |            |              |                   |
|----------------------|--------------------|-----------------------|------------------|----------|------|----------|------------|--------------|-------------------|
|                      |                    |                       |                  | Speed    | Feed | DOC      | Edge Prep. | Insert Grade | Others            |
| Cast Iron            | silicon nitride    | IS26<br>IS45<br>IS45C | chipping         | ↘        | ↘    | —        | wider      | —            | —                 |
|                      |                    |                       | break            | ↘        | ↘    | ↘        | —          | tougher      | larger radius     |
|                      |                    |                       | thermal crack    | ↘        | ↘    | —        | —          | —            | —                 |
|                      |                    |                       | crater wear      | —        | —    | —        | shaper     | —            | —                 |
| Heat Resistant Alloy | SiAlON             | IS14<br>IS15<br>IS45  | notching         | ↗        | ↗    | vary / ↘ | wider      | —            | pre-chamfer parts |
|                      |                    |                       | flank wear       | ↘        | ↗    | —        | —          | harder       | —                 |
|                      |                    |                       | chipping         | —        | —    | —        | wider      | tougher      | —                 |
|                      |                    |                       | break            | ↘        | —    | ↘        | —          | tougher      | —                 |
|                      |                    |                       | thermal pressure | —        | —    | —        | —          | —            | use RPG insert    |



## Solid Ceramic Endmill

## Endmills

- Experience incredibly fast machining speeds for HRSA (heat-resistant super alloy) materials with our long-lasting SiAlON grade "IS45".
- Achieve over 15 times higher productivity compared to a carbide end-mill.
- We offer options of 4, 6, and 8 flutes to meet your specific needs.
- Our patent pending design ensures exceptional toughness at the cutting edge.



## Ceramics Specialist's Design:

## Helix Angle

4-flute: toughness  
6-flute: less tool pressure and better chip evacuation



## Bottom edge

the unique shape of the bottom edge enhances the toughness and durability of our product

## For Maximum Productivity when Cutting HRSA

- It is recommended to perform a continuous cut, as an interrupted cut may result in chipping or breakage.
- When using a hydraulic or shrink chuck, blow air to the arbor body, don't blow air to the endmill itself.
- Ensure a minimum speed of 300 m/min is maintained. (don't run at lower speed.)

- For ramping cuts, a recommended angle of 1.5 degrees is suggested. It is recommended to run at a 50% lower feed rate during ramping cuts.
- It is important to continue the machining process even if you observe built-up edge (bue). Removing bue may lead to chipping or breakage at the cutting edge.
- Keep in mind that high-speed machining work hardens the material. Hence, it is recommended to leave at least 0.3 mm of material for the finishing process.

## Test Report

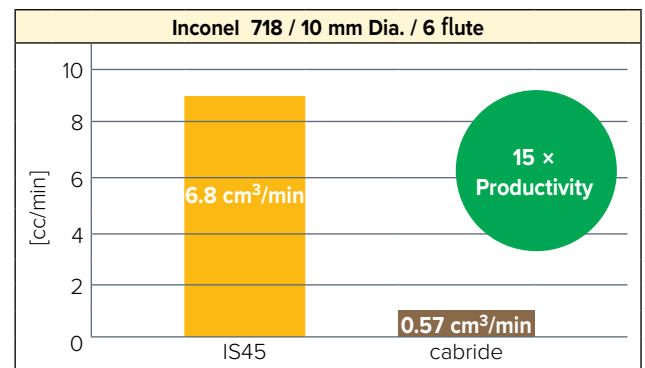
**Work Material** inconel 718

**Cutting Speed** ceramics - (IS45) 200 m/min  
carbide - 40 m/min

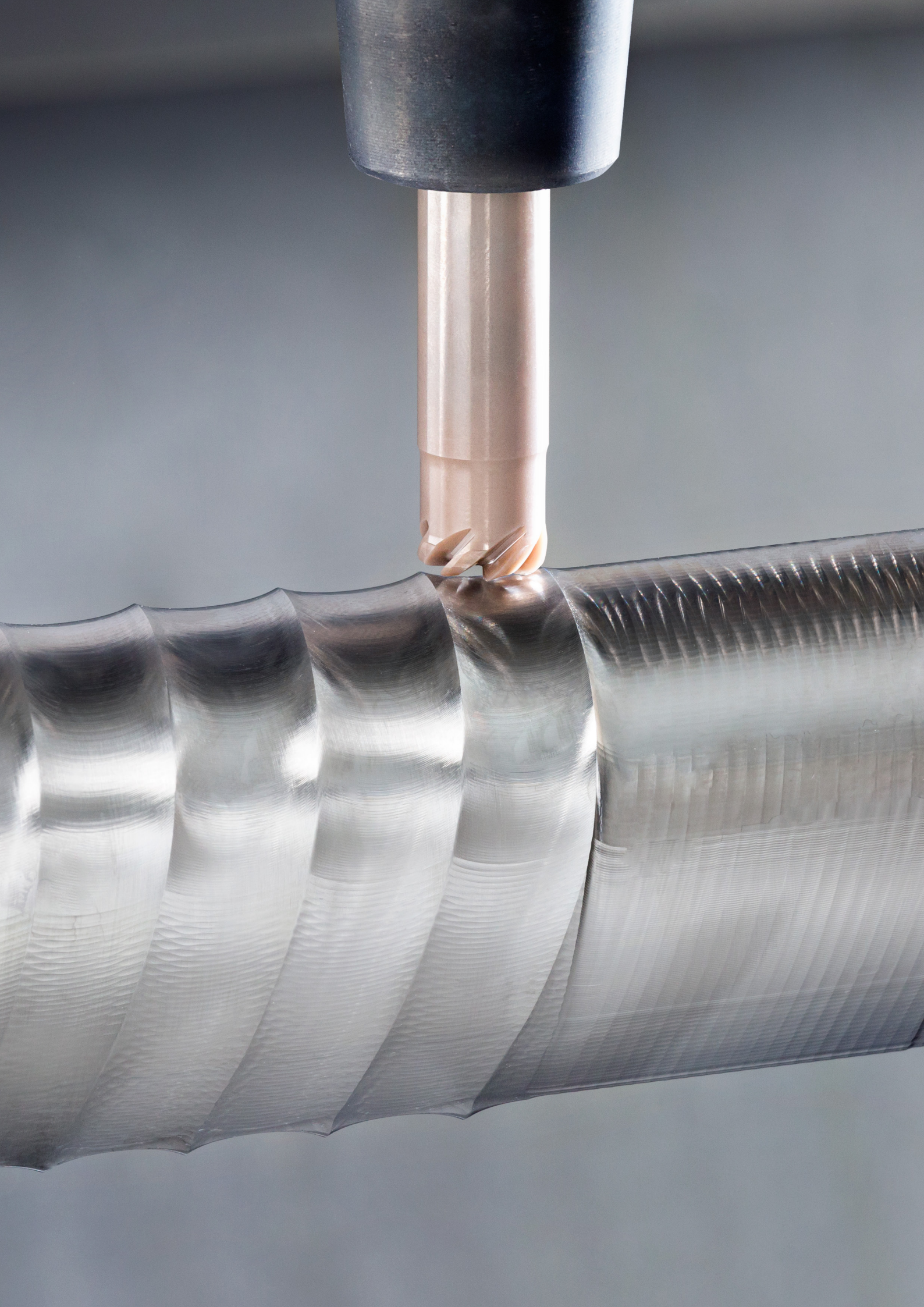
**Feed** 0.03 mm/t

**Depth of Cut** 3.0 mm

**Coolant** dry

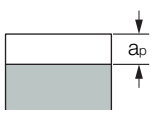
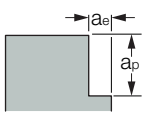
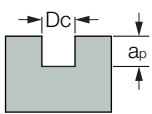


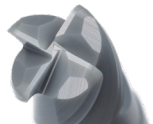

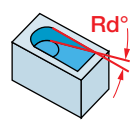
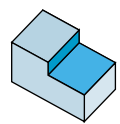
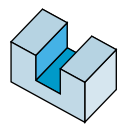
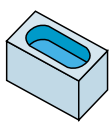






Recommended Cutting Conditions for HRSA Material

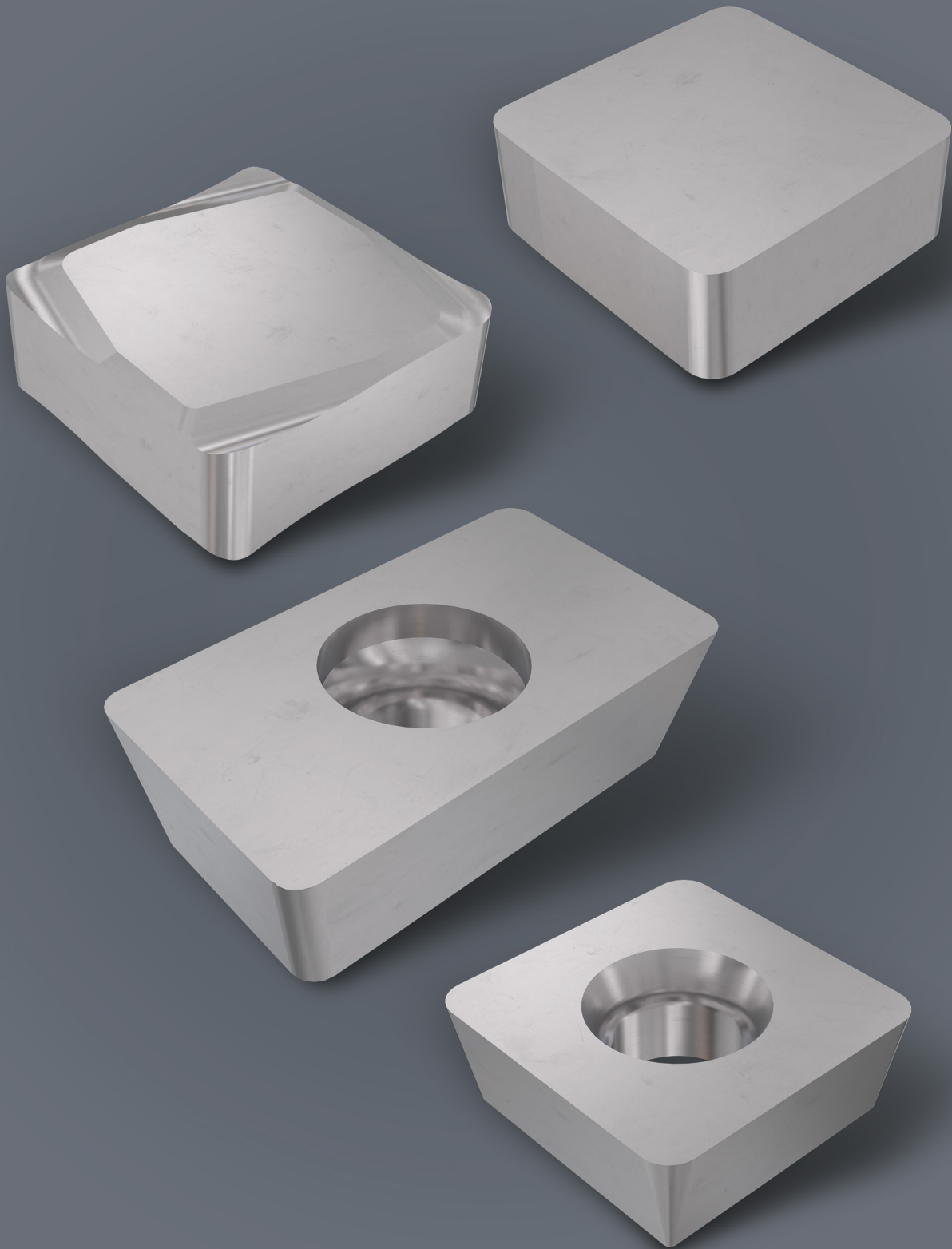
| Application   | Grade | ØDc   | Flute | Cutting Speed (m/min) |     |      | Feed (mm/t) | Depth of Cut<br>$a_p$ (mm) | Width of Cut<br>$a_e$ (mm) | Coolant |
|---|-------|-------|-------|-----------------------|-----|------|-------------|----------------------------|----------------------------|---------|
|   |       |       |       | 150                   | 600 | 1000 |             |                            |                            |         |
| face milling<br> | IS45  | 8 mm  | 4/6   |                       |     |      | 0.03        | 1.2                        | —                          | dry     |
|   |       | 10 mm |       |                       |     |      |             | 1.5                        |                            |         |
|   |       | 12 mm |       |                       |     |      |             | 1.8                        |                            |         |
|   |       | 16 mm |       |                       |     |      |             | 2.4                        |                            |         |
|   |       | 20 mm |       |                       |     |      |             | 3.0                        |                            |         |
| side milling<br> | IS45  | 8 mm  | 4/6   |                       |     |      | 0.03        | 4.0                        | 0.8                        | dry     |
|   |       | 10 mm |       |                       |     |      |             | 5.0                        | 1.0                        |         |
|   |       | 12 mm |       |                       |     |      |             | 6.0                        | 1.2                        |         |
|   |       | 16 mm |       |                       |     |      |             | 8.0                        | 1.6                        |         |
|   |       | 20 mm |       |                       |     |      |             | 10.0                       | 2.0                        |         |
| slotting<br>     | IS45  | 8 mm  | 4     |                       |     |      | 0.03        | 2.0                        | —                          | dry     |
|   |       | 10 mm |       |                       |     |      |             | 2.5                        |                            |         |
|   |       | 12 mm |       |                       |     |      |             | 3.0                        |                            |         |
|   |       | 16 mm |       |                       |     |      |             | 4.0                        |                            |         |
|   |       | 8 mm  | 6     |                       |     |      | 0.03        | 1.2                        | —                          | dry     |
|   |       | 10 mm |       |                       |     |      |             | 1.5                        |                            |         |
|   |       | 12 mm |       |                       |     |      |             | 1.8                        |                            |         |
|   |       | 16 mm |       |                       |     |      |             | 2.4                        |                            |         |

| 4-Flute   | 6-Flute   | Application   |   |   |   |
|---|---|---|---|---|---|
|  |  |  |  |  |  |





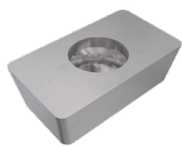
# CERAMIC MILLING INSERTS



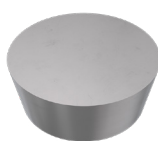


## Ceramic Milling Inserts - Index

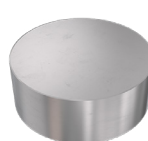
APCW 1604 (CER)



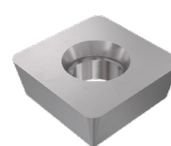
RPGN (CER)



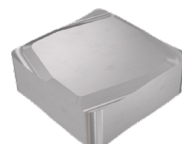
RNGN (CER)



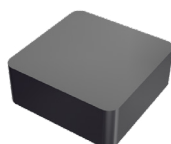
SDCW (CER)



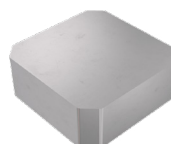
SNGF (CER)



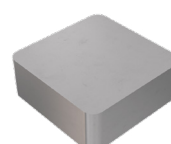
SNGN (CER)



SNGN-AN (CER)



SNGN-EN (CER)



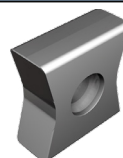
SNGN-ZN (CER)



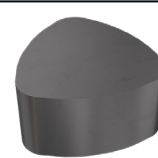
T488 LNHN (CER)



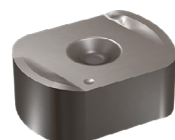
LNHW 1506 PNTN (CER)



FFN WNGF



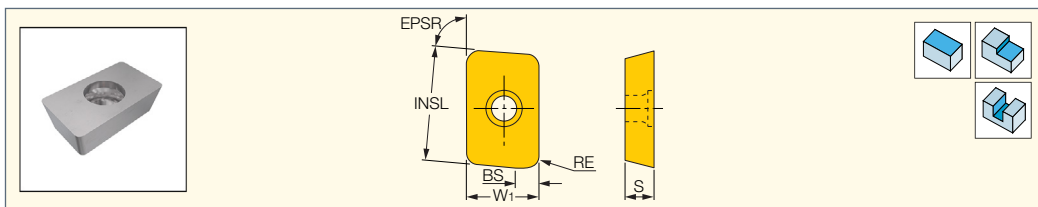
EFN WDNX





**APCW 1604 (CER)**

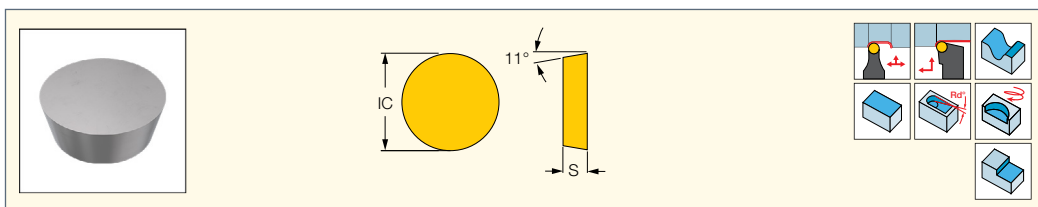
Radial Clamped Ceramic Insert  
Used for High-Speed Machining  
Gray and Nodular Cast Iron



| Designation          | Dimensions |       |      |      |      |      | Silicon Nitride |      | Recommended Machining Data |                 |
|----------------------|------------|-------|------|------|------|------|-----------------|------|----------------------------|-----------------|
|                      | W1         | INSL  | S    | RE   | EPSR | BS   | IS45C           | IS26 | $a_p$<br>(mm)              | $f_z$<br>(mm/t) |
| APCW 1604PDTR T01020 | 9.53       | 16.46 | 4.76 | 0.80 | 85.0 | 2.60 | •               | •    | 0.80-14.00                 | 0.05-0.20       |
| APCW 1604PDTR T01020 | 9.53       | 16.46 | 4.76 | 0.80 | 85.0 | 2.60 | •               | •    | 0.80-14.00                 | 0.05-0.20       |
| APCW 160408 T01020   | 9.53       | 16.46 | 4.76 | 0.80 | 85.0 | -    | •               | •    | 0.80-14.00                 | 0.05-0.20       |
| APCW 160412 T01020   | 9.53       | 16.46 | 4.76 | 1.20 | 85.0 | -    | •               | •    | 1.20-14.00                 | 0.05-0.20       |
| APCW 160416 T01020   | 9.53       | 16.46 | 4.76 | 1.60 | 85.0 | -    | •               | •    | 1.60-14.00                 | 0.05-0.20       |
| APCW 160420 T01020   | 9.53       | 16.46 | 4.76 | 2.00 | 85.0 | -    | •               | •    | 1.60-14.00                 | 0.05-0.20       |

**RPGN (CER)**

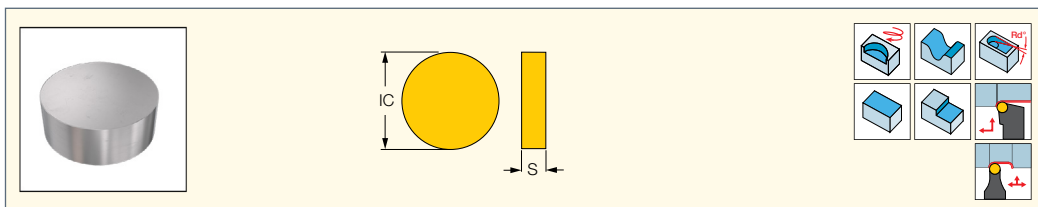
Positive Round Ceramic  
Inserts for Machining Cast Iron  
and Heat-Resistant Alloys



| Designation        | Dimensions |      | Silicon Nitride |      |      | Recommended Machining Data |                   |
|--------------------|------------|------|-----------------|------|------|----------------------------|-------------------|
|                    | IC         | S    | IS14            | IS15 | IS45 | $a_p$<br>(mm)              | $f_z$<br>(mm/rev) |
| RPGN 060200 E004   | 6.35       | 2.38 | •               | •    | •    | 1.00-1.50                  | 0.08-0.15         |
| RPGN 060200 T00520 | 6.35       | 2.38 | •               | •    | •    | 1.00-1.50                  | 0.08-0.15         |
| RPGN 060200 T01020 | 6.35       | 2.38 | •               | •    | •    | 1.00-1.50                  | 0.08-0.15         |
| RPGN 090300 E004   | 9.53       | 3.18 | •               | •    | •    | 1.00-2.00                  | 0.08-0.15         |
| RPGN 090300 T01020 | 9.53       | 3.18 | •               | •    | •    | 1.00-2.00                  | 0.08-0.15         |
| RPGN 120400 E004   | 12.70      | 4.76 | •               | •    | •    | 1.00-3.00                  | 0.08-0.15         |
| RPGN 120400 T01020 | 12.70      | 4.76 | •               | •    | •    | 1.00-3.00                  | 0.08-0.15         |

**RNGN (CER)**

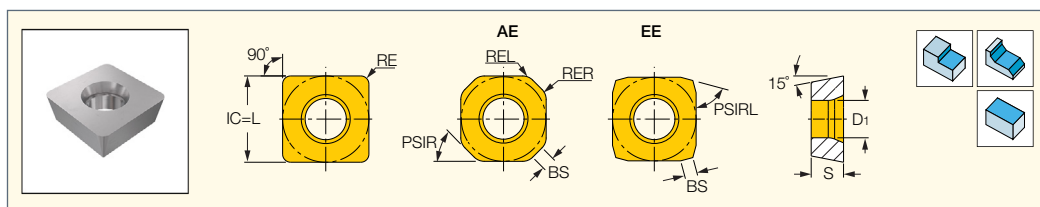
Negative Round Double-Sided  
Ceramic Inserts for Machining  
Cast Iron, Hardened Steel,  
and Heat-Resistant Alloys



| Designation        | Dimensions |      | Whisker<br>IW10 | Silicon Nitride |      |       |      |      |      | Recommended Machining Data |                 |
|--------------------|------------|------|-----------------|-----------------|------|-------|------|------|------|----------------------------|-----------------|
|                    | IC         | S    |                 | IS14            | IS15 | IS45C | IS45 | IS55 | IS26 | $a_p$<br>(mm)              | $f_z$<br>(mm/t) |
| RNGN 120700 E004   | 12.70      | 7.94 | •               | •               | •    | •     | •    | •    | •    | 0.05-3.00                  | 0.05-0.50       |
| RNGN 120700 T01020 | 12.70      | 7.94 | •               | •               | •    | •     | •    | •    | •    | 0.10-4.50                  | 0.07-0.50       |
| RNGN 120700 T00520 | 12.70      | 7.94 | •               | •               | •    | •     | •    | •    | •    | 0.05-3.00                  | 0.05-0.50       |
| RNGN 120700 P20015 | 12.70      | 7.94 | •               | •               | •    | •     | •    | •    | •    | 0.05-3.00                  | 0.05-0.50       |
| RNGN 120700 S02025 | 12.70      | 7.94 | •               | •               | •    | •     | •    | •    | •    | 0.05-3.00                  | 0.05-0.50       |
| RNGN 120700 T02025 | 12.70      | 7.94 | •               | •               | •    | •     | •    | •    | •    | 0.05-3.00                  | 0.05-0.50       |

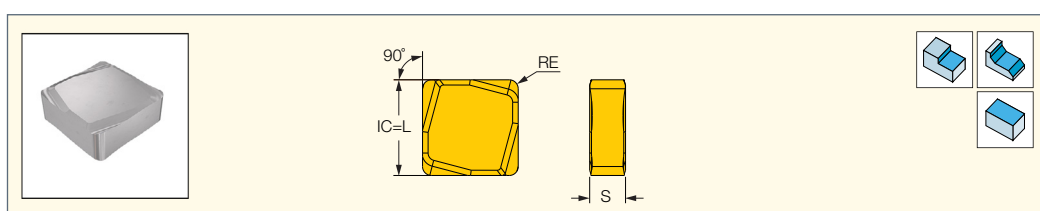



**SDCW (CER)**

 Ceramic Square Inserts  
for Machining Cast Iron


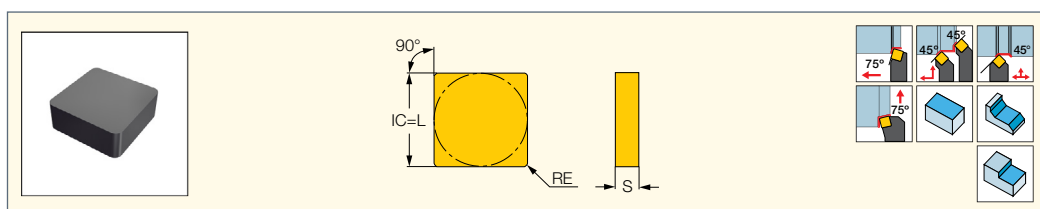
| Designation         | Dimensions |      |      |      |      |       |      |      |      | Silicon Nitride |      | Recommended Machining Data |                 |
|---------------------|------------|------|------|------|------|-------|------|------|------|-----------------|------|----------------------------|-----------------|
|                     | L          | S    | BS   | D1   | PSIR | PSIRL | RE   | REL  | RER  | IS45C           | IS26 | $a_p$<br>(mm)              | $f_z$<br>(mm/t) |
| SDCW 1204AE T01020  | 12.70      | 4.76 | 2.40 | 5.50 | 45.0 | -     | -    | 1.20 | 1.20 | ●               | ●    | 1.20-6.00                  | 0.05-0.20       |
| SDCW 1204EE RT01020 | 12.70      | 4.76 | 1.40 | 5.50 | -    | 75.0  | -    | -    | -    | ●               | ●    | 0.50-6.00                  | 0.05-0.20       |
| SDCW 120408 T01020  | 12.70      | 4.76 | -    | 5.50 | -    | -     | 0.80 | -    | -    | ●               | ●    | 0.80-6.00                  | 0.05-0.20       |


**SNGF (CER)**

 Radial Double-Sided  
Ceramic Face Milling Inserts  
with a Chipbreaker


| Designation          | Dimensions |      |      | Silicon Nitride |      | Recommended Machining Data |                 |
|----------------------|------------|------|------|-----------------|------|----------------------------|-----------------|
|                      | IC         | S    | RE   | IS45C           | IS26 | $a_p$<br>(mm)              | $f_z$<br>(mm/t) |
| SNGF 120412 T01020RC | 12.70      | 4.76 | 1.20 | ●               | ●    | 1.20-5.00                  | 0.05-0.20       |


**SNGN (CER)**

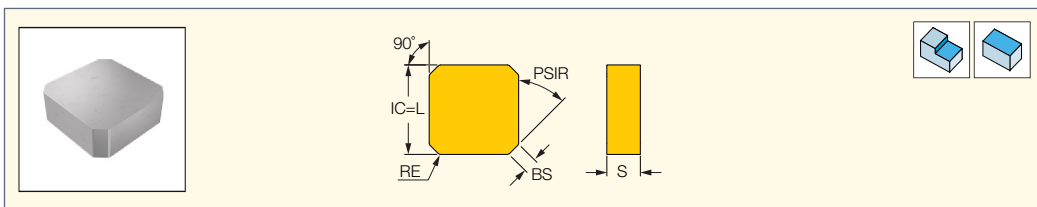
 Negative Square Double-Sided  
Ceramic Inserts for Machining  
Cast Iron, Hardened Steel  
and Heat-Resistant Alloys


| Designation        | Dimensions |      |      | Silicon Nitride |       |      |      | Recommended Machining Data |                 |
|--------------------|------------|------|------|-----------------|-------|------|------|----------------------------|-----------------|
|                    | IC         | S    | RE   | IS15            | IS45C | IS45 | IS26 | $a_p$<br>(mm)              | $f_z$<br>(mm/t) |
| SNGN 120404 S02025 | 12.70      | 4.76 | 0.40 |                 |       |      |      | 0.05-2.00                  | 0.05-0.20       |
| SNGN 120408 S02025 | 12.70      | 4.76 | 0.80 |                 |       |      |      | 0.05-3.00                  | 0.05-0.30       |
| SNGN 120408 T01020 | 12.70      | 4.76 | 0.80 |                 | ●     | ●    | ●    | 0.05-3.00                  | 0.05-0.30       |
| SNGN 120408 T02020 | 12.70      | 4.76 | 0.80 |                 |       |      | ●    | 0.05-3.00                  | 0.05-0.30       |
| SNGN 120412 S02025 | 12.70      | 4.76 | 1.20 |                 |       |      |      | 0.05-4.00                  | 0.05-0.45       |
| SNGN 120412 T01020 | 12.70      | 4.76 | 1.20 |                 | ●     | ●    | ●    | 0.05-4.00                  | 0.05-0.45       |
| SNGN 120416 T01020 | 12.70      | 4.76 | 1.60 |                 | ●     | ●    | ●    | 0.50-5.00                  | 0.05-0.50       |
| SNGN 120416 T02020 | 12.70      | 4.76 | 1.60 |                 |       |      | ●    | 0.50-5.00                  | 0.05-0.50       |



**SNGN-AN (CER)**

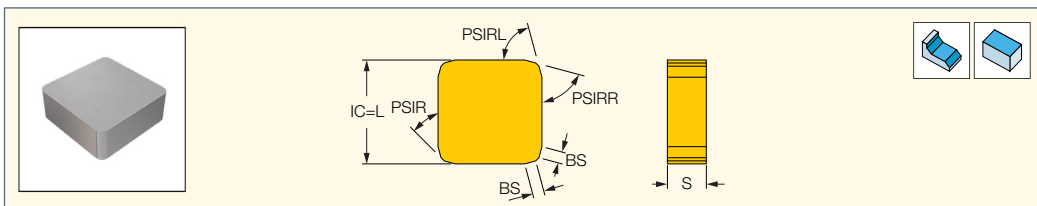
Negative Square Double-Sided  
Ceramic Inserts for Machining  
Cast Iron, Hardened Steel  
and Heat-Resistant Alloys



| Designation               | Dimensions |      |      |      |      | Silicon Nitride |      | Recommended Machining Data |                 |
|---------------------------|------------|------|------|------|------|-----------------|------|----------------------------|-----------------|
|                           | IC         | S    | RE   | PSIR | BS   | IS45C           | IS26 | $a_p$<br>(mm)              | $f_z$<br>(mm/t) |
| <b>SNGN 1204AN T01020</b> | 12.70      | 4.76 | 0.50 | 45.0 | 2.00 | ●               | ●    | 0.50-5.00                  | 0.05-0.20       |

**SNGN-EN (CER)**

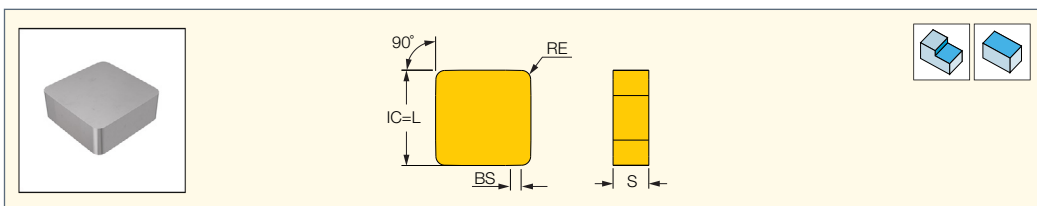
Negative Square Double-Sided  
Ceramic Inserts for Machining  
Cast Iron, Hardened Steel  
and Heat-Resistant Alloys



| Designation        | Dimensions |      |       |       |      |      | Silicon Nitride |      | Recommended Machining Data |                          |
|--------------------|------------|------|-------|-------|------|------|-----------------|------|----------------------------|--------------------------|
|                    | IC         | S    | PSIRR | PSIRL | PSIR | BS   | IS45C           | IS26 | a <sub>p</sub><br>(mm)     | f <sub>z</sub><br>(mm/t) |
|                    |            |      |       |       |      |      |                 |      |                            |                          |
| SNGN 1204EN T01020 | 12.70      | 4.76 | 75.0  | 75.0  | 45.0 | 1.40 | ●               | ●    | 0.50-5.00                  | 0.05-0.20                |

**SNGN-ZN (CER)**

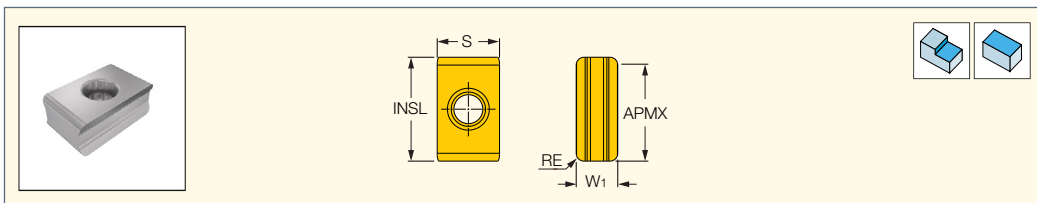
Radial Double-Sided Ceramic  
Face Milling Inserts Used for  
High-Speed Machining Gray  
and Nodular Cast Iron



| Designation               | Dimensions |      |      |       |      | Silicon Nitride |      | Recommended Machining Data |                 |
|---------------------------|------------|------|------|-------|------|-----------------|------|----------------------------|-----------------|
|                           | IC         | S    | RE   | L     | BS   | IS45C           | IS26 | $a_p$<br>(mm)              | $f_z$<br>(mm/t) |
| <b>SNGN 1204ZN T01025</b> | 12.70      | 4.76 | 1.20 | 12.70 | 2.00 | ●               | ●    | 1.20-5.00                  | 0.05-0.20       |
| <b>SNGN 1204ZN T01020</b> | 12.70      | 4.76 | 1.20 | 12.70 | 2.00 | ●               | ●    | 1.20-5.00                  | 0.05-0.20       |

**T488 LNHU (CER)**

Tangentially Clamped  
Ceramic Insert for Machining  
Gray and Ductile Iron

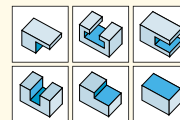
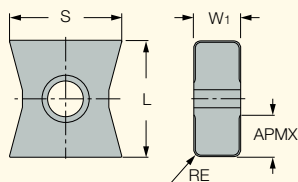
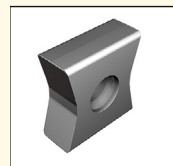


| Designation              | Dimensions |      |      |      |       | Silicon Nitride |      | Recommended Machining Data |                 |
|--------------------------|------------|------|------|------|-------|-----------------|------|----------------------------|-----------------|
|                          | INSL       | S    | RE   | W1   | APMX  | IS45C           | IS26 | $a_p$<br>(mm)              | $f_z$<br>(mm/t) |
| <b>T488 LNHU 160608N</b> | 15.88      | 6.35 | 0.80 | 9.53 | 14.00 | ●               | ●    | 0.80-14.00                 | 0.05-0.20       |
| <b>T488 LNHU 160612N</b> | 15.88      | 6.35 | 1.20 | 9.53 | 14.00 | ●               | ●    | 1.20-14.00                 | 0.05-0.20       |
| <b>T488 LNHU 160616N</b> | 15.88      | 6.35 | 1.60 | 9.53 | 14.00 | ●               | ●    | 1.60-14.00                 | 0.05-0.20       |




**LNHW 1506 PNTN (CER)**

Tangentially Clamped Ceramic Insert for High Speed Machining of Gray and Nodular Cast Iron



| Designation           | Dimensions |       |       |      |                     | Silicon Nitride |      | Recommended Machining Data |                          |
|-----------------------|------------|-------|-------|------|---------------------|-----------------|------|----------------------------|--------------------------|
|                       | W1         | L     | S     | RE   | APMX <sup>(1)</sup> | IS8             | IS26 | a <sub>p</sub><br>(mm)     | f <sub>z</sub><br>(mm/t) |
| <b>LNHW 1506 PNTN</b> | 6.00       | 15.00 | 14.47 | 0.80 | 5.00                | ●               | ●    | 1.00-5.00                  | 0.15-0.25                |

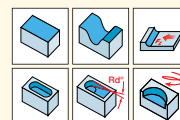
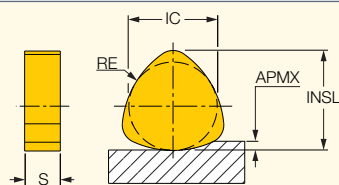
• Ceramic peripherally ground inserts for high speed machining of grey and nodular cast iron providing high surface finish

• Feature 4 L.H. and 4 R.H. cutting edges when used on F90LN.. cutters

<sup>(1)</sup> D.O.C. when the insert is on the cutter


**FFN WNGF**

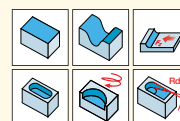
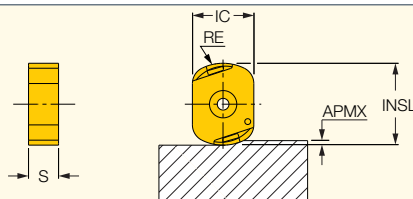
Double-Sided Ceramic Inserts with 6 Cutting Edges for Fast Feed Machining



| Designation              | Dimensions |       |      |      |       | Silicon Nitride |  | Recommended Machining Data |                          |
|--------------------------|------------|-------|------|------|-------|-----------------|--|----------------------------|--------------------------|
|                          | INSL       | IC    | S    | APMX | RE    | IS35            |  | a <sub>p</sub><br>(mm)     | f <sub>z</sub><br>(mm/t) |
| <b>FFN WNGF 1207-E04</b> | 13.57      | 12.00 | 7.00 | 2.50 | 13.00 | ●               |  | 1.00-2.00                  | 0.150-0.350              |


**EFN WDNX**

Double-sided Ceramic Inserts with 4 Cutting Edges for Fast Feed Milling



| Designation              | Dimensions |      |      |      |      | Silicon Nitride |  | Recommended Machining Data |                          |
|--------------------------|------------|------|------|------|------|-----------------|--|----------------------------|--------------------------|
|                          | INSL       | IC   | S    | APMX | RE   | IS35            |  | a <sub>p</sub><br>(mm)     | f <sub>z</sub><br>(mm/t) |
| <b>EFN WDNX 0904-E04</b> | 12.00      | 9.00 | 5.00 | 1.50 | 7.00 | ●               |  | 0.50-1.00                  | 0.150-0.350              |

• To generate a straight surface without cusps, the width of cut must not exceed DC



# CERAMIC MILLING TOOLS PRELUDE

CERAMIC MILLING TOOLS PRELUDE



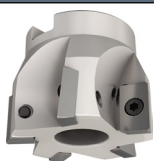


# Ceramic Milling Tools - Index

F90-AP16



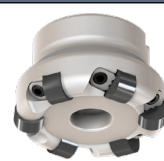
E90-AP16



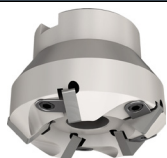
ERP



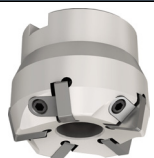
FRN



F45SN



F75SN



F88SN



F90TN



T488 FLN



F90LN-N15



FFN FD-12



EFN ED-09



EFN FD-09



EC-E4 (CER)



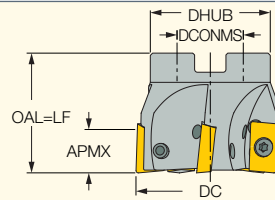
EC-E6 (CER)





**F90-AP16**

90° Face Mills Carrying  
APCW 1604 Inserts



| Designation                | DC    | CICT <sup>(1)</sup> | APMX  | DHUB  | DCONMS | OAL   | Arbor | kg   |
|----------------------------|-------|---------------------|-------|-------|--------|-------|-------|------|
| <b>F90 D040-04-16-AP16</b> | 40.00 | 4                   | 14.00 | 35.00 | 16.00  | 40.00 | A     | 0.20 |
| <b>F90 D050-05-22-AP16</b> | 50.00 | 5                   | 14.00 | 45.00 | 22.00  | 40.00 | A     | 0.30 |
| <b>F90 D063-06-22-AP16</b> | 63.00 | 6                   | 14.00 | 58.00 | 22.00  | 50.00 | A     | 1.40 |
| <b>F90 D080-08-27-AP16</b> | 80.00 | 8                   | 14.00 | 58.00 | 27.00  | 50.00 | A     | 1.90 |

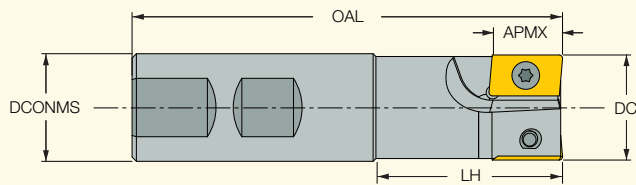
<sup>(1)</sup> Number of inserts

**Spare Parts**

| Designation     |  |  |  |
|-----------------|---|---|---|
| <b>F90-AP16</b> | SR M4X9-4H  | BLD T15/S7  | SW6-SD  |

**E90-AP16**

90° Endmills Carrying  
APCW 1604 Inserts






| Designation                 | DC    | CICT <sup>(1)</sup> | APMX  | LH   | DCONMS | OAL    | Shank <sup>(2)</sup> | kg   |
|-----------------------------|-------|---------------------|-------|------|--------|--------|----------------------|------|
| <b>E90 D020-01-W20-AP16</b> | 20.00 | 1                   | 14.00 | 30.0 | 20.00  | 100.00 | W                    | 0.20 |
| <b>E90 D025-02-W25-AP16</b> | 25.00 | 2                   | 14.00 | 30.0 | 25.00  | 100.00 | W                    | 0.30 |
| <b>E90 D032-02-W32-AP16</b> | 32.00 | 2                   | 14.00 | 35.0 | 32.00  | 110.00 | W                    | 0.50 |
| <b>E90 D040-04-W32-AP16</b> | 40.00 | 4                   | 14.00 | 37.0 | 32.00  | 110.00 | W                    | 0.60 |

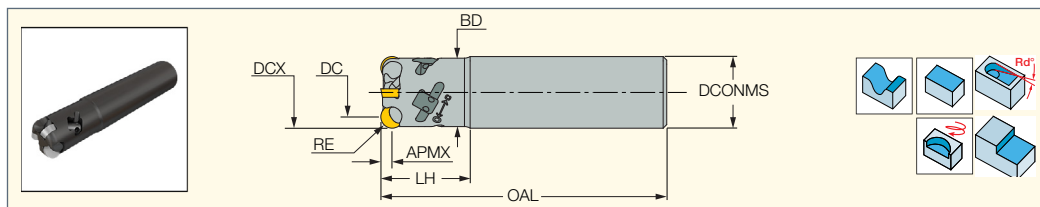
<sup>(1)</sup> Number of inserts (or edges for solid tool)

<sup>(2)</sup> W-Weldon

**Spare Parts**






| Designation     |  |  |  |
|-----------------|---|---|---|
| <b>E90-AP16</b> | SR M4X9-4H  | BLD T15/S7  | SW6-SD  |



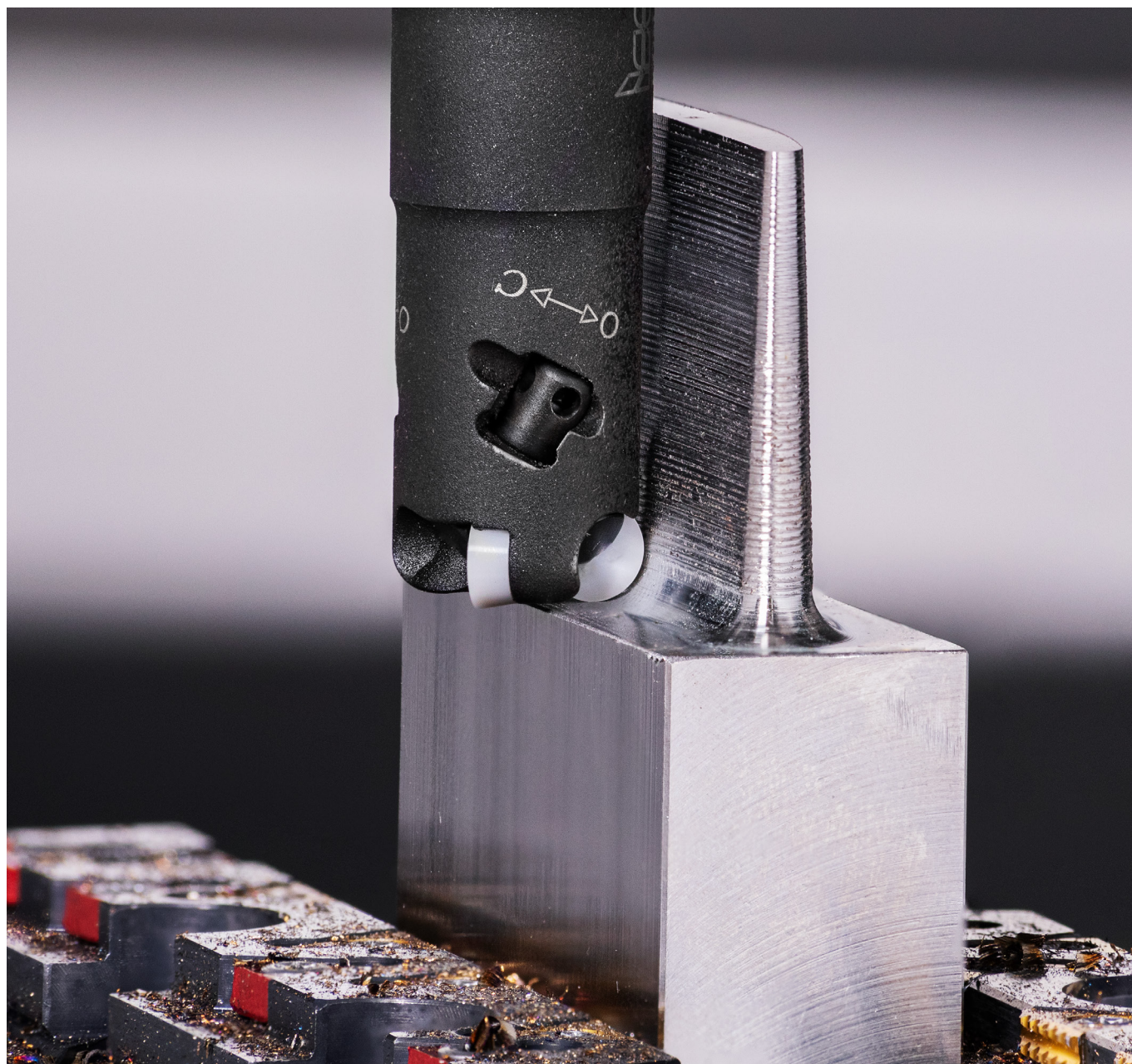
**CERMILL****ERP**Endmills Carrying Single-Sided  
Ceramic Round Inserts

| Designation            | DCX   | DC    | RE   | APMX | CICT | LH   | OAL    | BD    | DCONMS | RMPX° | Shank | CSP | MIID    |
|------------------------|-------|-------|------|------|------|------|--------|-------|--------|-------|-------|-----|---------|
| ERP D010A016-03-C16-06 | 16.00 | 9.65  | 3.18 | 1.50 | 3    | 25.0 | 80.00  | 15.00 | 16.00  | 2.5   | C     | 0   | RPGN 06 |
| ERP D014A020-04-C20-06 | 20.00 | 13.65 | 3.18 | 1.50 | 4    | 30.0 | 80.00  | 19.00 | 20.00  | 4.0   | C     | 0   | RPGN 06 |
| ERP D019A025-05-C25-06 | 25.00 | 18.65 | 3.18 | 1.50 | 5    | 40.0 | 100.00 | 24.00 | 25.00  | 3.5   | C     | 0   | RPGN 06 |
| ERP D026A032-06-C32-06 | 32.00 | 25.64 | 3.18 | 1.50 | 6    | 50.0 | 120.00 | 31.00 | 32.00  | 2.0   | C     | 0   | RPGN 06 |
| ERP D034A040-07-C32-06 | 40.00 | 33.64 | 3.18 | 1.50 | 7    | 50.0 | 120.00 | 39.00 | 32.00  | 1.5   | C     | 0   | RPGN 06 |

**Spare Parts**

| Designation |  |  |  |  |  |
|-------------|---|---|---|---|---|
| ERP         | CL-D4-L9-M3X0.5   | NUT-D4.5-L6-M3X0.5  | CW 1.7-L20  | ERP BIT D4-30°  | T.WRENCH TBN 0.7NM*   |

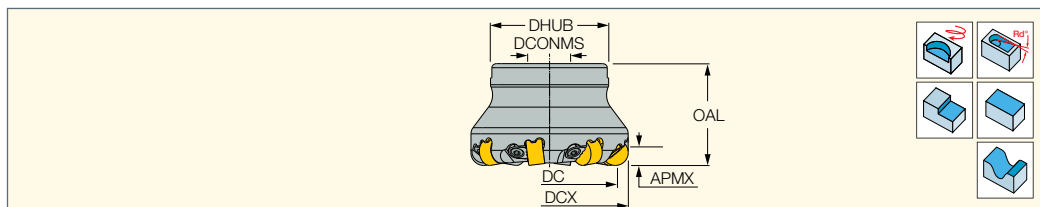
\* Optional, to be ordered separately





**FRN**

Face Mill for Wedge-Clamped  
Double-Sided Round Inserts



| Designation           | DCX <sup>(1)</sup> | DC    | APMX | OAL   | DCONMS | DHUB  | Arbor | CICT <sup>(2)</sup> | MDN <sup>(3)</sup> | MDX <sup>(4)</sup> | RMPX <sup>(5)</sup> | kg   |
|-----------------------|--------------------|-------|------|-------|--------|-------|-------|---------------------|--------------------|--------------------|---------------------|------|
| FRN D038A050-05-22-12 | 50.00              | 37.30 | 3.00 | 40.00 | 22.00  | 45.00 | A     | 5                   | 87.30              | 99.00              | 0.4                 | 0.46 |
| FRN D051A063-06-22-12 | 63.00              | 50.30 | 3.00 | 40.00 | 22.00  | 47.00 | A     | 6                   | 113.30             | 125.00             | 0.3                 | 0.63 |
| FRN D068A080-07-27-12 | 80.00              | 67.30 | 3.00 | 50.00 | 27.00  | 58.00 | A     | 7                   | 147.30             | 159.00             | 0.3                 | 0.85 |

• Radius for programming: 6.35

<sup>(1)</sup> Cutting diameter maximum

<sup>(2)</sup> Number of inserts

<sup>(3)</sup> Machinable diameter minimum for interpolation

<sup>(4)</sup> Machinable diameter maximum for interpolation

<sup>(5)</sup> Maximum ramping angle

**Spare Parts**

| Designation |  |  |  |
|-------------|---|---|---|
| FRN         | WEDGE SCREW <sup>(a)</sup>  | LW 1207C  | T-W3  |

<sup>(a)</sup> Recommended tightening torque: 4.8 Nm

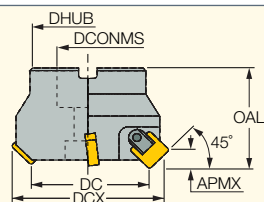






### F45SN

45° Face Mills with Wedge  
Clamp for Negative SNGN 12  
Ceramic Inserts







| Designation         | DC     | DCX <sup>(1)</sup> | APMX | OAL   | CICT <sup>(2)</sup> | DHUB  | DCONMS | Arbor | kg   |
|---------------------|--------|--------------------|------|-------|---------------------|-------|--------|-------|------|
| F45SN D50-05-22-12  | 50.00  | 58.00              | 8.00 | 50.00 | 5                   | 45.00 | 22.00  | A     | 0.78 |
| F45SN D63-06-22-12  | 63.00  | 72.00              | 8.00 | 50.00 | 6                   | 58.00 | 22.00  | A     | 0.93 |
| F45SN D80-08-27-12  | 80.00  | 95.00              | 8.00 | 50.00 | 8                   | 62.00 | 27.00  | A     | 1.21 |
| F45SN D100-10-32-12 | 100.00 | 120.00             | 8.00 | 50.00 | 10                  | 62.00 | 32.00  | A     | 1.66 |
| F45SN D125-13-40-12 | 125.00 | 146.00             | 8.00 | 50.00 | 13                  | 83.00 | 40.00  | A     | 2.80 |

<sup>(1)</sup> Cutting diameter maximum

<sup>(2)</sup> Number of inserts

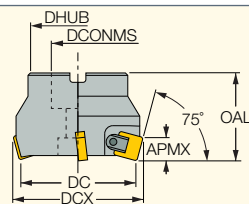
### Spare Parts

| Designation |  |  |  |  |
|-------------|---|---|---|---|
| F45SN       | WS M6X1-L16 R/L   | BLD T15/S7  | SW6-SD  | LW 5225-M5  |



### F75SN

75° Face Mills with Wedge  
Clamp for Negative SNGN 12  
Ceramic Inserts







| Designation         | DC     | DCX <sup>(1)</sup> | CICT <sup>(2)</sup> | APMX  | OAL   | DHUB  | DCONMS | Arbor | kg   |
|---------------------|--------|--------------------|---------------------|-------|-------|-------|--------|-------|------|
| F75SN D50-05-22-12  | 50.00  | 57.00              | 5                   | 12.00 | 50.00 | 45.00 | 22.00  | A     | 0.65 |
| F75SN D63-06-22-12  | 63.00  | 70.00              | 6                   | 12.00 | 50.00 | 58.00 | 22.00  | A     | 0.79 |
| F75SN D80-08-27-12  | 80.00  | 87.00              | 8                   | 12.00 | 50.00 | 62.00 | 27.00  | A     | 1.06 |
| F75SN D100-10-32-12 | 100.00 | 107.00             | 10                  | 12.00 | 50.00 | 62.00 | 32.00  | A     | 1.39 |
| F75SN D125-13-40-12 | 125.00 | 132.00             | 13                  | 12.00 | 50.00 | 83.00 | 40.00  | A     | 2.56 |

<sup>(1)</sup> Cutting diameter maximum

<sup>(2)</sup> Number of inserts

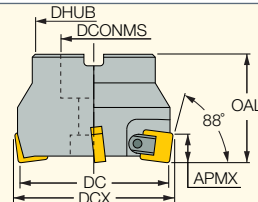
### Spare Parts

| Designation |  |  |  |  |
|-------------|---|---|---|---|
| F75SN       | WS M6X1-L16 R/L   | BLD T15/S7  | SW6-SD  | LW 5225-M5  |



**F88SN**

88° Face Mills with Wedge  
Clamp for Negative SNGN 12  
Ceramic Inserts



| Designation         | DC     | DCX <sup>(1)</sup> | CICT <sup>(2)</sup> | DCONMS | DHUB   | APMX  | OAL   | Arbor | kg   |
|---------------------|--------|--------------------|---------------------|--------|--------|-------|-------|-------|------|
| F88SN D50-05-22-12  | 50.00  | 51.00              | 5                   | 22.00  | 45.00  | 12.00 | 50.00 | A     | 0.65 |
| F88SN D63-06-22-12  | 63.00  | 64.00              | 6                   | 22.00  | 58.00  | 12.00 | 50.00 | A     | 0.79 |
| F88SN D80-08-27-12  | 80.00  | 81.00              | 8                   | 27.00  | 62.00  | 12.00 | 50.00 | A     | 1.06 |
| F88SN D100-10-32-12 | 100.00 | 101.00             | 10                  | 32.00  | 62.00  | 12.00 | 50.00 | A     | 1.39 |
| F88SN D125-13-40-12 | 125.00 | 126.00             | 13                  | 40.00  | 83.00  | 12.00 | 58.00 | A     | 2.56 |
| F88SN D160-16-40-12 | 156.00 | 161.00             | 16                  | 40.00  | 100.00 | 12.00 | 60.00 | A     | 4.10 |

<sup>(1)</sup> Cutting diameter maximum

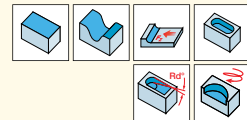
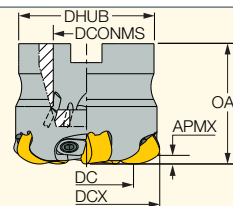
<sup>(2)</sup> Number of inserts

**Spare Parts**

| Designation |                 |            |        |            |
|-------------|-----------------|------------|--------|------------|
| F88SN       | WS M6X1-L16 R/L | BLD T15/S7 | SW6-SD | LW 5225-M5 |

**CERMILL**
**FFN FD-12**

Fast Feed Face Mills Carrying  
Double-Sided Inserts  
with 6 Cutting Edges



| Designation        | DC    | DCX <sup>(1)</sup> | APMX | CICT <sup>(2)</sup> | OAL   | RMPX <sup>(3)</sup> | DHUB  | DCONMS | Rg <sup>(4)</sup> | Arbor | CSP <sup>(5)</sup> | kg   | MIID <sup>(6)</sup> |
|--------------------|-------|--------------------|------|---------------------|-------|---------------------|-------|--------|-------------------|-------|--------------------|------|---------------------|
| FFN FD050-5-22-12F | 32.80 | 50.00              | 2.50 | 5                   | 40.00 | 0.6                 | 45.00 | 22.00  | 4.50              | A     | 1                  | 0.46 | FFN WNGF 1207-E04   |
| FFN FD063-6-22-12F | 45.70 | 63.00              | 2.50 | 6                   | 40.00 | 0.5                 | 47.00 | 22.00  | 4.50              | A     | 1                  | 0.62 | FFN WNGF 1207-E04   |
| FFN FD080-8-27-12F | 62.60 | 80.00              | 2.50 | 8                   | 50.00 | 0.4                 | 70.00 | 27.00  | 4.50              | A     | 1                  | 1.35 | FFN WNGF 1207-E04   |

• To generate a straight surface without cusps, the width of cut must not exceed DC

<sup>(1)</sup> Cutting diameter maximum

<sup>(2)</sup> Number of inserts (or edges for solid tool)

<sup>(3)</sup> Maximum ramping angle

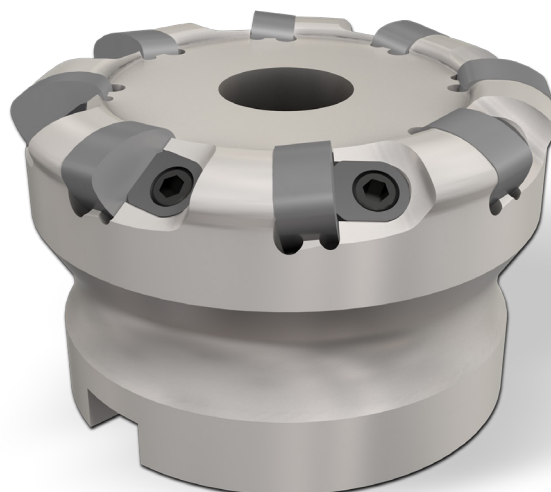
<sup>(4)</sup> Radius for programming

<sup>(5)</sup> 0 - Without coolant supply, 1 - With coolant supply (use only air-coolant is prohibited)

<sup>(6)</sup> Master insert identification

**Spare Parts**

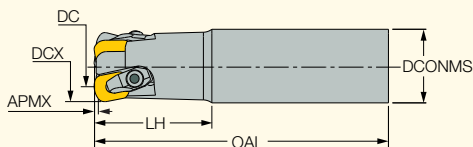
| Designation        |                       |             |          |      |
|--------------------|-----------------------|-------------|----------|------|
| FFN FD050-5-22-12F | SR M10X1.5X30 DIN912  | WEDGE SCREW | LW 1207C | T-W3 |
| FFN FD063-6-22-12F | SR M10X1.5X30 DIN912  | WEDGE SCREW | LW 1207C | T-W3 |
| FFN FD080-8-27-12F | SR M12X1.75X35 DIN912 | WEDGE SCREW | LW 1207C | T-W3 |





**CERAMILL**
**EFN ED-09**

Fast Feed Endmills Carrying  
Double-Sided Inserts  
with 4 Cutting Edges



| Designation            | DC    | DCX <sup>(1)</sup> | APMX | CICT <sup>(2)</sup> | OAL    | RMPX <sup>(3)</sup> | DCONMS | Rg <sup>(4)</sup> | kg   | MIID <sup>(5)</sup> |
|------------------------|-------|--------------------|------|---------------------|--------|---------------------|--------|-------------------|------|---------------------|
| EFN ED25-3-100-C25-09X | 14.80 | 25.00              | 1.50 | 3                   | 100.00 | 1.2                 | 25.00  | 3.40              | 0.34 | EFN WDNX 0904-E04   |
| EFN ED32-3-120-C25-09X | 21.50 | 32.00              | 1.50 | 3                   | 120.00 | 0.6                 | 32.00  | 3.40              | 0.67 | EFN WDNX 0904-E04   |
| EFN ED40-4-120-C32-09X | 29.40 | 40.00              | 1.50 | 4                   | 120.00 | 0.6                 | 32.00  | 3.40              | 0.74 | EFN WDNX 0904-E04   |

- To generate a straight surface without cusps, the width of cut must not exceed DC

<sup>(1)</sup> Cutting diameter maximum

<sup>(2)</sup> Number of inserts (or edges for solid tool)

<sup>(3)</sup> Maximum ramping angle

<sup>(4)</sup> Radius for programming

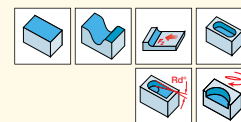
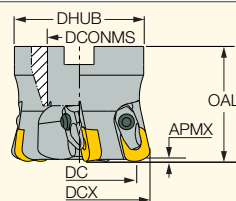
<sup>(5)</sup> Master insert identification

**Spare Parts**

| Designation |        |                           |        |          |
|-------------|--------|---------------------------|--------|----------|
| EFN ED-09   | CCL-3S | CLS-35A120/HG CLAMP SCREW | HW 2.0 | CSR 1.25 |

**CERAMILL**
**EFN FD-09**

Fast Feed Face Mills Carrying  
Double-Sided Inserts  
with 4 Cutting Edges



| Designation       | DC    | DCX <sup>(1)</sup> | APMX | CICT <sup>(2)</sup> | OAL   | RMPX <sup>(3)</sup> | DHUB  | DCONMS | Rg <sup>(4)</sup> | Arbor | CSP <sup>(5)</sup> | kg   | MIID <sup>(6)</sup> |
|-------------------|-------|--------------------|------|---------------------|-------|---------------------|-------|--------|-------------------|-------|--------------------|------|---------------------|
| EFN FD50-5-22-09X | 39.40 | 50.00              | 1.50 | 5                   | 40.00 | 0.5                 | 45.00 | 22.00  | 3.40              | A     | 0                  | 0.43 | EFN WDNX 0904-E04   |

- To generate a straight surface without cusps, the width of cut must not exceed DC

<sup>(1)</sup> Cutting diameter maximum

<sup>(2)</sup> Number of inserts (or edges for solid tool)

<sup>(3)</sup> Maximum ramping angle

<sup>(4)</sup> Radius for programming

<sup>(5)</sup> 0 - Without coolant supply, 1 - With coolant supply (use only air-coolant is prohibited)

<sup>(6)</sup> Master insert identification

**Spare Parts**

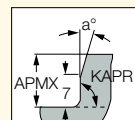
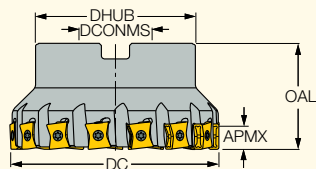
| Designation |                      |        |        |                           |          |
|-------------|----------------------|--------|--------|---------------------------|----------|
| EFN FD-09   | SR M10X1.5X30 DIN912 | HW 2.0 | CCL-3S | CLS-35A120/HG CLAMP SCREW | CSR 1.25 |



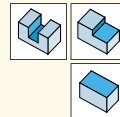



**F90LN-N15**

90° Face Mills Carrying  
LN..1506... Tangentially  
Clamped Inserts



DC=50, a=8°, KAPR=91°  
DC=63, a=6°, KAPR=90°  
DC≥100, a=4.5°, KAPR=90°



| Designation                             | DC     | CICT <sup>(2)</sup> | APMX  | OAL   | DHUB   | DCONMS | Arbor | CSP <sup>(3)</sup> |  |
|---|--------|---------------------|-------|-------|--------|--------|-------|--------------------|---|
| F90LN D050-05-22-R/L-N15                | 50.00  | 5                   | 14.00 | 40.00 | 47.00  | 22.00  | A     | 0                  | 0.33  |
| F90LN D063-05-22-R/L-N15                | 63.00  | 5                   | 14.00 | 40.00 | 59.20  | 22.00  | B     | 0                  | 0.48  |
| F90LN D063-08-22-R/L-N15                | 63.00  | 8                   | 14.00 | 40.00 | 59.20  | 22.00  | B     | 0                  | 0.50  |
| F90LN D080-07-27-L-N15 <sup>(1)</sup>   | 80.00  | 7                   | 14.00 | 50.00 | 70.00  | 27.00  | B     | 0                  | 1.01  |
| F90LN D080-07-27-R-N15 <sup>(1)</sup>   | 80.00  | 7                   | 14.00 | 50.00 | 70.00  | 27.00  | B     | 0                  | 1.02  |
| F90LN D080-10-27-L-N15 <sup>(1)</sup>   | 80.00  | 10                  | 14.00 | 50.00 | 70.00  | 27.00  | B     | 0                  | 1.05  |
| F90LN D080-10-27-R-N15 <sup>(1)</sup>   | 80.00  | 10                  | 14.00 | 50.00 | 70.00  | 27.00  | B     | 0                  | 1.06  |
| F90LN D100-08-32-L-N15 <sup>(1)</sup>   | 100.00 | 8                   | 14.00 | 50.00 | 78.00  | 32.00  | B     | 0                  | 0.50  |
| F90LN D100-08-32-R-N15 <sup>(1)</sup>   | 100.00 | 8                   | 14.00 | 50.00 | 78.00  | 32.00  | B     | 0                  | 1.52  |
| F90LN D100-12-32-L-N15 <sup>(1)</sup>   | 100.00 | 12                  | 14.00 | 50.00 | 78.00  | 32.00  | B     | 0                  | 1.59  |
| F90LN D100-12-32-R-N15 <sup>(1)</sup>   | 100.00 | 12                  | 14.00 | 50.00 | 78.00  | 32.00  | B     | 0                  | 1.60  |
| F90LN D125-09-40-R/L-N15 <sup>(1)</sup> | 125.00 | 9                   | 14.00 | 63.00 | 95.00  | 40.00  | B     | 0                  | 2.95  |
| F90LN D125-15-40-L-N15 <sup>(1)</sup>   | 125.00 | 15                  | 14.00 | 63.00 | 95.00  | 40.00  | B     | 0                  | 3.06  |
| F90LN D125-15-40-R-N15 <sup>(1)</sup>   | 125.00 | 15                  | 14.00 | 63.00 | 95.00  | 40.00  | B     | 0                  | 3.07  |
| F90LN D160-10-40-L-N15                  | 160.00 | 10                  | 14.00 | 63.00 | 120.00 | 40.00  | C     | 0                  | 4.30  |
| F90LN D160-10-40-R-N15                  | 160.00 | 10                  | 14.00 | 63.00 | 120.00 | 40.00  | C     | 0                  | 4.29  |
| F90LN D160-20-40-L-N15                  | 160.00 | 20                  | 14.00 | 63.00 | 120.00 | 40.00  | C     | 0                  | 4.48  |
| F90LN D160-20-40-R-N15                  | 160.00 | 20                  | 14.00 | 63.00 | 120.00 | 40.00  | C     | 0                  | 4.50  |
| F90LN D200-12-60-L-N15                  | 200.00 | 12                  | 14.00 | 63.00 | 135.00 | 60.00  | C     | 0                  | 6.67  |
| F90LN D200-12-60-R-N15                  | 200.00 | 12                  | 14.00 | 63.00 | 135.00 | 60.00  | C     | 0                  | 6.64  |
| F90LN D250-15-60-R-N15                  | 250.00 | 15                  | 14.00 | 63.00 | 150.00 | 60.00  | C     | 0                  | 10.39   |





• Left-hand cutters are designated by a red groove

<sup>(1)</sup> For internal coolant through the holder, use a matching coolant set (should be ordered separately)

<sup>(2)</sup> Number of inserts (or edges for solid tool)

<sup>(3)</sup> 0 - Without coolant supply, 1 - With coolant supply

**Spare Parts**

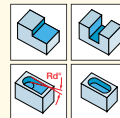
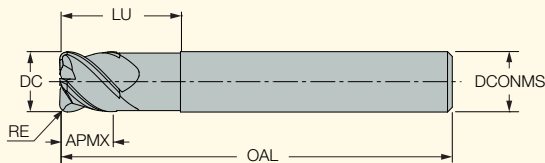
| Designation              |  |  |  |  |
|--------------------------|---|---|---|---|
| F90LN D050-05-22-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  | SR M10X25 DIN912  |
| F90LN D063-05-22-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D063-08-22-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D080-07-27-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D080-10-27-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D100-08-32-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D100-12-32-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D125-09-40-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D125-15-40-L-N15   | SR 34-535   | SW6-T   | BLD T15/M7  |   |
| F90LN D125-15-40-R-N15   | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D160-10-40-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D160-20-40-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D200-12-60-R/L-N15 | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |
| F90LN D250-15-60-R-N15   | SR 34-535   | SW6-T-SH  | BLD T15/M7  |   |





### EC-E4 (CER)

Solid Ceramic Endmills with 4  
Flutes for Machining  
Nickel-Based Alloy Materials



| Designation               | Dimensions |      |       |       |        |      |                    |                      |                      |                    | IS45 |
|---------------------------|------------|------|-------|-------|--------|------|--------------------|----------------------|----------------------|--------------------|------|
|                           | DC         | APMX | LU    | OAL   | DCONMS | RE   | NOF <sup>(1)</sup> | RMPX <sup>o(2)</sup> | Shank <sup>(3)</sup> | CSP <sup>(4)</sup> |      |
| EC-E4 08-060/16R1N60CE    | 8.00       | 6.00 | 16.00 | 60.00 | 8.00   | 1.00 | 4                  | 1.5                  | C                    | 0                  | ●    |
| EC-E4 10-075/20R1.25N65CE | 10.00      | 7.50 | 20.00 | 65.00 | 10.00  | 1.25 | 4                  | 1.5                  | C                    | 0                  | ●    |
| EC-E4 12-09/2024R1.5N70CE | 12.00      | 9.00 | 24.00 | 70.00 | 12.00  | 1.50 | 4                  | 1.5                  | C                    | 0                  | ●    |

<sup>(1)</sup> Number of flutes

<sup>(2)</sup> Maximum ramping angle

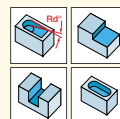
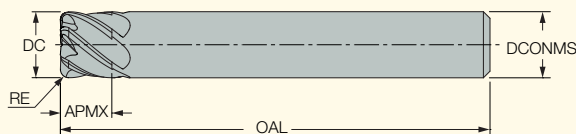
<sup>(3)</sup> C-Cylindrical

<sup>(4)</sup> 0 - Without coolant supply, 1 - With coolant supply



### EC-E6 (CER)

Solid Ceramic Endmills with 6  
Flutes for Machining Nickel-  
Based Alloy Materials



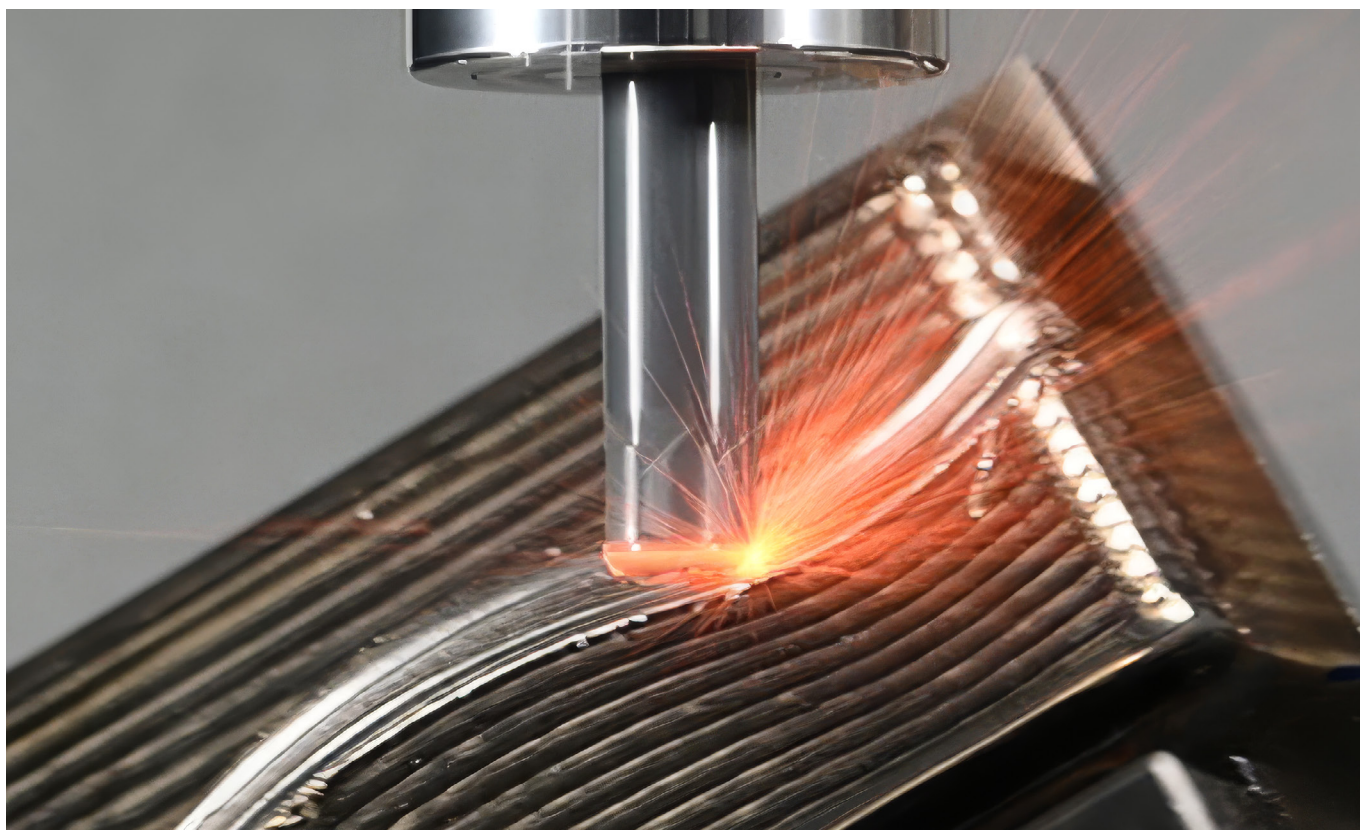
| Designation             | Dimensions |      |       |        |      |                    |                      |                      |                    | IS45 |
|-------------------------|------------|------|-------|--------|------|--------------------|----------------------|----------------------|--------------------|------|
|                         | DC         | APMX | OAL   | DCONMS | RE   | NOF <sup>(1)</sup> | RMPX <sup>c(2)</sup> | Shank <sup>(3)</sup> | CSP <sup>(4)</sup> |      |
| EC-E6 08-060-R1N60CE    | 8.00       | 6.00 | 60.00 | 8.00   | 1.00 | 6                  | 1.5                  | C                    | 0                  | ●    |
| EC-E6 10-075-R1.25N65CE | 10.00      | 7.50 | 65.00 | 10.00  | 1.25 | 6                  | 1.5                  | C                    | 0                  | ●    |
| EC-E6 12-09-R1.5N70CE   | 12.00      | 9.00 | 70.00 | 12.00  | 1.50 | 6                  | 1.5                  | C                    | 0                  | ●    |

<sup>(1)</sup> Number of flutes

<sup>(2)</sup> Maximum ramping angle

<sup>(3)</sup> C-Cylindrical

<sup>(4)</sup> 0 - Without coolant supply, 1 - With coolant supply





## **ISCAR LTD.**

### **Israel**

#### **Headquarters**

Tel +972 (0)4 997 0311  
Fax+972 (0)4 987 3741  
headquarter@iscar.co.il

### **Argentina**

ISCAR TOOLS ARGENTINA SA

Tel +54 114 912 2200  
Fax+54 114 912 4411  
admin@iscararg.com.ar

### **Australia**

ISCAR AUSTRALIA PTY. LTD

Tel +61 (0) 2 8848 3500  
Fax+61 (0) 2 8848 3511  
iscaraus@iscar.com.au

### **Austria**

ISCAR AUSTRIA GmbH

Tel +43 7252 71200-0  
Fax+43 7252 71200-999  
office@iscar.at

### **Belarus**

JV ALC "TWINING-M"

Tel +375 17 506-32-38  
+375 17 506-33-31/65  
Tel/Fax +375 17 506-32-37  
info@twing.by  
www.twing.by

### **Belgium**

n.v. ISCAR Benelux s.a.

Tel +32 (0) 2 464 2020  
Fax+32 (0) 2 522 5121  
info@iscar.be

### **Bosnia**

(Representative Office)

Tel +387 32 201 100  
Fax+387 32 201 101  
info@iscar.ba

### **Brazil**

Iscar do Brasil Coml. Ltda.

Tel +55 19 3826-7100  
Fax+55 19 3826-7171  
DDG 0800 701 8877  
iscar@iscarbrasil.com.br

### **Bulgaria**

ISCAR BULGARIA

Tel/Fax +359 431 62557  
aa\_iscar@infotel.bg

### **Canada**

ISCAR TOOLS INC.

Tel +1 905 829 9000  
Fax+1 905 829 9100  
admin@iscar.ca

### **Chile**

J&A INTERNATIONAL

Tel +56 2 2232 5838  
amedina@jya.cl  
www.jya.cl

### **China**

ISCAR CHINA

Tel +86 21 8024 8888  
iscar@iscar.com.cn

### **Colombia**

ISCAR Andina

Tel +57 310 380 9932  
Tel/fax +57 1 896 65 78  
iscar@iscar.com.co

### **Croatia**

ISCAR ALATI d.o.o.

Tel +385 (0) 1 33 23 301  
Fax+385 (0) 1 33 76 145  
podrska@iscar.hr

### **Cyprus**

WAMET (Demetriades) Ltd.

Tel +357 (0) 2 336660/5498  
Fax+357 (0) 2 333386  
wamet@cytanet.com.cy

### **Czech Republic**

ISCAR CR s.r.o.

Tel +420 377 420 625  
Fax+420 377 420 630  
iscar@iscar.cz

### **Denmark**

KJ VAERKTOEJ AS/ISCAR DENMARK

Tel +45 70 11 22 44  
Fax+45 46 98 67 10  
kj@kj.dk

### **Ecuador**

ISCAR Andina

Tel/fax +57 1 821 93 38  
iscar@iscar.com.co  
atencioncliente@iscar.com.co

### **Estonia**

KATOMSK AS

Tel +372 6775 671  
Fax+372 6720 266  
aleksei@katomsk.ee

### **Finland**

ISCAR FINLAND OY

Tel +358-(0)9-439 1420  
Fax+358-(0)9-466 328  
info@iscar.fi

### **France**

ISCAR FRANCE SAS

Tel +33 (0)1 30 12 92 92  
Fax+33 (0)1 30 12 95 82  
info@iscar.fr

### **Germany**

ISCAR Germany GmbH

Tel +49 (0) 72 43 9908-0  
Fax+49 (0) 72 43 9908-93  
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Fax+85-2-27988789  
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### **Hungary**

ISCAR HUNGARY KFT.

Tel +36 28 887 700  
Fax+36 28 887 710  
iscar@iscar.hu

### **India**

ISCAR India Ltd.

Tel +91 77009 63707  
sales@iscar.in

### **Indonesia**

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Tel +62-21-29206242/44/45/59  
Fax+62-21-29206243  
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### **Ireland**

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### **Italy**

ISCAR ITALIA srl

Tel +39 02 93 528 1  
Fax+39 02 93 528 213  
marketing@iscaritalia.it

### **Japan**

ISCAR JAPAN LTD.

Tel +81 6 6835 5471  
Fax+81 6 6835 5472  
iscar@iscar.co.jp

### **Latvia**

MECHA, UAB

Tel +370 37 407 230  
Fax+370 37 407 231  
info@mecha.lt

### **Lithuania**

MECHA, UAB

Tel +370 37 407 230  
Fax+370 37 407 231  
sigitas@mecha.lt

### **Mexico**

ISCAR DE MÉXICO

Tel +52 (442) 214 5505  
Fax+52 (442) 214 5510  
iscarmex@iscar.com.mx

### **The Netherlands**

ISCAR NEDERLAND B.V.

Tel +31 (0) 182 535523  
Fax+31 (0) 182 572777  
info@iscar.nl

### **New Zealand**

ISCAR PACIFIC LTD.

Tel +64 (0) 9 573 1280  
Fax+64 (0) 9 573 0781  
iscar@iscarpac.co.nz

### **North Macedonia**

(Representative Office)

Tel +389 2 309 02 52  
Fax+389 2 309 02 54  
info@iscar.com.mk

### **Norway**

SVEA MASKINER AS

Tel +47 32277750  
Fax+47 32277751  
per.martin.bakken@svea.no

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HARTMETALL SAC

Tel: (511) 6612699  
otorres@hartmetallgroup.com

### **Philippines**

MESCO

Tel +63 2631 1775  
Fax+63 2635 0276  
mesco@mesco.com.ph

### **Poland**

ISCAR POLAND Sp. z o.o.

Tel +48 32 735 7700  
Fax+48 32 735 7701  
iscar@iscar.pl

### **Portugal**

ISCAR Portugal, SA

Tel +351 256 579950  
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info@iscarportugal.pt

### **Romania**

ISCAR Tools SRL

Tel +40 (0)312 286 614  
Fax+40 (0)312 286 615  
iscar-romania@iscar.com

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leeyj@taegutec.co.kr

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Tel +34 93 594 6484  
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Fax+41 (0) 52 728 0855  
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Tel +886 (0)4-24731573  
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iscar.taiwan@msa.hinet.net

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iscar@iscarthailand.com

### **Turkey**

ISCAR Kesici Takim

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### **Ukraine**

ISCAR UKRAINE LLC

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info@iscar.com.ua

### **United Arab Emirates**

ISCAR GULF TRADING LLC

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www.svrs-mena.com

### **United Kingdom**

ISCAR TOOLS LTD.

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### **United States**

ISCAR USA

Arlington  
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Arlington, TX 76018  
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usmarketing@iscarusa.com

### **Charlotte**

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Charlotte, NC 28273  
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usmarketing@iscarusa.com

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Fax+58 2 632 5277  
iso-din@cantv.net

### **Vietnam**

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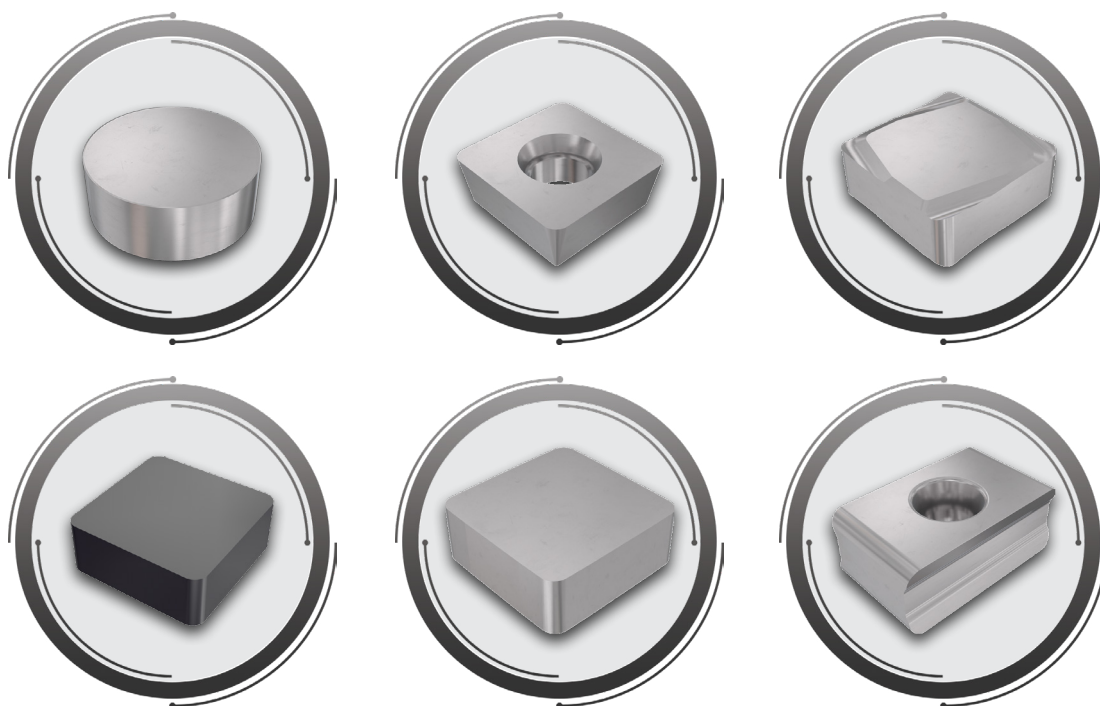
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