Insert Selection

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### Selection of Sumitomo Grades (Turning)

According to Work Materials and Applications

#### General Steel (Carbon Steel, Alloy Steel), Soft Steel

<table>
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<tr>
<th>ISO Classification</th>
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#### Sintered Components

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<td>Carbide</td>
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#### Insert Selection

- 1st Recommendation
- 2nd Recommendation
- CVD Coating
- PVD Coating
- Blank: Uncoated

### Cutting Process

- High-Speed
- Finishing to Light
- Medium
- Rough to Heavy
- Wear Resistance
- Fracture Resistance

### ISO Classification

- General Steel (Carbon Steel, Alloy Steel), Soft Steel
- Stainless Steel
- Cast Iron
- Exotic Alloy
- Hardened Steel
- Non-Ferrous Metal
- Sintered Components
According to Work Materials and Applications

### Selection of Sumitomo Grades (Milling)

#### ISO Classification

<table>
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<tr>
<th>Cutting Process</th>
<th>General Steel (Carbon Steel, Alloy Steel), Soft Steel</th>
<th>Stainless Steel</th>
<th>Cast Iron</th>
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<td>M01, M10, M20, M30, M40</td>
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</table>

#### Coated Carbide

- ACP100
- ACP200
- ACP300

#### Cermet

- T250A
- T450A

#### Carbid

- A30N

#### Uncoated CBN

- Coated CBN

#### Exotic Alloy

- ACM100
- ACM200
- ACM300

#### Hardened Steel

- EH520

#### Non-Ferrous Metal

- BN7000

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**Notes:**
- 1st Recommendation
- 2nd Recommendation
- CVD Coating
- PVD Coating
- Blank: Uncoated
Turning Insert Selection Guide

**Main Chipbreakers**

**Negative Type**

![Diagram of Negative Type Chipbreakers]

**Positive Type**

![Diagram of Positive Type Chipbreakers]

**Sub-Chipbreakers**

**Negative Type**

- Chipbreakers for High-Efficiency Machining
- Chipbreakers for Small Depths
- Wiper Inserts

**Strong Edge Chipbreakers**

- Chipbreakers for Heavy Cutting

**Grades**

- **● Finishing to Finishing**
- **● Finishing to Rough Cutting**

![Chart of Cutting Speed vs. Tool Life for Finishing and Roughing]
### Recommended Cutting Conditions

<table>
<thead>
<tr>
<th>Work Material</th>
<th>Cutting Process</th>
<th>Chipbreaker</th>
<th>Grade</th>
<th>Depth of Cut (mm)</th>
<th>Feed Rate (mm/rev)</th>
<th>Cutting Speed (mm/min)</th>
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<tbody>
<tr>
<td><strong>Soft Steel</strong></td>
<td>Fine Finishing</td>
<td>NFL</td>
<td>T1500Z</td>
<td>0.2-0.6-1.0</td>
<td>0.05-0.15-0.25</td>
<td>100-250-400</td>
</tr>
<tr>
<td></td>
<td>Finishing</td>
<td>NSE</td>
<td>AC805P</td>
<td>0.5-1,0-1,5</td>
<td>0.1-0.25-0.4</td>
<td>260-340-420</td>
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<tr>
<td></td>
<td>Medium Cutting</td>
<td>NLU</td>
<td>AC810P</td>
<td>1,0-2.5-4.0</td>
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<td>Roughing</td>
<td>NGU</td>
<td>AC8025P</td>
<td>2.0-4.0-6.0</td>
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<td>140-180-220</td>
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<td>NFL</td>
<td>T1500Z</td>
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<td>0.05-0.15-0.25</td>
<td>100-200-300</td>
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<tr>
<td></td>
<td>Finishing</td>
<td>NSE</td>
<td>AC805P</td>
<td>0.5-1.0-1.5</td>
<td>0.1-0.25-0.4</td>
<td>210-275-340</td>
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<td>AC810P</td>
<td>1.0-2.5-4.0</td>
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<td>150-190-230</td>
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<td>2.0-4.0-6.0</td>
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<td>110-135-160</td>
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<tr>
<td><strong>High Carbon Steel</strong></td>
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<td>NFL</td>
<td>T1500Z</td>
<td>0.2-0.6-1.0</td>
<td>0.05-0.15-0.25</td>
<td>50-150-250</td>
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<tr>
<td></td>
<td>Finishing</td>
<td>NSE</td>
<td>AC805P</td>
<td>0.5-1.0-1.5</td>
<td>0.1-0.25-0.4</td>
<td>170-225-280</td>
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<tr>
<td></td>
<td>Medium Cutting</td>
<td>NLU</td>
<td>AC810P</td>
<td>1.0-2.5-4.0</td>
<td>0.2-0.35-0.5</td>
<td>130-165-200</td>
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<td>Roughing</td>
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<td>AC8025P</td>
<td>2.0-4.0-6.0</td>
<td>0.3-0.45-0.6</td>
<td>90-120-150</td>
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#### Shared Features of the High Efficiency Chipbreaker Series

- **Application Range**
  - Rake face profile relieves stress concentration with smooth chip evacuation.
  - Limited chip contact area increases stress and causes insert damage.
- **Characteristics**
  - Conventional chip flow
  - Chip flow by NSE, NGE, and NME

![Rake face profile diagram](image_url)
Recommended Carbide Grades

**Grades**

**AC805P / AC810P / AC820P / AC8025P / AC830P / AC1030U**

AC800P Series covers a wide range of machining applications from high speed to interrupted cutting.

- All grades feature Super FF Coat, which has excellent wear and chipping resistance.
- Versatile GE Type chipbreaker suited to high-feed applications. High efficiency, long tool life.

**AC805P:**
The ultra-thick alumina coating achieves excellent wear resistance at high speed cutting above 300 m/min under dry cutting conditions.

**AC810P:**
In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a tough, thick Alumina coating enhanced by newly developed grain growth control technology, excellent wear resistance and long tool life in high-speed, high-feed cutting.

**AC820P:**
In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a high-density structured FF-Al₂O₃ layer using new smooth surface treatment technology, and also employs coating thickness control technology to achieve excellent versatility, stability, and long tool life.

**AC8025P:**
Employs Absotech Platinum, a new CVD coating. This grade has excellent adhesion and chipping resistance thanks to the smooth surface treatment and reduction in tensile stress of the coating to achieve a stable, long tool life.

**AC830P:**
In addition to FF-TiCN, which has excellent peel-off and wear resistance, this grade features a strengthened FF-Al₂O₃ layer using new stress control technology, and moreover provides excellent reliability and wear resistance in heavy interrupted cutting to achieve long tool life.

**AC1030U:**
Employs Absotech Bronze, a new PVD coating and exclusive tough carbide substrate. This grade reduces adhesion and microchipping with a high-quality cutting edge to achieve excellent machined surface quality.

**Performance**

**AC8025P**

- **Wear Resistance (Medium-Speed v_c=200m/min)**

  Excellent wear resistance in medium-speed cutting.

  ![Wear Resistance Graph](image)

  Work Material: 34CrMo4, Toolholder: PCLNR2525M12, Insert: CNMG120408NSE

  Cutting Conditions: v_c=200m/min, f=0.2mm/rev, a_p=1.5mm, Wet

  ![Wear Resistance Images](image)

- **Adhesion and Chipping Resistance**

  Greatly improved adhesion and chipping resistance with an advanced coating and smooth surface treatment.

  ![Chipping Resistance Graph](image)

  Work Material: 15CrMo5, Toolholder: PCLNR2525M12, Insert: CNMG120408NGU

  Cutting Conditions: v_c=300m/min, f=0.3mm/rev, a_p=1.5mm, Wet

  ![Chipping Resistance Images](image)
### T1000A / T1500A / T1500Z

**T1000A**
An uncoated cermet grade designed with wear resistance in mind that provides long tool life and excellent wear resistance in continuous finishing and profiling applications.

**T1500A**
A general purpose uncoated cermet grade that provides excellent value for money and delivers improved finished surface quality while providing good wear and fracture resistance.

**T1500Z**
Superior turning quality thanks to "Brilliant Coat". PVD coating with excellent adhesion resistance. A general purpose coated cermet grade capable of maintaining high-quality finished surfaces while providing excellent wear resistance.

### Performance

#### T1000A

- **Wear Resistance**
  - Exhibits excellent wear resistance.
  - **Work Material:** 34CrMo4, Insert: CNMG120408NSU
  - Cutting Conditions: \( v_c = 230 \text{m/min}, f = 0.20 \text{mm/rev}, a_p = 1.5 \text{mm}, \text{Dry} \)

#### T1500A

- **Wear Resistance**
  - 1.5 times better wear resistance!
  - **Work Material:** 34CrMo4, Insert: CNMG120408NSU
  - Cutting Conditions: \( v_c = 230 \text{m/min}, f = 0.20 \text{mm/rev}, a_p = 1.0 \text{mm}, \text{Wet} \)

#### T1500Z

- **Wear Resistance**
  - Reduces cloudy finish on machined surfaces.
  - **Work Material:** 34CrMo4, Insert: CNMG120408NSU
  - Cutting Conditions: \( v_c = 230 \text{m/min}, f = 0.20 \text{mm/rev}, a_p = 1.0 \text{mm}, \text{Wet} \)

### Recommended Cermet Grades

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<th>Cutting Time</th>
<th>Flank Wear Width (mm)</th>
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**Recommended Cutting Conditions**

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<tr>
<td>Soft Steel</td>
<td>Fine Finishing</td>
<td>NFA / NFL</td>
<td>T1500Z</td>
<td>0.2-0.5-1.0</td>
<td>0.05-0.15-0.25</td>
<td>150-280-400</td>
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<td>Finishing</td>
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<td>T3000Z</td>
<td>0.3-1.0-1.8</td>
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<td>0.08-0.20-0.35</td>
<td>100-200-300</td>
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<td>NGU</td>
<td>T1500Z</td>
<td>0.8-2.2-4.0</td>
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<tr>
<td>High Carbon Steel</td>
<td>Fine Finishing</td>
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<td>T1500A</td>
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<td>0.15-0.25-0.50</td>
<td>50-150-250</td>
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*T1000A: An uncoated cermet grade designed with wear resistance in mind that provides long tool life and excellent wear resistance in continuous finishing and profiling applications.*

*T1500A: A general purpose uncoated cermet grade that provides excellent value for money and delivers improved finished surface quality while providing good wear and fracture resistance.*

*T1500Z: Superior turning quality thanks to ‘Brilliant Coat’. PVD coating with excellent adhesion resistance. A general purpose coated cermet grade capable of maintaining high-quality finished surfaces while providing excellent wear resistance.*

---

**Recommended Cermet Grades**

**Steel**

<table>
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<th>Cutting Time</th>
<th>Flank Wear Width (mm)</th>
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<td>0.10</td>
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**Recommended Cutting Conditions**

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<th>Grades</th>
<th>Depth of Cut (mm)</th>
<th>Feed Rate (mm/rev)</th>
<th>Cutting Speed (m/min)</th>
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<tr>
<td>Soft Steel</td>
<td>Fine Finishing</td>
<td>NFA / NFL</td>
<td>T1500Z</td>
<td>0.2-0.5-1.0</td>
<td>0.05-0.15-0.25</td>
<td>150-280-400</td>
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<tr>
<td></td>
<td>Finishing</td>
<td>NLU</td>
<td>T3000Z</td>
<td>0.3-1.0-1.8</td>
<td>0.08-0.20-0.35</td>
<td>150-280-400</td>
</tr>
<tr>
<td>Alloy Steel</td>
<td>Fine Finishing</td>
<td>NFA / NFL</td>
<td>T1500A</td>
<td>0.2-0.5-1.0</td>
<td>0.05-0.15-0.25</td>
<td>100-200-300</td>
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<tr>
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<td>0.08-0.20-0.35</td>
<td>100-200-300</td>
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<tr>
<td></td>
<td>Medium</td>
<td>NGU</td>
<td>T1500Z</td>
<td>0.8-2.2-4.0</td>
<td>0.15-0.25-0.50</td>
<td>50-150-250</td>
</tr>
<tr>
<td>High Carbon Steel</td>
<td>Fine Finishing</td>
<td>NFA / NFL</td>
<td>T1500A</td>
<td>0.2-0.5-1.0</td>
<td>0.05-0.15-0.25</td>
<td>50-150-250</td>
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<tr>
<td>Carbon Steel</td>
<td>Finishing</td>
<td>NSU / NSE</td>
<td>T1500Z</td>
<td>0.5-1.0-2.0</td>
<td>0.08-0.20-0.35</td>
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<td>Medium</td>
<td>NGU</td>
<td>T1500Z</td>
<td>0.8-2.2-4.0</td>
<td>0.15-0.25-0.50</td>
<td>50-150-250</td>
</tr>
</tbody>
</table>
### Stainless Steel

#### Turning Insert Selection Guide

**Chipbreakers**

**Negative Type**
- **NEM** (NMU)
- **NEX**
- **NGU**

**Positive Type**
- **NMU**
- **NSU**
- **NLU**
- **NLB**

### Grades

#### Cutting Conditions

<table>
<thead>
<tr>
<th>Work Material</th>
<th>Cutting Range</th>
<th>Chipbreaker</th>
<th>Grade</th>
<th>Cutting Conditions</th>
<th>Depth of Cut $a_p$ (mm)</th>
<th>Feed Rate $f$ (mm/rev)</th>
<th>Cutting Speed $v_c$ (m/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferritic</td>
<td></td>
<td></td>
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<tr>
<td>X6CrAl 13, X8CrNiS 18 9, X29Cr/k 13, X6CrMoS 17, X12CrS 13</td>
<td>Finishing</td>
<td>NEG (NSU)</td>
<td>AC6020M</td>
<td>0.5-1.5, 2.0</td>
<td>100-150 &amp; 140-170-200</td>
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<td>Medium</td>
<td>NEM</td>
<td>AC6030M</td>
<td>1.0-2.5, 4.0</td>
<td>100-150 &amp; 140-170-200</td>
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<tr>
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<td>Roughing</td>
<td>NEM</td>
<td>AC6040M</td>
<td>1.5-3.5, 6.0</td>
<td>100-150 &amp; 140-170-200</td>
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<td>Martensitic</td>
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<td>X12Cr 13, X20Cr 13, X30Cr 13, X6Cr 17, X18NiCr 17.2, X6CrNi 18 9</td>
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<td>100-150 &amp; 140-170-200</td>
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<td>1.0-2.5, 4.0</td>
<td>100-150 &amp; 140-170-200</td>
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<td>100-150 &amp; 140-170-200</td>
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<td>Austenitic</td>
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<td>Materials</td>
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<td>X2CrNi 17 7, X2CrNi 18 9, X10NiCrMo 18 12 2, X2CrNiMN 12 17 2, X10NiCrMo 18 10</td>
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<td>100-150 &amp; 140-170-200</td>
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<td>Two-Phase</td>
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<td>Ferrite)</td>
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<td>X2CrNiMo 17 7 7, X2CrNiMo 18 9, X10NiCrMo 18 12 2, X2CrNiMo 18 12 2</td>
<td>Finishing</td>
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<td>0.5-1.5, 2.0</td>
<td>100-150 &amp; 140-170-200</td>
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<td>Medium</td>
<td>NEM</td>
<td>AC6030M</td>
<td>1.0-2.5, 4.0</td>
<td>100-150 &amp; 140-170-200</td>
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<td>Roughing</td>
<td>NEM</td>
<td>AC6040M</td>
<td>1.5-3.5, 6.0</td>
<td>100-150 &amp; 140-170-200</td>
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<td>Precipitation</td>
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<td>Hardening</td>
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<td>XCrNiCuNb 16 4, X7CrNiAl 17 7, X6CrNiMo 27 5 2, X2CrNiMo 22 5 3, X2CrNiMoCu 25 6 3</td>
<td>Finishing</td>
<td>NEG (NSU)</td>
<td>AC6020M</td>
<td>0.5-1.5, 2.0</td>
<td>100-150 &amp; 140-170-200</td>
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<td>Medium</td>
<td>NEM</td>
<td>AC6030M</td>
<td>1.0-2.5, 4.0</td>
<td>100-150 &amp; 140-170-200</td>
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<td>Roughing</td>
<td>NEM</td>
<td>AC6040M</td>
<td>1.5-3.5, 6.0</td>
<td>100-150 &amp; 140-170-200</td>
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</tbody>
</table>
AC6020M: Employes "Absotech Platinum", a new CVD coating. The first recommended grade for continuous stainless steel machining that achieves a good balance between wear resistance and fracture resistance by combining a hardened substrate with excellent wear resistance.

AC6030M: Employes "Absotech Platinum", a new CVD coating. The first recommended grade for general machining of stainless steel that drastically reduces the occurrence of abnormal damage, which is a problem in stainless steel machining. Achieves long and stable machining thanks to the improved coating strength and excellent adhesion.

AC6040M: Employes "Absotech Bronze", a new PVD coating and exclusive tough carbide substrate. The first recommended grade for interrupted machining of stainless steel that drastically improves the reliability in unstable machining thanks to the excellent adhesion and peel-off resistance of the new PVD coating as well as the improved fracture resistance of the exclusive carbide substrate.


**Performance**

**AC6030M**

- **Continuous Cutting**
  - Work Material: X6CrMo17 12 2  Insert: CNMG 120408 NEX
  - Cutting Conditions: $v_c = 200$ m/min, $f = 0.2$ mm/rev, $d_a = 2.0$ mm, Wet

- **Interrupted Cutting**
  - Work Material: X6CrMo17 12 2  Insert: CNMG 120408 NGU
  - Cutting Conditions: $v_c = 100$ m/min, $f = 0.1$ mm/rev, $d_a = 1.0$ mm, Wet

**AC6040M**

- **Continuous Cutting**
  - Work Material: X6CrMo17 12 2  Insert: CNMG 120408 NGU
  - Cutting Conditions: $v_c = 150$ m/min, $f = 0.2$ mm/rev, $d_a = 2.0$ mm, Wet

- **Interrupted Cutting**
  - Work Material: CNMG 120408 NGU  Insert: CNMG 120408 NGU
  - Cutting Conditions: $v_c = 230$ m/min, $f = 0.23$ mm/rev, $d_a = 0.80$ mm, Dry
**Recommended Cutting Conditions**

<table>
<thead>
<tr>
<th>Applications</th>
<th>Cutting Process</th>
<th>Chipbreakers</th>
<th>Grades</th>
<th>GG (Grey Cast Iron)</th>
<th>GGG (Ductile Cast Iron)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Feed Rate (mm/rev)</td>
<td>Feed Rate (mm/rev)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Cutting Speed (m/min)</td>
<td>Cutting Speed (m/min)</td>
</tr>
<tr>
<td>High Speed Cutting</td>
<td>Continuous</td>
<td>–</td>
<td>BN7000</td>
<td>0,1-0,20-0,5</td>
<td>0,1-0,20-0,4</td>
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<tr>
<td></td>
<td>General</td>
<td>BNC500</td>
<td>500-1.500-2.000</td>
<td>250-350-500</td>
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<tr>
<td>Finishing</td>
<td>Continuous</td>
<td>NUR</td>
<td>AC405K</td>
<td>0,1-0,25-0,4</td>
<td>0,1-0,25-0,4</td>
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<tr>
<td></td>
<td>General</td>
<td>NUR</td>
<td>AC415K</td>
<td>230-400-570</td>
<td>170-350-500</td>
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<tr>
<td></td>
<td>Interrupted</td>
<td>NUR</td>
<td>AC415K</td>
<td>200-350-500</td>
<td>150-300-450</td>
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<tr>
<td>Light Interrupted</td>
<td>Continuous</td>
<td>NGZ</td>
<td>AC405K</td>
<td>0,1-0,30-0,5</td>
<td>0,1-0,30-0,5</td>
</tr>
<tr>
<td></td>
<td>General</td>
<td>NGZ</td>
<td>AC415K</td>
<td>150-275-400</td>
<td>150-250-350</td>
</tr>
<tr>
<td></td>
<td>Interrupted</td>
<td>NGZ</td>
<td>AC420K</td>
<td>100-200-300</td>
<td>80-150-220</td>
</tr>
<tr>
<td>Medium</td>
<td>Continuous</td>
<td>NGZ</td>
<td>AC415K</td>
<td>170-315-460</td>
<td>170-285-400</td>
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<tr>
<td></td>
<td>General</td>
<td>AC415K</td>
<td>150-275-400</td>
<td>150-250-350</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interrupted</td>
<td>AC420K</td>
<td>100-200-300</td>
<td>80-150-220</td>
<td></td>
</tr>
<tr>
<td>Roughing</td>
<td>Continuous</td>
<td>NGZ</td>
<td>AC415K</td>
<td>0,1-0,30-0,5</td>
<td>0,1-0,30-0,5</td>
</tr>
<tr>
<td></td>
<td>General</td>
<td>AC420K</td>
<td>150-275-400</td>
<td>150-250-350</td>
<td></td>
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<tr>
<td></td>
<td>Interrupted</td>
<td>–</td>
<td>AC420K</td>
<td>100-200-300</td>
<td>80-150-220</td>
</tr>
</tbody>
</table>

*(Min. - Optimum - Max.)*
Recommended Grades and Chipbreakers

**Grades**

**AC405K / AC415K / AC420K**

- **AC405K**: Suitable for high-speed continuous cutting. Excellent resistance to wear and plastic deformation.
- **AC415K**: First recommended grade for cast iron turning. Provides stability and long tool life in a wide range of processes.
- **AC420K**: Superior fracture resistance provides excellent stability in interrupted unstable cutting and when cutting mill-scaled work.

- Improvements to super FF-TiCN coating grain and hardness provide significantly improved wear resistance.
  Newly developed stress control technology enhances micro-grained α-Alumina (FF-Al₂O₃) coating for superior reliability.

- **Coating Structure**
  
  - Micro-grained α-Alumina (FF-Al₂O₃)
    - Improved adhesion and peel-off resistance.
  
  - Super FF-TiCN
    - Ultra-fine grained, ultra-hard TiCN coating increases wear resistance 1.5 times.

**AC405K / AC415K Wear Resistance**

<table>
<thead>
<tr>
<th>Cutting Speed</th>
<th>Tool Life sec.</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC405K</td>
<td>600</td>
</tr>
<tr>
<td>AC415K</td>
<td>500</td>
</tr>
</tbody>
</table>

Work Material: GGG-40,3 (Round Bar)
Insert: CNMG120408
Cutting Conditions: \( v_c = 200 \sim 400 \text{ m/min} \), \( f = 0.30 \text{ mm/rev} \), \( d_{oc} = 1.5 \text{ mm} \), Wet

**AC415K Chipping Resistance**

![Graph showing chipping resistance improvement](image)

- Chipping resistance improved 1.5 times

Work Material: GGG-40,3
Insert: CNMG120408
Cutting Conditions: \( v_c = 300 \text{ m/min} \), \( f = 0.25 \text{ mm/rev} \), \( d_{oc} = 1.5 \text{ mm} \), Wet

**AC420K Fracture Resistance**

![Graph showing fracture resistance](image)

- Great improvement in fracture resistance

Work Material: GGG-40,3
Toolholder: PCLNR22525-43
Insert: CNMG120408
Cutting Conditions: \( v_c = 350 \text{ m/min} \), \( f = 0.25 \text{ mm/rev} \), \( d_{oc} = 1.5 \text{ mm} \), Wet

**Insert Selection**

- AC420K
- Competitor’s Product D (K15)
- Competitor’s Product E (K20)
Exotic Metal

Turning Insert Selection Guide

### Chipbreakers

Negative Type

<table>
<thead>
<tr>
<th>Feed Rate (mm/rev)</th>
<th>Depth of Cut (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,1</td>
<td>0,2</td>
</tr>
<tr>
<td>0,3</td>
<td>0,5</td>
</tr>
<tr>
<td>0,7</td>
<td>1,0</td>
</tr>
<tr>
<td>1,0</td>
<td>1,5</td>
</tr>
</tbody>
</table>

### Grades

- **BN7000**: CBN Grades for High Speed Finishing
- **AC510U / EH510**: Coated Grade for Finishing to Rough Cutting
- **AC520U / EH520**: Coated Grade for Medium to Rough Cutting
- **Carbide Grade**: Carbide Grade

### Recommended Cutting Conditions

<table>
<thead>
<tr>
<th>Work Material</th>
<th>Cutting Process</th>
<th>Chipbreakers</th>
<th>Grades</th>
<th>Depth of Cut (mm)</th>
<th>Feed Rate (mm/rev)</th>
<th>Cutting Speed (m/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat-Resistant Alloy</td>
<td>Finishing</td>
<td>NEF(NSU)</td>
<td>AC510U</td>
<td>0,2-0,5-1,5</td>
<td>0,1-0,12-0,2</td>
<td>50-60-90</td>
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<tr>
<td></td>
<td>Light</td>
<td>NEX</td>
<td>AC510U</td>
<td>0,5-1,0-3,0</td>
<td>0,1-0,20-0,3</td>
<td>40-50-80</td>
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<tr>
<td></td>
<td>Medium</td>
<td>NEG</td>
<td>AC510U</td>
<td>0,5-2,0-4,0</td>
<td>0,15-0,25-0,3</td>
<td>40-50-80</td>
</tr>
<tr>
<td></td>
<td>Rough</td>
<td>NMU</td>
<td>AC520U</td>
<td>1,0-2,0-4,0</td>
<td>0,2-0,25-0,35</td>
<td>30-45-60</td>
</tr>
</tbody>
</table>

| Titanium Alloy  | Finishing       | NEF(AC510U)  | EH510       | 0,2-0,5-1,5       | 0,1-0,15-0,2        | 50-65-80              |
|                 | Light           | NEX          | AC510U      | 0,5-1,0-2,5       | 0,1-0,20-0,25       | 40-55-70              |
|                 | Medium          | NEG          | EH510       | 0,5-2,0-3,5       | 0,15-0,25-0,3       | 40-55-70              |
|                 | Rough           | NMU          | AC520U      | 1,0-2,0-3,5       | 0,2-0,25-0,3        | 30-40-50              |
Recommended Grades and Chipbreakers

**Grades**

- **AC510U / AC520U / EH510 / EH520**
  - **AC510U**: Excellent sharpness and reliability. A general purpose grade suitable for a wide range of applications from roughing to finishing.
  - **AC520U**: Excellent fracture resistance. A tough grade that is perfect for heavy interrupted cutting and mill-scaled work.
  - **EH510**: General purpose grade for titanium machining that features excellent wear and thermal resistance. For applications from roughing to finishing.
  - **EH520**: Tough grade for titanium machining with excellent fracture and thermal resistance. Perfect for interrupted cutting and mill-scaled work.

**Performance**

- **AC510U**
  - Turning of Thermal Resistant (Ni-based) Alloys
  - Carbides with excellent thermal, wear, and fracture resistance for use with exotic alloys. Lineup also includes new chipbreaker design.

- **AC520U**
  - Turning of Thermal Resistant (Fe-based) Alloys
  - Carbides with excellent thermal, wear, and fracture resistance. A general purpose grade suitable for a wide range of applications from roughing to finishing.

**Application Examples**

**AC510U / EH510**

- **Inconel 718, Shaft Component**
  - Stable, long tool life with no breakages. Small chips.
  - Insert: CNMG 120408 NEG (AC510U)
  - Cutting Conditions: \( v_c = 45 \text{ m/min}, \ f = 0.23 \text{ mm/rev}, \ d_{oc} = 2.0 \text{ mm}, \) Wet

- **Titanium Ti-6Al-4V**
  - Tool life doubled with reduced crater wear. Now with drastically improved chip control.
  - Insert: CNMG 120412 NEG (EH510)
  - Cutting Conditions: \( v_c = 65 \text{ m/min}, \ f = 0.2 \text{ mm/rev}, \ d_{oc} = 2.5 \text{ mm}, \) Wet

**AC520U**

- **Inconel 718, Machine Component**
  - Stable, long tool life with no breakage.
  - Insert: CNMG 120412 NMU (AC520U)
  - Cutting Conditions: \( v_c = 35 \text{ m/min}, \ f = 0.2 \text{ mm/rev}, \ d_{oc} = 2.5 \text{ mm}, \) Wet

- **Stellite, Machine Component**
  - Achieving 1.5x higher efficiency with cutting speeds of 30m/min as compared to 20m/min for conventional grades.
  - Insert: CNMG 120408 NEX (AC520U)
  - Cutting Conditions: \( v_c = 30 \text{ m/min}, \ f = 0.1 \text{ mm/rev}, \ d_{oc} = 1.0 \text{ mm}, \) Wet
**Chipbreakers**

NSV Type Chipbreaker: For chip control during carburized layer removal
NLV Type / NFV Type Chipbreaker: For chip control during finishing of hardened steel

**Grades**

- **Coated SUMIBORON**
  - BNC100
  - BNC200
  - BNC2010
  - BNC2020
  - BNC300
  - BNC160
  - AC503U

- **Uncoated SUMIBORON**
  - BN1000
  - BNX20
  - BN2000
  - BN350

**Recommended Cutting Conditions**

<table>
<thead>
<tr>
<th>Cutting Process</th>
<th>Grade</th>
<th>Depth of Cut (mm)</th>
<th>Feed Rate (mm/rev)</th>
<th>Cutting Speed (m/min)</th>
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</thead>
<tbody>
<tr>
<td>Continuous Cutting</td>
<td>BNC2010</td>
<td>0.03-0.20-0.35</td>
<td>0.03-0.10-0.20</td>
<td>120-200-300</td>
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<td>BNC100</td>
<td>0.03-0.20-0.30</td>
<td>0.03-0.10-0.20</td>
<td>120-200-300</td>
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<td></td>
<td>BN1000</td>
<td>0.03-0.15-0.20</td>
<td>0.03-0.10-0.15</td>
<td>100-150-300</td>
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<tr>
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<td>BNX10</td>
<td>0.03-0.10-0.20</td>
<td>0.03-0.10-0.15</td>
<td>120-180-300</td>
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<tr>
<td></td>
<td>AC503U</td>
<td>0.03-0.50-1.00</td>
<td>0.02-0.05-0.10</td>
<td>40-70-100</td>
</tr>
<tr>
<td>General Turning</td>
<td>BNC2020</td>
<td>0.03-0.30-0.50</td>
<td>0.03-0.20-0.40</td>
<td>50-130-220</td>
</tr>
<tr>
<td></td>
<td>BNC160</td>
<td>0.03-0.20-0.35</td>
<td>0.03-0.10-0.25</td>
<td>120-180-220</td>
</tr>
<tr>
<td></td>
<td>BNC200</td>
<td>0.03-0.30-0.50</td>
<td>0.03-0.10-0.30</td>
<td>50-130-220</td>
</tr>
<tr>
<td></td>
<td>BN2000</td>
<td>0.03-0.20-0.30</td>
<td>0.03-0.10-0.20</td>
<td>50-100-200</td>
</tr>
<tr>
<td></td>
<td>BNX20</td>
<td>0.03-0.20-0.35</td>
<td>0.03-0.15-0.30</td>
<td>70-130-170</td>
</tr>
<tr>
<td>Interrupted Cutting</td>
<td>BNC300</td>
<td>0.03-0.20-0.30</td>
<td>0.03-0.10-0.20</td>
<td>50-100-150</td>
</tr>
<tr>
<td></td>
<td>BN350</td>
<td>0.03-0.20-0.30</td>
<td>0.03-0.10-0.20</td>
<td>50-100-150</td>
</tr>
<tr>
<td></td>
<td>BNX25</td>
<td>0.03-0.20-0.50</td>
<td>0.03-0.15-0.30</td>
<td>120-160-220</td>
</tr>
</tbody>
</table>
Recommended CBN Grades and Chipbreakers

**Hardened Steel**

### Grades

**BNC2010 / BNC2020 / BN1000 / BN2000**

**BNC2010:** A grade for high-precision machining applicable for finishing requiring good surface roughness and dimensional accuracy. Provides further improved wear resistance thanks to a newly developed CBN substrate coated with a TiCN layer. Reduces flank wear and achieves excellent surface finish thanks to newly developed special stable multi-layered coating.

**BNC2020:** A general-purpose grade applicable to general hardened steel machining. A newly developed tough CBN-substrate coated with a highly wear-resistant TiAlN layer. Achieves more stable machining and longer tool life by employing a highly adhesive layer for high chipping resistance.

**BN1000:** For high-speed machining. BN1000 provides the highest wear resistance of all uncoated SUMIBORON grades. Features improved fracture resistance while still placing a priority on wear resistance.

**BN2000:** General purpose grade suitable for typical hardened steel machining applications. Provides a high degree of fracture and wear resistance.

### Performance

**BNC2010**

- **Conventional Coated CBN:** Flank wear occurs
- **BN2010 Reduced flank wear**

**BNC2020**

- **Conventional coated CBN:** 1.5 times the conventional tool life
- **Competitor's coated CBN**

| Work Material: 15CrMo5, 58-62HRC, Continuous | Insert: DNGA 150408 NC4 (BNC2010) | Cutting Edge Treatment: S01225 | Cutting Conditions: \( v_c = 160 \text{m/min}, \ f = 0.08 \text{mm/rev}, \ a_p = 0.1 \text{mm}, \text{ Wet} \) |
| Work Material: SCM415-5V, 58-62HRC, Interrupted | Insert: CNGA 120412 NC4 (BNC2020) | Cutting Edge Treatment: S01225 | Cutting Conditions: \( v_c = 130 \text{m/min}, \ f = 0.1 \text{mm/rev}, \ a_p = 0.6 \text{mm}, \text{ Dry} \) |

### BN1000 / BN2000

**Wear Resistance (Continuous Cutting)**

- **BN1000**

| Work Material: 15CrMo5, Round Bar (58-62HRC) | Cutting Conditions: \( v_c = 100 \text{m/min}, \ f = 0.1 \text{mm/rev}, \ a_p = 0.2 \text{mm}, \text{ Dry} \) |

- **BN2000**

| Work Material: 100Cr6, Round Bar (58-62HRC) | Cutting Conditions: \( v_c = 150 \text{m/min}, \ f = 0.1 \text{mm/rev}, \ a_p = 0.2 \text{mm}, \text{ Dry} \) |

**Chipping Resistance (Interrupted Cutting)**

(Comparison based on conventional BN2000 as 100%)

- **BN2000**

| Work Material: 15CrMo5, 8V Grooved Material (58-62HRC) | Insert: CNMA120408 NU-2 | Cutting Conditions: \( v_c = 150 \text{m/min}, \ F = 0.1 \text{mm/rev}, \ a_p = 0.2 \text{mm}, \text{ Dry} \) |
Non-Ferrous Metal

Turning Insert Selection Guide

Chipbreakers

Positive Type

Depth of Cut (mm)

Feed Rate (mm/rev)

NAG

NGD

NLD

Grades

SUMIDIA

DA1000

Cutting Speed (m/min)

Feed Rate (mm/rev)

Depth of Cut (mm)

Continuous Cutting

General Cutting

Interrupted Cutting

Recommended Cutting Conditions

(Min. - Optimum - Max.)

<table>
<thead>
<tr>
<th>Cutting Process</th>
<th>Category</th>
<th>Grades</th>
<th>Cutting Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Continuous Cutting</td>
<td>SUMIDIA</td>
<td>DA1000</td>
<td>Depth of Cut (mm) 0.1-0.5-3.0, Feed Rate (mm/rev) 0.05-0.10-0.20, Cutting Speed (m/min) ~ 2000</td>
</tr>
<tr>
<td>General Turning</td>
<td>Carbide</td>
<td>H1</td>
<td>Depth of Cut (mm) 0.3-1.0-5.0, Feed Rate (mm/rev) 0.1-0.20-0.5, Cutting Speed (m/min) ~ 1000</td>
</tr>
<tr>
<td>Interrupted Cutting</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Grade**  
**DA1000**
- Ultra-high-density sintered, ultra-fine diamond particles
- Significantly improved surface roughness on machined surfaces
- World’s best wear resistance and strength
- Suitable for use with all aluminium and non-ferrous alloys

**DA1000 Wear Resistance**

![Graph showing DA1000 wear resistance](image)

**Comparison of Surface Roughness of Nose Radius Cutting Edge**

![Comparison of surface roughness](image)

**Wear Resistance in Turning Applications**

![Graph showing wear resistance in turning applications](image)

**Wear Resistance in Milling Applications**

![Graph showing wear resistance in milling applications](image)

**Application Examples**

**H1 + NAG Type Breakers**

**ADC12 Aluminium Wheel**
Excellent adhesion resistance. Longer tool life.

![Image of ADC12 Aluminium Wheel](image)

**Copper Alloy Bush**
Stable surface roughness with no edge breakage (3,2S). Tool life improved to 3x that of conventional models.

![Image of Copper Alloy Bush](image)

**Recommended PCD and Carbide Grades**

**Non-Ferrous Metal**

**Grades**

- **DA1000**
  - Ultra-high-density sintered, ultra-fine diamond particles
  - Significantly improved surface roughness on machined surfaces
  - World’s best wear resistance and strength
  - Suitable for use with all aluminium and non-ferrous alloys

**Application Examples**

**H1 + NAG Type Breakers**

**ADC12 Aluminium Wheel**
Excellent adhesion resistance. Longer tool life.

![Image of ADC12 Aluminium Wheel](image)

**Copper Alloy Bush**
Stable surface roughness with no edge breakage (3,2S). Tool life improved to 3x that of conventional models.

![Image of Copper Alloy Bush](image)
## Grades

### Application Range

<table>
<thead>
<tr>
<th>Category</th>
<th>High Precision</th>
<th>Finish-Light Cut</th>
<th>Medium Cut</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coated Carbide (PVD)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACZ150</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>AC510U</td>
<td></td>
<td></td>
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<tr>
<td>AC520U</td>
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<td></td>
<td></td>
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<tr>
<td>AC530U</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AC1030U</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cermet/Coated Cermet</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>T1000A</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>T1500A / T1500Z</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Carbide</td>
<td></td>
<td></td>
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<tr>
<td>H1</td>
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<td></td>
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<tr>
<td>EH510</td>
<td></td>
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<td></td>
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<tr>
<td>CBN (SUMIBORON)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BN1000 / BN2000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SUMIDIA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DA1000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Work Material

- General Steel
- Stainless Steel
- Cast Iron
- Heat Resistant Steel
- Hardened Steel
- Non-Ferrous Metal

- Preferred Choice
- Suitable

## Chipbreakers

- **M-Class Finishing to Light Cut**
- **G-Class Chipbreaker (Groove Design)**
- **G-Class Chipbreaker (3D Design)**

## Recommended Cutting Conditions

### Work Material

<table>
<thead>
<tr>
<th>Grade</th>
<th>Free Cutting Steel</th>
<th>Carbon Steel</th>
<th>Stainless Steel</th>
<th>Hardened Steel</th>
<th>Aluminium</th>
<th>Brass</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>v&lt;sub&gt;c&lt;/sub&gt; (m/min)</td>
<td>f (mm/rev)</td>
<td>v&lt;sub&gt;c&lt;/sub&gt; (m/min)</td>
<td>f (mm/rev)</td>
<td>v&lt;sub&gt;c&lt;/sub&gt; (m/min)</td>
<td>f (mm/rev)</td>
</tr>
<tr>
<td>AC2150</td>
<td>50 - 200</td>
<td>0.02 - 0.10</td>
<td>50 - 150</td>
<td>0.01 - 0.08</td>
<td>50 - 150</td>
<td>0.01 - 0.05</td>
</tr>
<tr>
<td>AC510U</td>
<td>50 - 200</td>
<td>0.02 - 0.15</td>
<td>50 - 200</td>
<td>0.02 - 0.10</td>
<td>*50 - 200</td>
<td>0.02 - 0.10</td>
</tr>
<tr>
<td>AC520U</td>
<td>50 - 200</td>
<td>0.02 - 0.15</td>
<td>50 - 200</td>
<td>0.02 - 0.10</td>
<td>*50 - 200</td>
<td>0.02 - 0.10</td>
</tr>
<tr>
<td>AC530U</td>
<td>50 - 200</td>
<td>0.02 - 0.15</td>
<td>50 - 200</td>
<td>0.02 - 0.10</td>
<td>*50 - 200</td>
<td>0.02 - 0.10</td>
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<tr>
<td>AC1030U</td>
<td>50 - 200</td>
<td>0.02 - 0.15</td>
<td>50 - 200</td>
<td>0.02 - 0.10</td>
<td>*50 - 200</td>
<td>0.02 - 0.10</td>
</tr>
<tr>
<td>T1000A</td>
<td>50 - 200</td>
<td>0.02 - 0.15</td>
<td>50 - 200</td>
<td>0.02 - 0.10</td>
<td>*50 - 150</td>
<td>0.02 - 0.10</td>
</tr>
<tr>
<td>T1500A</td>
<td>50 - 200</td>
<td>0.02 - 0.15</td>
<td>50 - 200</td>
<td>0.02 - 0.10</td>
<td>*50 - 150</td>
<td>0.02 - 0.10</td>
</tr>
<tr>
<td>T1500Z</td>
<td>50 - 200</td>
<td>0.02 - 0.15</td>
<td>50 - 200</td>
<td>0.02 - 0.10</td>
<td>*50 - 150</td>
<td>0.02 - 0.10</td>
</tr>
<tr>
<td>BN1000</td>
<td>50 - 200</td>
<td>0.02 - 0.10</td>
<td>70 - 300</td>
<td>0.02 - 0.10</td>
<td>70 - 300</td>
<td>0.02 - 0.10</td>
</tr>
<tr>
<td>BN2000</td>
<td>50 - 120</td>
<td>0.02 - 0.10</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>DA1000</td>
<td>50 - 120</td>
<td>0.02 - 0.10</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

* Please use maximal possible C/speed
Turning Insert Selection Guide

Application Range

AC1030U

AC1030U Performance

AC1030U

AC1030U Performance

AC1030U

AC1030U Performance

AC1030U

AC1030U Performance

AC1030U

AC1030U Performance

AC1030U

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AC1030U
Coated Grades

Coating Series .......................................................... B2
CVD / PVD Series ......................................................... B3 - 4

Coated and Uncoated

Uncoated Carbide

Cermet ................................................................. B5
“igetalloy” ............................................................ B6

CBN Grades

“SUMIBORON” ......................................................... B7 - 8

PCD Grades

“SUMIDIA” ............................................................ B9
“SUMIDIA” Binderless .................................................. B10

Chart

Grades Comparision Chart ................................. B11-13
Properties of Base Materials ............................... B14
Coated Carbide

Sumitomo Electric Hardmetal’s Coating Series are high-quality, high-performance indexable grades that combines a proprietary, special ultra-hard carbide substrate with a multi-layered coating that provides excellent wear and heat resistance plus superior adhesion strength. Utilised in high-speed, high-efficiency applications on a wide range of work material including, steel, cast iron, and exotic alloys.

Characteristics

**Absotech Platinum (CVD)**

Achieves a good balance between drastically-improved coating strength and excellent surface smoothness thanks to a newly-developed, boride-based titanium compound coating.

- Achieves more than double the chipping resistance of conventional coatings thanks to the improved coating strength.
- Drastically improves the adhesion resistance and reduces the occurrence of abnormal damage thanks to excellent surface smoothness.
- Improves the corner visibility with a unique light color.

*Adopted Grades* For stainless steel turning: AC6030M

**Super FF Coat (CVD)**

- Smooth coating surface provides excellent adhesion and chipping resistance. Improved coating adhesion strength.
- Harder than conventional coatings with huge improvements in wear resistance.
- High speed, high efficiency machining of more than 1.5 times that of conventional grades is possible.
- Achieving more than double the tool life of conventional grades under conventional cutting conditions.


**AURORA Coat (DLC : Diamond Like Carbon)**

Using our proprietary PVD process technology, we have developed a hydrogen-free DLC coating that is extremely hard and smooth.

- ADC12 Comparison of Cutting Edge Adhesion After Cutting

  - Second only to diamond in terms of hardness, this smooth coating has a low coefficient of friction and provides excellent adhesion resistance to deliver better-quality machined surfaces.
  - Can be used for high-speed, high-efficiency cutting of aluminium alloys, copper alloys, resins, and more.

*Adopted Grades* For Milling: DL1000 For Endmilling: DL1000, DL1200 For Drilling: DL1300, DL1500
### CVD Coating Series

#### Coated Carbide

#### Characteristic Values

<table>
<thead>
<tr>
<th>For Turning (CVD)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class</strong></td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>P</td>
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</table>

#### For Milling (CVD)

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th><strong>Hardness (HRA)</strong></th>
<th><strong>TRS (GPa)</strong></th>
<th><strong>Coating Type</strong></th>
<th><strong>Coating Thickness (μm)</strong></th>
<th><strong>Characteristics</strong></th>
<th><strong>Old Grades</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>ACP100</td>
<td>89,3</td>
<td>3,1</td>
<td>Super FF Coat</td>
<td>6</td>
<td>A grade that employs a tough carbide substrate and thin-layer Super FF Coat to provide superior thermal crack and wear resistance in high-speed milling of steel.</td>
<td>AC230</td>
</tr>
<tr>
<td></td>
<td>ACM200</td>
<td>89,8</td>
<td>3,4</td>
<td>Super FF Coat</td>
<td>6</td>
<td>A grade ideal for hardened steel machining that provides excellent wear and heat resistance by employing a newly-developed ultra-hard carbide and Super FF Coat.</td>
<td>AC230</td>
</tr>
<tr>
<td>M</td>
<td>ACK100</td>
<td>92,0</td>
<td>2,4</td>
<td>Super FF Coat</td>
<td>6</td>
<td>A grade that employs a high-strength carbide substrate and Super FF Coat to provide excellent wear resistance in high-speed milling.</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>ACK200</td>
<td>91,7</td>
<td>2,5</td>
<td>Super FF Coat</td>
<td>6</td>
<td>A grade that employs a tough carbide substrate and thin-layer Super FF Coat to provide superior thermal crack and wear resistance for high-speed milling.</td>
<td>AC211</td>
</tr>
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</table>
### Coated Carbide

#### PVD Coating Series

**For Turning (PVD)**

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th>Hardness (HRA)</th>
<th>TRS (GPa)</th>
<th>Coating Type</th>
<th>Coating Thickness (μm)</th>
<th>Characteristics</th>
<th>Old Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>T1500Z (Cermet)</td>
<td>92,0</td>
<td>2,2</td>
<td>Brilliant Coat*</td>
<td>3</td>
<td>Brilliant Coat* PVD coating gives excellent lubricity for higher quality machining. General-purpose coated cermet grade that can maintain high-quality machined surfaces and also gives excellent wear resistance.</td>
<td>T2000Z</td>
</tr>
<tr>
<td>M</td>
<td>T3000Z (Cermet)</td>
<td>91,3</td>
<td>2,4</td>
<td>ZX Coat</td>
<td>3</td>
<td>An ultra-reliable coating grade with tough cermet substrate.</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>AC530U</td>
<td>91,4</td>
<td>3,3</td>
<td>Super ZX Coat</td>
<td>3</td>
<td>For interrupted and general steel cutting. Utilizing the super multi-layered PVD coating of nanometre thick TiAIN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.</td>
<td>ACZ310</td>
</tr>
<tr>
<td>M</td>
<td>AC520U</td>
<td>91,7</td>
<td>3,0</td>
<td>Super ZX Coat</td>
<td>3</td>
<td>Interrupted machining and stainless steel machining. Utilizing the super multi-layered PVD coating of nanometre thick TiAIN and AlCrN layers, coupled with a tough substrate for excellent fracture resistance.</td>
<td>EH520Z</td>
</tr>
<tr>
<td>M</td>
<td>AC6040M</td>
<td>91,6</td>
<td>3,8</td>
<td>Absotech Bronze</td>
<td>3</td>
<td>The first recommended grade for interrupted machining of stainless steel that drastically improves the reliability in unstable machining thanks to the excellent adhesion and peel-off resistance of the new Absotech Bronze PVD coating, as well as the improved fracture resistance of the exclusive ultra-hard carbide substrate.</td>
<td>ACZ30U</td>
</tr>
<tr>
<td>M</td>
<td>AC530U</td>
<td>91,4</td>
<td>3,3</td>
<td>Super ZX Coat</td>
<td>3</td>
<td>Heavy interrupted machining and stainless steel machining. Utilizing the super multi-layered PVD coating of nanometre thick TiAIN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.</td>
<td>ACZ310</td>
</tr>
<tr>
<td>M</td>
<td>AC510U</td>
<td>92,6</td>
<td>2,6</td>
<td>Super ZX Coat</td>
<td>3</td>
<td>General to interrupted machining of cast iron and ductile cast iron. Utilizing the super multi-layered PVD coating of nanometre thick TiAIN and AlCrN layers, coupled with a fine-grained super tough substrate for excellent fracture resistance.</td>
<td>EH510Z</td>
</tr>
<tr>
<td>M</td>
<td>AC510U</td>
<td>92,6</td>
<td>2,6</td>
<td>Super ZX Coat</td>
<td>3</td>
<td>Finishing to medium cutting of exotic alloys. Utilizing the super multi-layered PVD coating of nanometre thick TiAIN and AlCrN layers. Superior wear and heat resistance, and stable, long tool life.</td>
<td>EH510Z</td>
</tr>
<tr>
<td>M</td>
<td>AC520U</td>
<td>91,7</td>
<td>3,0</td>
<td>Super ZX Coat</td>
<td>3</td>
<td>Medium to rough cutting of exotic alloys. Utilizing the super multi-layered PVD coating of nanometre thick TiAIN and AlCrN layers. Superior wear and heat resistance, and stable, long tool life even in interrupted cutting.</td>
<td>EH520Z</td>
</tr>
<tr>
<td>S</td>
<td>AC503U</td>
<td>93,2</td>
<td>1,7</td>
<td>Super ZX Coat</td>
<td>3</td>
<td>For hardened steel. Utilizing the super multi-layered PVD coating of nanometre thick TiAIN and AlCrN layers, coupled with an ultra-hard substrate for excellent wear resistance.</td>
<td>—</td>
</tr>
<tr>
<td>M</td>
<td>ACZ150</td>
<td>91,4</td>
<td>3,3</td>
<td>ZX Coat</td>
<td>1</td>
<td>For small tools, and high-precision finishing to general finishing applications. TiN ultra-thin coating and fine-grained, super tough substrate combine to give good edge sharpness and superior cut finish.</td>
<td>—</td>
</tr>
<tr>
<td>M</td>
<td>AC1030U</td>
<td>91,6</td>
<td>3,8</td>
<td>Absotech Bronze</td>
<td>2</td>
<td>For precision machining that supports a wide range of work materials. Employs the new “Absotech Bronze” coating with excellent adhesion and peel-off resistance to deliver excellent machined surface quality with improvements in cutting edge quality and superb stability.</td>
<td>—</td>
</tr>
</tbody>
</table>

**For Milling (PVD)**

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th>Hardness (HRA)</th>
<th>TRS (GPa)</th>
<th>Main Coating Components</th>
<th>Coating Thickness (μm)</th>
<th>Characteristics</th>
<th>Old Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>ACP200</td>
<td>89,5</td>
<td>3,2</td>
<td>(New) Super ZX Coat</td>
<td>3</td>
<td>For general machining of general and die steel. Employs PVD coating consisting of multiple nanometre-thin layers. A general grade that achieves a good balance between fracture resistance and wear resistance when combined with an exclusive tough substrate.</td>
<td>ACZ330</td>
</tr>
<tr>
<td>M</td>
<td>ACP300</td>
<td>89,3</td>
<td>3,1</td>
<td>(New) Super ZX Coat</td>
<td>3</td>
<td>For interrupted machining and stainless steel machining. Employs PVD coating consisting of multiple nanometre-thin layers. Provides excellent fracture resistance when combined with an ultra-tough substrate.</td>
<td>ACZ360</td>
</tr>
<tr>
<td>M</td>
<td>ACM100</td>
<td>91,4</td>
<td>3,3</td>
<td>(New) Super ZX Coat</td>
<td>3</td>
<td>A grade that provides excellent wear resistance by employing an ultra-hard fine-grained carbide and New Super ZX Coating.</td>
<td>ACZ310</td>
</tr>
<tr>
<td>M</td>
<td>ACM300</td>
<td>89,8</td>
<td>3,4</td>
<td>(New) Super ZX Coat</td>
<td>3</td>
<td>The first recommended grade for stainless steel machining that achieves a good balance between wear resistance and fracture resistance by employing a newly-developed ultra-hard carbide and New Super ZX Coating.</td>
<td>—</td>
</tr>
<tr>
<td>K</td>
<td>ACK300</td>
<td>91,4</td>
<td>3,3</td>
<td>(New) Super ZX Coat</td>
<td>3</td>
<td>For general and interrupted machining of cast iron and ductile cast iron. Employs PVD coating consisting of multiple nanometre-thin layers. Provides excellent fracture resistance when combined with a fine-grained super tough substrate.</td>
<td>ACZ310</td>
</tr>
<tr>
<td>N</td>
<td>DL1000</td>
<td>92,9</td>
<td>2,1</td>
<td>AURORA Coat (DLC Coat)</td>
<td>0,5</td>
<td>For machining of non-ferrous metals including aluminum and copper alloy as well as resin. Coated with DLC, which provides a low friction coefficient and excellent adhesion resistance.</td>
<td>—</td>
</tr>
</tbody>
</table>

*There may be minor differences in the colour tone/finish of Brilliant Coat grades due to the interference of light. Such differences have no effect on performance.*
Various grades and expanded lineup of catalogue items meet a wide range of finishing needs.

Lineup includes wear-resistant T1000A, general purpose T1500A, general purpose coated cermet T1500Z and tough T3000Z.

Significantly expanded lineup of catalogue items for a wide variety of finishing applications.

**Uncoated Cermet**

**T1000A** High Speed Finishing Grade
High speed finishing grade with excellent wear resistance.
- Improved wear and fracture resistance.
- Solid solution hard phase reduces reaction with steel.
- Perflect for high-speed continuous finishing of steel, cast iron and powdered metal.

**T1500A** New General Purpose Grade
General purpose cermet grade that provides both wear and fracture resistance with better quality finished surfaces.
- Mixing hard phases of different functionality, grain size and compositions improves balance of wear and fracture resistance.
- Reduces adhesion of work material for beautiful finished surfaces.

**Coated Cermet**

**T1500Z** New General Purpose Grade
General purpose coated cermet grade that employs new Brilliant Coat* PVD coating with excellent lubricity.
- Excellent wear resistance provides long tool life.
- Reduces adhesion of work material for beautiful finished surfaces.

**Surface Finish Comparison**

<table>
<thead>
<tr>
<th>Work Material: St 34-2</th>
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</thead>
<tbody>
<tr>
<td>Insert: CNMG 120408 NLU</td>
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<tr>
<td>Cutting Conditions:</td>
</tr>
<tr>
<td>$v_c=100\text{m/min}$</td>
</tr>
<tr>
<td>$f=0.15\text{mm/rev}$</td>
</tr>
<tr>
<td>$d_o=1.0\text{mm}, \text{ Wet}$</td>
</tr>
</tbody>
</table>

**For Turning**

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th>Hardness (HRA)</th>
<th>TRS (GPa)</th>
<th>Coating Type</th>
<th>Coating Thickness (μm)</th>
<th>Characteristics</th>
<th>Old Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>T1000A</td>
<td>93.3</td>
<td>1.8</td>
<td>—</td>
<td>—</td>
<td>Uncoated cermet grade with excellent wear resistance that provides good cost efficiency. Demonstrates excellent wear resistance in continuous finishing applications, and stable finishing of cast iron and sintered alloy as well.</td>
<td>T110A</td>
</tr>
<tr>
<td>P</td>
<td>T1500A</td>
<td>92.0</td>
<td>2.2</td>
<td>—</td>
<td>—</td>
<td>A general purpose grade that employs a substrate with improved balance of fracture and wear resistance to deliver superior finished surfaces in a wide variety of cutting conditions.</td>
<td>T1200A</td>
</tr>
<tr>
<td>P</td>
<td>T1500Z</td>
<td>92.0</td>
<td>2.2</td>
<td>PVD Brilliant Coat*</td>
<td>3</td>
<td>Brilliant Coats* new PVD coating gives excellent lubricity for higher quality machining. General-purpose coated cermet grade that can maintain high-quality machined surfaces and also gives excellent wear resistance.</td>
<td>T2000Z</td>
</tr>
<tr>
<td>P</td>
<td>T3000Z</td>
<td>91.3</td>
<td>2.4</td>
<td>PVD ZX Coat</td>
<td>3</td>
<td>An ultra-reliable coated grade with tough cermet substrate.</td>
<td>—</td>
</tr>
</tbody>
</table>

**For Milling**

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th>Hardness (HRA)</th>
<th>TRS (GPa)</th>
<th>Coating Type</th>
<th>Coating Thickness (μm)</th>
<th>Characteristics</th>
<th>Old Grades</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>T1500A</td>
<td>92.0</td>
<td>2.2</td>
<td>—</td>
<td>—</td>
<td>A general-purpose grade that employs a substrate with an improved balance between fracture and wear resistance to deliver superior finished surfaces in a wide variety of cutting conditions.</td>
<td>T1200A</td>
</tr>
<tr>
<td>M</td>
<td>T250A</td>
<td>91.4</td>
<td>2.1</td>
<td>—</td>
<td>—</td>
<td>Tough cermet grade with enhanced crack advancement resistance.</td>
<td>—</td>
</tr>
</tbody>
</table>

*There may be minor differences in the colour tone/finish of Brilliant Coat grades due to the interference of light. Such differences have no effect on performance.
Igetalloy carbides have a solid history and a big variety of grades to suit many different applications. They are widely used and appreciated for their superior performance.

The Igetalloy line-up consists of carbide cutting tools that are available in a variety of different structures and compositions, each differing in terms of WC grain size and containing varying amounts of Co binder and TiC, TaC, and other double carbide components. The wide selection enables excellent wear resistance and toughness with a variety of work materials and cutting conditions.

### Characteristic Values

<table>
<thead>
<tr>
<th>Application</th>
<th>Grade</th>
<th>Hardness (HRA)</th>
<th>TRS (GPa)</th>
<th>Young's Modulus (GPa)</th>
<th>Thermal Conductivity (W/m·°C)</th>
<th>Compressive Strength (GPa)</th>
<th>Linear-Thermal Expansion Coefficient (X 10⁻⁶/°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>ST10P</td>
<td>92,1</td>
<td>1,9</td>
<td>470</td>
<td>25</td>
<td>4,9</td>
<td>6,2</td>
</tr>
<tr>
<td></td>
<td>ST20E</td>
<td>91,8</td>
<td>1,9</td>
<td>550</td>
<td>42</td>
<td>4,8</td>
<td>5,2</td>
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<tr>
<td></td>
<td>A30</td>
<td>91,3</td>
<td>2,1</td>
<td>520</td>
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<td>—</td>
<td>5,2</td>
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<tr>
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<td>A30N</td>
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<td>520</td>
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<tr>
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<td>ST40E</td>
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<td>2,6</td>
<td>—</td>
<td>75</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td>M</td>
<td>U10E</td>
<td>92,4</td>
<td>1,8</td>
<td>460</td>
<td>—</td>
<td>5,9</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>EH510</td>
<td>92,6</td>
<td>2,6</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>U2</td>
<td>91,5</td>
<td>2,2</td>
<td>—</td>
<td>88</td>
<td>—</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td>EHS20</td>
<td>91,7</td>
<td>3,0</td>
<td>—</td>
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</tr>
<tr>
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<td>A30</td>
<td>91,3</td>
<td>2,1</td>
<td>520</td>
<td>—</td>
<td>—</td>
<td>5,2</td>
</tr>
<tr>
<td></td>
<td>A30N</td>
<td>91,0</td>
<td>2,4</td>
<td>—</td>
<td>—</td>
<td>—</td>
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<tr>
<td>K</td>
<td>BL130</td>
<td>94,3</td>
<td>2,9</td>
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<td>—</td>
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</tr>
<tr>
<td></td>
<td>H2</td>
<td>93,2</td>
<td>1,8</td>
<td>600</td>
<td>105</td>
<td>6,1</td>
<td>4,4</td>
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<tr>
<td></td>
<td>H1</td>
<td>92,9</td>
<td>2,1</td>
<td>650</td>
<td>109</td>
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<td>2,6</td>
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<td>H10E</td>
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</tr>
<tr>
<td></td>
<td>G10E</td>
<td>91,1</td>
<td>2,2</td>
<td>620</td>
<td>105</td>
<td>5,7</td>
<td>—</td>
</tr>
<tr>
<td>N</td>
<td>H1</td>
<td>92,9</td>
<td>2,1</td>
<td>650</td>
<td>109</td>
<td>6,1</td>
<td>4,7</td>
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<td>EH510</td>
<td>92,6</td>
<td>2,6</td>
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<td>EHS20</td>
<td>91,7</td>
<td>3,0</td>
<td>—</td>
<td>—</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>
CBN (Cubic Boron Nitride)

SUMIBORON

High hardness and heat resistance for cutting high hardness steel and hard cast iron. Long tool life with high-speed finishing of grey cast iron.

In 1977, Sumitomo Electric Hardmetal successfully developed a revolutionary CBN sintered tool - SUMIBORON. The main component in SUMIBORON is Cubic Boron Nitride with a special ceramic binder sintered under super high pressure and temperature. As compared to other conventional tool materials, CBN has higher hardness and excellent heat resistance.

With these distinct characteristics, SUMIBORON can perform machining of hardened steel, high hardness cast iron and exotic metals where previously only grinding was done. Furthermore, excellent efficiency and longer tool life can also be achieved from high speed machining of cast irons.

Characteristics

<table>
<thead>
<tr>
<th>Classifications</th>
<th>Structure</th>
<th>CBN Content</th>
<th>Hardness (GPa)</th>
<th>Grades</th>
<th>Application</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mainly CBN grains fused together</td>
<td></td>
<td>High</td>
<td>44</td>
<td>BN700, BN7000, BN7500, BNS800</td>
<td>Carbide, Chilled cast iron, Ni-Hard cast iron, Steel-resistant alloy, Cast iron, Sintered ferrous alloy</td>
<td>High carbon content. Structure consists of strongly fused CBN grains. Suited to cutting cast iron, heat-resistant alloy, ultra-hard alloy, and other hard materials.</td>
</tr>
<tr>
<td>Mainly CBN grains held together with a binder</td>
<td></td>
<td>Low</td>
<td>21</td>
<td>BNC500, BN1000, BN2000, BN350, BNX10, BNX20, BNX25, BNC2010, BNC2020, BNC100, BNC160, BNC200, BNC300</td>
<td>Alloy steel, Case hardened steel, Carbon tool steels, Bearing steel, Die steel, Ductile cast iron</td>
<td>CBN grains are fused together strongly with a special ceramic binder. Strong CBN binding force gives superior wear resistance and toughness when cutting hardened steel and cast iron.</td>
</tr>
</tbody>
</table>

*BNC500 can also be used with cast iron, while BN350 can also be used with sintered ferrous alloys.

Grade Range Map

<table>
<thead>
<tr>
<th>Class</th>
<th>Series</th>
<th>Finishing – Light Cutting</th>
<th>Medium Cutting</th>
<th>Rough – Heavy Cutting</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>Coated SUMIBORON</td>
<td>BNC2010</td>
<td>BNC2020</td>
<td></td>
</tr>
<tr>
<td></td>
<td>BN100</td>
<td>BNC160</td>
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<td>BNC200</td>
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<td></td>
<td>BNC300</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Uncoted SUMIBORON</td>
<td>BNX10, BN1000</td>
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</tr>
<tr>
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<td>BN2000</td>
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<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>BNX25, BN350</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Sintered Components</td>
<td>Uncoated SUMIBORON</td>
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<td>BN700, BN7000</td>
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</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>Coated SUMIBORON</td>
<td>BNC500</td>
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<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Uncoted SUMIBORON</td>
<td></td>
<td>BN7000, BN7000</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>BNS800</td>
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</tr>
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</table>
### Characteristic Values

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th>Binder</th>
<th>Carbon Content (%)</th>
<th>Grain Size (µm)</th>
<th>Hardness HV (GPa)</th>
<th>TRS (GPa)</th>
<th>Main Coating Components</th>
<th>Coating Thickness (µm)</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>BNC2010</td>
<td>TiCN</td>
<td>50 ~ 55</td>
<td>2</td>
<td>30 ~ 32</td>
<td>1,10 ~ 1,20</td>
<td>TiCN multi-layered</td>
<td>1,5</td>
<td>Improves the wear resistance of coating and substrate and stably achieves excellent surface roughness.</td>
</tr>
<tr>
<td></td>
<td>BNC2020</td>
<td>TiN</td>
<td>70 ~ 75</td>
<td>5</td>
<td>34 ~ 36</td>
<td>1,20 ~ 1,30</td>
<td>TiAlN multi-layered</td>
<td>1,5</td>
<td>Provides long tool life in general and high-efficiency cutting thanks to tough substrate coated with a highly wear-resistant and highly adhesive layer.</td>
</tr>
<tr>
<td></td>
<td>BNC100</td>
<td>TiN</td>
<td>40 ~ 45</td>
<td>1</td>
<td>29 ~ 32</td>
<td>1,05 ~ 1,15</td>
<td>TiAlN</td>
<td>1</td>
<td>Highly wear resistant coating makes this grade suited for high speed finishing.</td>
</tr>
<tr>
<td></td>
<td>BNC160</td>
<td>TiN</td>
<td>60 ~ 65</td>
<td>3</td>
<td>31 ~ 33</td>
<td>1,10 ~ 1,20</td>
<td>TiAlN/TiCN</td>
<td>2</td>
<td>Stable, high precision finishing of hardened steel.</td>
</tr>
<tr>
<td></td>
<td>BNC200</td>
<td>TiN</td>
<td>65 ~ 70</td>
<td>4</td>
<td>34 ~ 36</td>
<td>1,15 ~ 1,25</td>
<td>TiAlN/TiCN</td>
<td>2</td>
<td>Tough substrate with high wear resistant coating provide longer tool life.</td>
</tr>
<tr>
<td></td>
<td>BNC300</td>
<td>TiN</td>
<td>60 ~ 65</td>
<td>1</td>
<td>33 ~ 35</td>
<td>1,15 ~ 1,25</td>
<td>TiAlN</td>
<td>2</td>
<td>Suited for finishing when there is a combination of continuous and interrupted cutting.</td>
</tr>
<tr>
<td></td>
<td>BNX10</td>
<td>TiCN</td>
<td>40 ~ 45</td>
<td>3</td>
<td>27 ~ 31</td>
<td>0,80 ~ 0,90</td>
<td>–</td>
<td>–</td>
<td>Optimum wear resistance. Suited to continuous, high-speed cutting.</td>
</tr>
<tr>
<td></td>
<td>BN1000</td>
<td>TiCN</td>
<td>40 ~ 45</td>
<td>1</td>
<td>27 ~ 31</td>
<td>0,90 ~ 1,00</td>
<td>–</td>
<td>–</td>
<td>Ultimate wear and fracture resistance. Suited to high-speed cutting.</td>
</tr>
<tr>
<td></td>
<td>BNX20</td>
<td>TiN</td>
<td>55 ~ 60</td>
<td>3</td>
<td>31 ~ 33</td>
<td>0,95 ~ 1,10</td>
<td>–</td>
<td>–</td>
<td>Crater resistant grade, suitable for high efficiency cutting under high temperature conditions.</td>
</tr>
<tr>
<td></td>
<td>BNX25</td>
<td>TiN</td>
<td>65 ~ 70</td>
<td>4</td>
<td>29 ~ 31</td>
<td>1,00 ~ 1,10</td>
<td>–</td>
<td>–</td>
<td>Excellent fracture resistance during high speed cutting. Suited to high speed interrupted cutting of hardened steel.</td>
</tr>
<tr>
<td></td>
<td>BN2000</td>
<td>TiN</td>
<td>50 ~ 55</td>
<td>2</td>
<td>31 ~ 34</td>
<td>1,05 ~ 1,15</td>
<td>–</td>
<td>–</td>
<td>A general purpose grade for hardened steel that provides a high degree of fracture and wear resistance.</td>
</tr>
<tr>
<td></td>
<td>BN350</td>
<td>TiN</td>
<td>60 ~ 65</td>
<td>1</td>
<td>33 ~ 35</td>
<td>1,20 ~ 1,30</td>
<td>–</td>
<td>–</td>
<td>High cutting edge strength; suited to heavy interrupted cutting.</td>
</tr>
<tr>
<td></td>
<td>BN7500</td>
<td>Co Compound</td>
<td>90 ~ 95</td>
<td>1</td>
<td>41 ~ 44</td>
<td>1,40 ~ 1,50</td>
<td>–</td>
<td>–</td>
<td>Maintains optimum cutting edge sharpness. Suited for finishing of sintered alloy.</td>
</tr>
<tr>
<td></td>
<td>BN700</td>
<td>Co Compound</td>
<td>90 ~ 95</td>
<td>2</td>
<td>40 ~ 43</td>
<td>1,20 ~ 1,30</td>
<td>–</td>
<td>–</td>
<td>Maintains good wear and fracture resistance in rough cutting of sintered components.</td>
</tr>
<tr>
<td></td>
<td>BN7000</td>
<td>Co Compound</td>
<td>90 ~ 95</td>
<td>2</td>
<td>41 ~ 44</td>
<td>1,30 ~ 1,40</td>
<td>–</td>
<td>–</td>
<td>Improved wear and fracture resistance in rough cutting of sintered components.</td>
</tr>
<tr>
<td></td>
<td>BN700</td>
<td>Co Compound</td>
<td>90 ~ 95</td>
<td>2</td>
<td>40 ~ 43</td>
<td>1,20 ~ 1,30</td>
<td>–</td>
<td>–</td>
<td>Maintains good wear and fracture resistance in rough cutting of cast iron and exotic alloy.</td>
</tr>
<tr>
<td></td>
<td>BN7000</td>
<td>Co Compound</td>
<td>90 ~ 95</td>
<td>2</td>
<td>41 ~ 44</td>
<td>1,30 ~ 1,40</td>
<td>–</td>
<td>–</td>
<td>Improved wear and fracture resistance in rough cutting of cast iron and exotic alloy.</td>
</tr>
<tr>
<td></td>
<td>BNS800</td>
<td>Al Alloy</td>
<td>85 ~ 90</td>
<td>8</td>
<td>39 ~ 42</td>
<td>0,95 ~ 1,10</td>
<td>–</td>
<td>–</td>
<td>100% solid CBN structure with good thermal impact resistance.</td>
</tr>
<tr>
<td></td>
<td>BNC500</td>
<td>TiC</td>
<td>60 ~ 65</td>
<td>4</td>
<td>32 ~ 34</td>
<td>1,00 ~ 1,10</td>
<td>TiAlN</td>
<td>2</td>
<td>Substrate with excellent wear resistance and coating makes this grade suited for hard-to-cut cast iron.</td>
</tr>
</tbody>
</table>
Excellent wear resistance, longer tool life, and high-speed, high-efficiency, high-precision cutting of non-ferrous metals and non-metals.

SUMIDIA is a polycrystalline diamond material made from sintered diamond powder that was first created using our proprietary technology in 1978. SUMIDIA’s superior wear resistance achieves longer tool life, high speed, high efficiency and high precision in non-metal cutting and non-ferrous metal applications including aluminium, copper, magnesium and zinc alloys.

Characteristics DA1000

The DA1000 utilises Sumitomo Electric Hardmetal’s proprietary sintering technology to achieve a high-density sintered material made of ultra-fine diamond particles that has superior wear and fracture resistance and longer tool life.

Polycrystalline Diamond Subjected to Acid Treatment

Grade Range Map

<table>
<thead>
<tr>
<th>Class</th>
<th>Series</th>
<th>Classification</th>
<th>Finishing ~ Light Cutting</th>
<th>Medium Cutting</th>
<th>Rough ~ Heavy Cutting</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>01</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>SUMIDIA Binderless</td>
<td></td>
<td></td>
<td>NPD10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Classification</td>
<td></td>
<td></td>
<td>N01</td>
<td>N02</td>
<td>N20</td>
</tr>
<tr>
<td>PCD (sintered)</td>
<td></td>
<td></td>
<td>DA150</td>
<td></td>
<td></td>
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</table>

Characteristic Values

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th>Binder</th>
<th>Carbon Content (%)</th>
<th>Grain Size (μm)</th>
<th>Hardness HV (GPa)</th>
<th>TRS (GPa)</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>DA1000</td>
<td>Co</td>
<td></td>
<td>90 ~ 95</td>
<td>~ 0,5</td>
<td>110 ~ 120</td>
<td>≈ 2,60</td>
<td>High density sintered material made of ultra-fine diamond particles that demonstrates optimum wear and fracture resistance, and edge sharpness.</td>
</tr>
<tr>
<td>DA150</td>
<td>Co</td>
<td></td>
<td>85 ~ 90</td>
<td>5</td>
<td>100 ~ 120</td>
<td>≈ 1,95</td>
<td>Sintered material made of fine diamond particles that provides a good balance of workability and wear resistance.</td>
</tr>
</tbody>
</table>
SUMIDIA Binderless Series uses nano-polycrystalline diamond for the cutting edge and demonstrates excellent wear and fracture resistance compared to conventional sintered diamond tools. In particular, SUMIDIA Binderless Series allows for improvements in tool life and machining precision that go far beyond conventional diamond tools in the machining of hard brittle materials, such as carbide.

**Excellent for High Precision Machining of Carbide**
Nano-polycrystalline diamond with excellent wear resistance achieves high precision machining of carbide.

**Maintains Superior Dimensional Tolerances Over Many Hours**
Greatly reduces the number of tool replacements compared to conventional diamond tools and increases work efficiency while reducing total costs.

**Suitable for Hard Brittle Material Machining**
Hard brittle materials (such as ceramics) that could only be ground before can now be cut.

**Characteristics**

**Comparison of Structure**

<table>
<thead>
<tr>
<th>Nano-Polycrystalline Diamond SEM Structure</th>
<th>Conventional PCD SEM Structure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diamond Particles (30 ~ 50nm)</td>
<td>Diamond Particles (1 ~ 10μm)</td>
</tr>
</tbody>
</table>

**Hardness**

- **Nano-Polycrystalline Diamond**: No anisotropy and ultra-hard
- **Single-crystal Diamond**: Hardness depends on face orientation
- **Conventional PCD**: Load 4.9N

**Application (Carbide Machining)**

**Recommend Cutting Conditions (Carbide Machining)**

<table>
<thead>
<tr>
<th>Work Material</th>
<th>Classification</th>
<th>Hardness (HRA)</th>
<th>SEH Grade</th>
<th>Cutting Conditions</th>
<th>Coolant: Dry</th>
<th>Min. - Optimum - Max.</th>
<th>Cutting Speed vc (m/min)</th>
<th>Feed Rate f (mm/rev)</th>
<th>Depth of Cut a₀ (mm/rev)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>VM VC</td>
<td>70</td>
<td>60 50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>83 ~ 87</td>
<td>G7 G6</td>
<td>5 - 20 - 30</td>
<td>0.03 - 0.10 - 0.20</td>
<td>0.03 - 0.10 - 0.20</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>VM VC</td>
<td>40</td>
<td>≥ 88</td>
<td>5 - 15 - 30</td>
<td>0.03 - 0.05 - 0.07</td>
<td>0.03 - 0.10 - 0.20</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Coated Carbide

### Application Class | Sumitomo Electric | Mitsubishi | Tungaloy | Kyocera | Mitsubishi-Hitachi | Sandvik | Kenmetal | Dijet | Valenite | SECO Tools Japan | WALTER | ISCAR
<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>P05</td>
<td>AC805P</td>
<td>UE6105</td>
<td>T9105</td>
<td>CA510</td>
<td>CAS505</td>
<td>HG8010</td>
<td>GC4205</td>
<td>KCP05</td>
<td>KC1050</td>
<td>JC1100</td>
<td>VP5615</td>
<td>TP0050</td>
</tr>
<tr>
<td>P10</td>
<td>AC810P</td>
<td>UE6110</td>
<td>T9115</td>
<td>CA515</td>
<td>CAS515</td>
<td>HG8010</td>
<td>GC4215</td>
<td>KCP10</td>
<td>KC1051</td>
<td>JC1010</td>
<td>SV310</td>
<td>TP1000</td>
</tr>
<tr>
<td>P20</td>
<td>AC8025P</td>
<td>UE6205</td>
<td>T9125</td>
<td>CA525</td>
<td>CAS525</td>
<td>HG2225</td>
<td>GC4225</td>
<td>KCP25</td>
<td>KC1052</td>
<td>JC2116</td>
<td>SV315</td>
<td>TP2500</td>
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<tr>
<td>P30</td>
<td>AC830P</td>
<td>UE6305</td>
<td>T9135</td>
<td>CA530</td>
<td>CAS530</td>
<td>IP3000</td>
<td>GC4235</td>
<td>KCP30</td>
<td>KC1053</td>
<td>JC1216</td>
<td>SV315</td>
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</tr>
<tr>
<td>P40</td>
<td>AC830P</td>
<td>UE6400</td>
<td>T9135</td>
<td>PR660</td>
<td>CAS530</td>
<td>IP3000</td>
<td>GC4235</td>
<td>KCP35</td>
<td>KC1054</td>
<td>JC2316</td>
<td>SV325</td>
<td>TP5000</td>
</tr>
</tbody>
</table>

### Turning Class

| M10               | AC610M           | MC7015      | T9115    | CA6515    | PR1125            | IP1005 | GC2015    | KC2015 | HC1050 | JC1316              | VP5825  | TP1500  |
| M20               | AC602M           | MC7025      | T9120    | CA6525    | PR1125            | IP1005 | GC2025    | KC2025 | HC1051 | JC1416              | VP5825  | TP2500  |
| M30               | AC603M           | MC7035      | T9125    | CA6525    | PR1125            | IP1005 | GC2035    | KC2035 | HC1052 | JC1516              | VP5825  | TP3500  |

### Milling Class

| M10               | ACM100           | AH9030      | PR1125    | JC1025    | PR1125            | IP1005 | GC2025    | JC2125 | HC1053 | JC1616              | VP5825  | TP1500  |
| M20               | ACM200           | AH9030      | PR1125    | JC1025    | PR1125            | IP1005 | GC2025    | JC2125 | HC1054 | JC1716              | VP5825  | TP2500  |
| M30               | ACM300           | AH9030      | PR1125    | JC1025    | PR1125            | IP1005 | GC2025    | JC2125 | HC1055 | JC1816              | VP5825  | TP3500  |

### Drills

| K05               | AC405K           | AH9030      | PR1125    | JC1025    | PR1125            | IP1005 | GC2025    | JC2125 | HC1056 | JC1916              | VP5825  | TP1500  |
| K10               | AC415K           | AH9030      | PR1125    | JC1025    | PR1125            | IP1005 | GC2025    | JC2125 | HC1057 | JC2016              | VP5825  | TP2500  |
| K20               | AC420K           | AH9030      | PR1125    | JC1025    | PR1125            | IP1005 | GC2025    | JC2125 | HC1058 | JC2116              | VP5825  | TP3500  |

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**Grade Comparison Chart**

- **Grades:** K, M, S, P, K, M, S, P
- **Manufacturers:** Hitachi, Sandvik, Kennametal, Dijet, Valenite, SECO Tools, Japan WALTER, ISCAR
### Grade Comparision Chart

#### Cermet

<table>
<thead>
<tr>
<th>Application</th>
<th>Class</th>
<th>Sumitomo Electric</th>
<th>Mitsubishi</th>
<th>Tungaloy</th>
<th>Kyocera</th>
<th>Mitsubishi-Hitachi</th>
<th>Sandvik</th>
<th>Kennametal</th>
<th>Dijet</th>
<th>Valenite</th>
<th>SECO Tools Japan</th>
<th>WALTER</th>
<th>ISCAR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Turning</td>
<td>P10</td>
<td>T1000A</td>
<td>NX255</td>
<td>NS525</td>
<td>GT250*</td>
<td>TN60</td>
<td>PV90</td>
<td>LN10</td>
<td>CX60</td>
<td>VC605</td>
<td>IC20N IC520N</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>P20</td>
<td>T1500A/T15000Z*</td>
<td>NX255</td>
<td>NS525</td>
<td>NS930</td>
<td>GT930* GT1530* GT1730*</td>
<td>CH550</td>
<td>CT5015</td>
<td>KC125 HTX KT1120</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>P30</td>
<td>T3000Z*</td>
<td>NX305</td>
<td>MP9025*</td>
<td>PV7025* PV90*</td>
<td>CT5015</td>
<td>CX90</td>
<td>CN60</td>
<td>VC120</td>
<td>VC610</td>
<td>IC30N IC530N</td>
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<tr>
<td>Milling</td>
<td>K10</td>
<td>T1000A</td>
<td>AP25N</td>
<td>NX255</td>
<td>GT250*</td>
<td>TN60</td>
<td>PV90</td>
<td>LN10</td>
<td>CX50</td>
<td>VC605</td>
<td></td>
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<td>T250A</td>
<td>NX4545</td>
<td>VP49N*</td>
<td>NS540</td>
<td>NS740</td>
<td>TC60M</td>
<td>MN100M</td>
<td>CT530</td>
<td>KT530M*</td>
<td>IC30N</td>
<td></td>
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</tbody>
</table>

* denotes coated cermet

#### Uncoated Carbide

<table>
<thead>
<tr>
<th>Class</th>
<th>Grade</th>
<th>Sumitomo Electric</th>
<th>Mitsubishi</th>
<th>Tungaloy</th>
<th>Kyocera</th>
<th>Hitachi</th>
<th>Sandvik</th>
<th>Kennametal</th>
<th>Dijet</th>
<th>SECO Tools Japan</th>
<th>ISCAR</th>
</tr>
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<tr>
<td></td>
<td>P10</td>
<td>ST10P</td>
<td>WS10</td>
<td>S1P</td>
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<td>IC70 IC50M</td>
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<td>P20</td>
<td>ST20E</td>
<td>UTI20T</td>
<td>UX30</td>
<td>EX35</td>
<td>SMA</td>
<td>K125M</td>
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<td>EX40</td>
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<tr>
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<td>IC70 IC50M</td>
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</tr>
<tr>
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<td>UX30</td>
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<td></td>
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<td>IC70 IC50M</td>
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<tr>
<td></td>
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<td>UTI20T</td>
<td>UX30</td>
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<td>H10F</td>
<td>SM30</td>
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<td>IC70 IC50M</td>
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<td>H2 H1</td>
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<td>IC50 IC8 IC28</td>
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<td>IC50 IC8 IC28</td>
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<td>MM105M12M</td>
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### Fine-grained Carbide

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## Properties of Basic Materials

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<th>Specific Gravity</th>
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<th>Young’s Modulus (GPa)</th>
<th>Thermal Conductivity Coefficient (W/m·°C)</th>
<th>Linear-Thermal Expansion Coefficient (x 10⁻⁶/°C)</th>
<th>Melting Point (°C)</th>
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