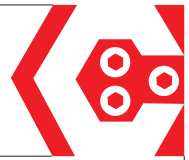


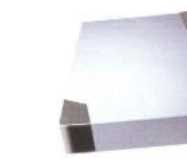



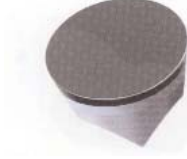



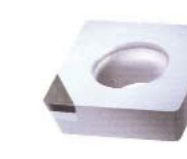















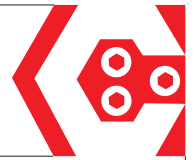


PCBN - PCD inserts

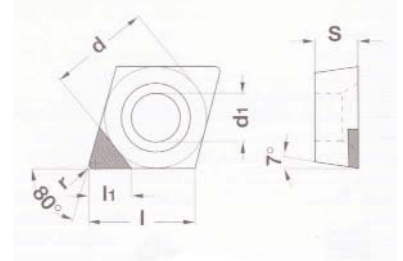




| | | | | |
|--|---|---|--|--|
| P C B N | <p>CCMT EW</p>  <p>Page 1</p> | <p>CCMW EW</p>  <p>Page 1</p> | <p>CNMN</p>  <p>Page 2</p> | <p>DCMW EW</p>  <p>Page 2</p> |
| | <p>RNGN Solid</p>  <p>Page 3</p> | <p>RNGN FullFace</p>  <p>Page 3</p> | <p>RCGX FullFace</p>  <p>Page 3</p> | <p>RCGX Solid</p>  <p>Page 4</p> |
| | <p>SNGN Solid</p>  <p>Page 5</p> | <p>SNMN</p>  <p>Page 5</p> | <p>SCMW EW</p>  <p>Page 5</p> | <p>TCMW EW</p>  <p>Page 6</p> |
| | <p>TPGN EW</p>  <p>Page 6</p> | <p>VBMW EWS</p>  <p>Page 7</p> | <p>VNMG s</p>  <p>Page 7</p> | <p>VNMA M</p>  <p>Page 7</p> |
| | <p>VNMA mw</p>  <p>Page 7</p> | <p>CCMW</p>  <p>Page 9</p> | <p>DCMW</p>  <p>Page 9</p> | <p>SCMW</p>  <p>Page 10</p> |
| | <p>SPGN</p>  <p>Page 10</p> | <p>TCMW</p>  <p>Page 11</p> | <p>TPGN</p>  <p>Page 11</p> | <p>VBMW</p>  <p>Page 12</p> |
| | <p>P C D</p> | | | |

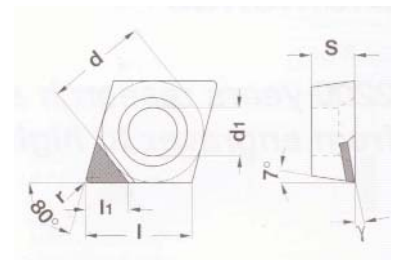
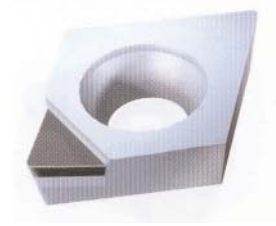


CCMT EW



| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|-----|-----|------|-------|
| | ISO | d | s | r | d1 | CBN10 |
| CCMT 060202 | 6.35 | 2.38 | 0.2 | 2.8 | + | + |
| CCMT 060204 | 6.35 | 2.38 | 0.4 | 2.8 | + | + |
| CCMT 060208 | 6.35 | 2.38 | 0.8 | 2.8 | + | + |
| CCMT 09T302 | 9.52 | 3.97 | 0.2 | 4.4 | + | + |
| CCMT 09T304 | 9.52 | 3.97 | 0.4 | 4.4 | + | + |
| CCMT 09T308 | 9.52 | 3.97 | 0.8 | 4.4 | + | + |

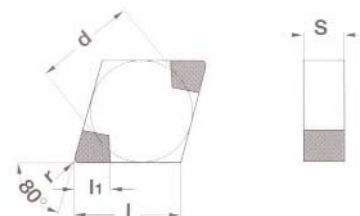
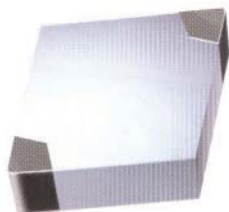
CCMW EW



| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|-----|-----|------|-------|
| | ISO | d | s | r | d1 | CBN10 |
| CCMW 060202 | 6.35 | 2.38 | 0.2 | 2.8 | + | + |
| CCMW 060204 | 6.35 | 2.38 | 0.4 | 2.8 | + | + |
| CCMW 060208 | 6.35 | 2.38 | 0.8 | 2.8 | + | + |
| CCMW 090304 | 9.52 | 3.18 | 0.4 | 4.4 | + | + |
| CCMW 090308 | 9.52 | 3.18 | 0.8 | 4.4 | + | + |
| CCMW 09T302 | 9.52 | 3.97 | 0.2 | 4.4 | + | + |
| CCMW 09T304 | 9.52 | 3.97 | 0.4 | 4.4 | + | + |
| CCMW 09T308 | 9.52 | 3.97 | 0.8 | 4.4 | + | + |
| CCMW 09T312 | 9.52 | 3.97 | 1.2 | 4.4 | + | + |
| CCMW 120404 | 12.7 | 4.76 | 0.4 | 5.5 | + | + |
| CCMW 120408 | 12.7 | 4.76 | 0.8 | 5.5 | + | + |

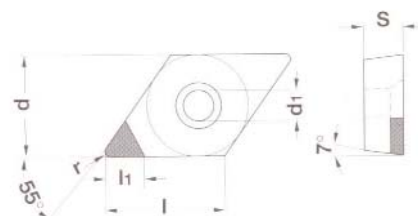
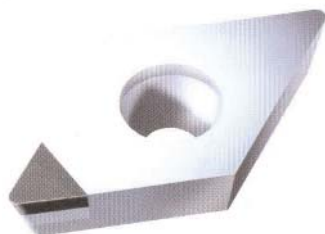


CNMN

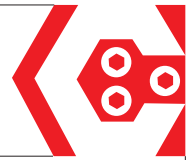


| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|-----|----|-------|-------|
| ISO | d | s | r | d1 | CBN10 | CBN20 |
| CNMN 090304 | 9.52 | 3.18 | 0.4 | - | + | + |
| CNMN 090308 | 9.52 | 3.18 | 0.8 | - | + | + |
| CNMN 090312 | 9.52 | 3.18 | 1.2 | - | + | + |
| CNMN 090404 | 12.7 | 4.76 | 0.4 | - | + | + |
| CNMN 090408 | 12.7 | 4.76 | 0.8 | - | + | + |
| CNMN 090412 | 12.7 | 4.76 | 1.2 | - | + | + |

DCMW EW



| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|-----|-----|-------|-------|
| ISO | d | s | r | d1 | CBN10 | CBN20 |
| DCMW 070202 | 6.35 | 2.38 | 0.1 | 2.8 | + | + |
| DCMW 070204 | 6.35 | 2.38 | 0.2 | 2.8 | + | + |
| DCMW 070208 | 6.35 | 2.38 | 0.4 | 2.8 | + | + |
| DCMW 110302 | 6.35 | 2.38 | 0.8 | 2.8 | + | + |
| DCMW 110304 | 9.52 | 3.18 | 0.2 | 4.4 | + | + |
| DCMW 110308 | 9.52 | 3.18 | 0.4 | 4.4 | + | + |
| DCMW 11T302 | 9.52 | 3.18 | 0.8 | 4.4 | + | + |
| DCMW 11T304 | 9.52 | 3.97 | 0.1 | 4.4 | + | + |
| DCMW 11T308 | 9.52 | 3.97 | 0.2 | 4.4 | + | + |
| DCMW 150404 | 9.52 | 3.97 | 0.4 | 4.4 | + | + |
| DCMW 150408 | 9.52 | 3.97 | 0.8 | 4.4 | + | + |



RNGN Solid



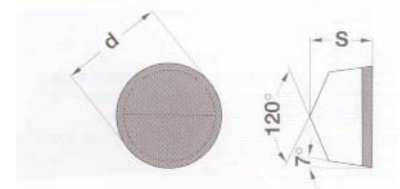
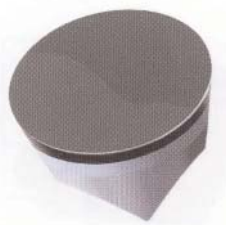
| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|---|----|-------|-------|
| ISO | d | s | r | d1 | CBN10 | CBN20 |
| RNGN 090300 | 9.52 | 3.18 | - | - | + | + |
| RNGN 120300 | 12.7 | 3.18 | - | - | + | + |
| RNGN 120400 | 12.7 | 4.76 | - | - | + | + |

RNGN FullFace

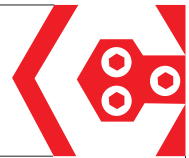


| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|---|----|-------|-------|
| ISO | d | s | r | d1 | CBN10 | CBN20 |
| RNGN 090300 | 9.52 | 3.18 | - | - | + | + |
| RNGN 120400 | 12.7 | 4.76 | - | - | + | + |

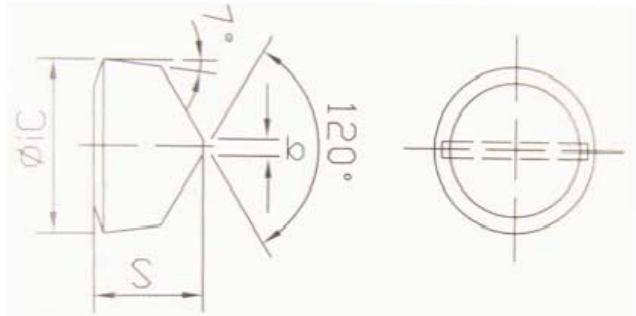
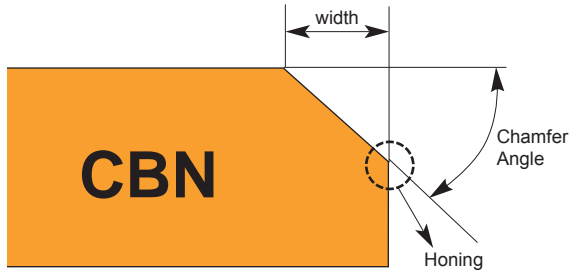
RCGX FullFace



| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|---|----|-------|-------|
| ISO | d | s | r | d1 | CBN10 | CBN20 |
| RCGX 060600 | 6.35 | 6.35 | - | - | + | + |
| RCGX 090700 | 9.52 | 7.94 | - | - | + | + |
| RCGX 120700 | 12.7 | 7.94 | - | - | + | + |



RCGX Solid



T = Chamfer (no hone)
S = Chamfer (hone)

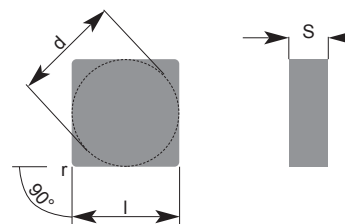
| Solid CBN insert | L | IC | S | b | Edge.Prepare |
|------------------|--------|--------|------|-----|--------------|
| RCGX 060400 | 6.35 | 6.35 | 4.76 | 0.8 | T01020 |
| RCGX 060600 | 6.35 | 6.35 | 6.35 | 0.8 | T01025 |
| RCGX 090700 | 9.525 | 9.525 | 7.94 | 1 | T02020 |
| RCGX 120700 | 12.7 | 12.7 | 7.94 | 2 | S01020 |
| RCGX 151000 | 15.875 | 15.875 | 10.0 | 2 | S02020 |
| RCGX 191000 | 19.05 | 19.05 | 10.0 | 2 | S05020 |
| RCGX 201200 | 20.0 | 20.0 | 12.0 | 2 | S10020 |
| RCGX 251200 | 25.4 | 25.4 | 12.0 | 2 | S20020 |

| Solid CBN | Welded CBN Full Face | Bind | CBN Percentage (%) | Size | Hardness HV (Mpa) | E6 | DI | SUMITOMO | SECO |
|-----------|----------------------|-------|--------------------|------|-------------------|-------|-------------|----------|--------|
| CBN10 | CS10 | TiN | 85 | 6-12 | 3000-3100 | | | | |
| CBN19 | CS19 | TiN | 90 | 6-12 | 3500-3600 | | | | |
| CBN20 | CS20 | TiN | 90 | 6-12 | 3000-3100 | | | | |
| CBN30 | CS30 | TiC | 83 | 2 | 3200-3400 | DBW85 | | | CBN200 |
| CBN31 | CS31 | TiN | 90 | 6-12 | 3300-3500 | AMB90 | BZN 7000S | BNS800 | CBN300 |
| CBN32 | CS32 | Co+Al | 90 | 2 | 3500-3600 | DBS90 | BZN 6000 | | CBN200 |
| CBN80 | CS80 | TiN | 75 | 6-12 | 3000-3200 | | DZN 9000 | BNS700 | |
| CBN81 | CS81 | TiN | 55 | 2 | 2700-2900 | DBC50 | BZN 8200 | | |
| CT351 | CT351 | TiN | 90 | 2 | 3300-3500 | | BZN 6000 | BN600 | |
| CT352 | CT3520 | TiN | 95 | 2 | 3400-3600 | | BZN 9100 | BN700 | |
| CT851 | CT851 | TiN | 55 | 2 | 2900-3100 | | BZNHTM 2100 | BN250 | |
| CN40 | CN402 | TiC | 83 | 2 | 3200-3400 | | | | |
| CN60 | CN602 | TiN | 55 | 2 | 2700-2900 | | | | |
| CN80 | CN452 | TiN | 95 | 2 | 3400-3600 | | BZN 9100 | BN700 | |

| Grade | Mainly Application | Workpiece | Features |
|-------|---------------------------|---|--|
| CBN10 | Cast Iron Rough | Roller in bad condition ,Brake disk,Brake drum,Pump, | Very good anti-shock resistance for roughing speed machining cast iron workpiece |
| CBN19 | Cast Iron Rough, Carbide | Brake -disk, -drum,Pump,Roller, Carb. Rolls, Int. Cut/Turning | Long life rough working for cast iron workpiece |
| CBN20 | Cast Iron Rough, Carbide | Brake disk,brake drum,Pump,Roller, Carbide Rolls | Long life rough working for cast iron workpiece |
| CBN30 | Cast Iron Rough+Finish | Alloy cast iron, gray cast iron, ductile cast iron workpiece | Both for Steel and Cast Iron workpiece |
| CBN31 | Cast Iron Rough | Brake disk,brake drum,Pump,Roller | Rough cast iron |
| CBN32 | Cast Iron Finish, Carbide | Brake drum,Brake disk , Carbide Rolls | Finish Cast iron workpiece,long insert life |
| CBN80 | Hardened Steel Rough | HSS Roller,Gear,Bearing | Rough+Interrupted turning |
| CBN81 | Hardened Steel Finish | HSS Roller,Gear,Bearing | Finish Continuous turning |

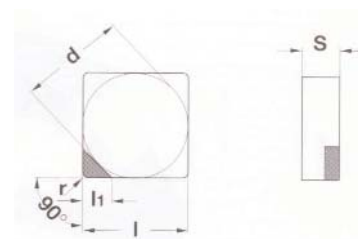


SNGN Solid



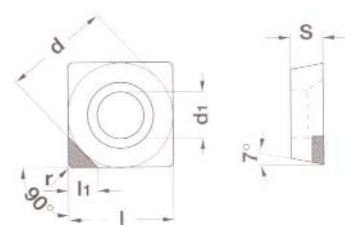
| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|-----|----|-------|-------|
| ISO | d | s | r | d1 | CBN10 | CBN20 |
| SNGN 090304 | 9.52 | 3.18 | 0.4 | - | + | + |
| SNGN 090308 | 9.52 | 3.18 | 0.8 | - | + | + |
| SNGN 090312 | 9.52 | 3.18 | 1.2 | - | + | + |
| SNGN 120404 | 12.7 | 4.76 | 0.4 | - | + | + |
| SNGN 120408 | 12.7 | 4.76 | 0.8 | - | + | + |
| SNGN 120412 | 12.7 | 4.76 | 1.2 | - | + | + |

SNMN

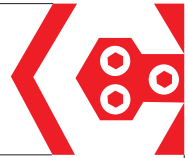


| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|-----|----|-------|-------|
| ISO | d | s | r | d1 | CBN10 | CBN20 |
| SNMN 120404 | 12.7 | 4.76 | 0.4 | - | + | + |
| SNMN 120408 | 12.7 | 4.76 | 0.8 | - | + | + |
| SNMN 120412 | 12.7 | 4.76 | 1.2 | - | + | + |

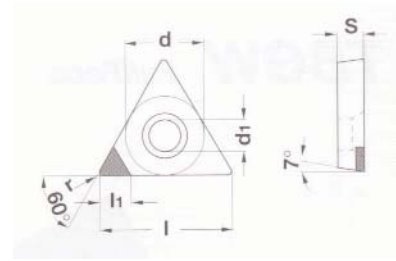
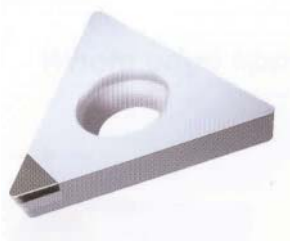
SCMW EW



| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|-----|-----|-------|-------|
| ISO | d | s | r | d1 | CBN10 | CBN20 |
| SCMW 09T304 | 9.52 | 3.97 | 0.4 | 4.4 | + | + |
| SCMW 09T308 | 9.52 | 3.97 | 0.8 | 4.4 | + | + |
| SCMW 120404 | 12.7 | 4.76 | 0.4 | 5.5 | + | + |
| SCMW 120408 | 12.7 | 4.76 | 0.8 | 5.5 | + | + |
| SCMW 120412 | 12.7 | 4.76 | 1.2 | 5.5 | + | + |

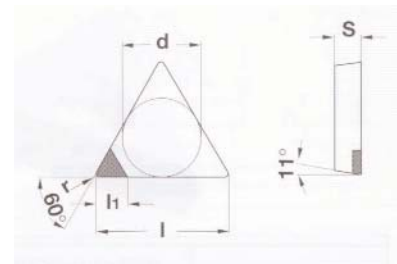
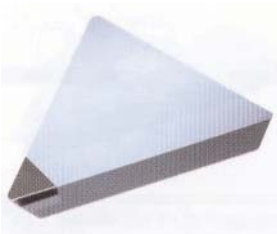


TCMW EW

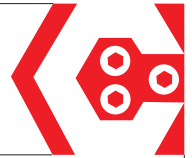


| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|-----|-----|-------|-------|
| ISO | d | s | r | d1 | CBN10 | CBN20 |
| TCMW 090202 | 5.56 | 2.38 | 0.2 | 2.5 | + | + |
| TCMW 090204 | 5.56 | 2.38 | 0.4 | 2.5 | + | + |
| TCMW 090208 | 5.56 | 2.38 | 0.8 | 2.5 | + | + |
| TCMW 110202 | 6.35 | 2.38 | 0.2 | 2.8 | + | + |
| TCMW 110204 | 6.35 | 2.38 | 0.4 | 2.8 | + | + |
| TCMW 110208 | 6.35 | 2.38 | 0.8 | 2.8 | + | + |
| TCMW 110212 | 6.35 | 2.38 | 1.2 | 2.8 | + | + |
| TCMW 16T304 | 9.52 | 3.97 | 0.4 | 4.4 | + | + |
| TCMW 16T308 | 9.52 | 3.97 | 0.8 | 4.4 | + | + |

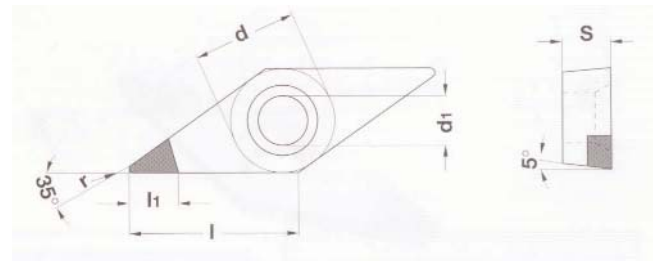
TPGN EW



| Type | Dimensions (mm) | | | | PCBN | |
|-------------|-----------------|------|-----|----|-------|-------|
| ISO | d | s | r | d1 | CBN10 | CBN20 |
| TPGN 090204 | 5.56 | 2.38 | 0.4 | - | + | + |
| TPGN 110204 | 6.35 | 2.38 | 0.4 | - | + | + |
| TPGN 110302 | 6.35 | 3.18 | 0.2 | - | + | + |
| TPGN 110304 | 6.35 | 3.18 | 0.4 | - | + | + |
| TPGN 110308 | 6.35 | 3.18 | 0.8 | - | + | + |
| TPGN 160304 | 9.52 | 3.18 | 0.4 | - | + | + |
| TPGN 160308 | 9.52 | 3.18 | 0.8 | - | + | + |

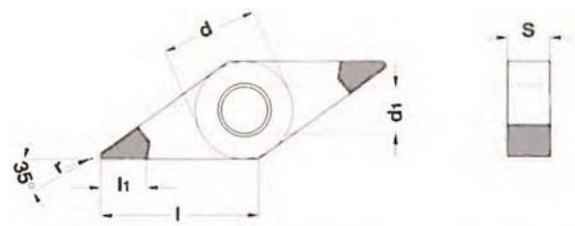


VBMW EWS



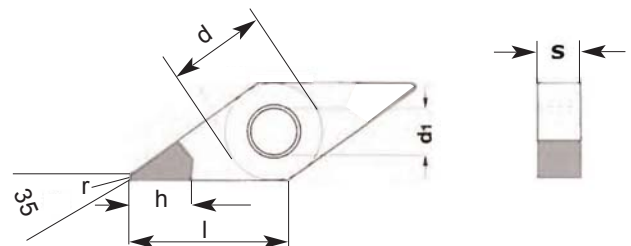
| Type | Dimensions (mm) | | | | PCBN | | |
|-------------|-----------------|------|------|-----|------|-------|-------|
| | ISO | d | s | r | d1 | CBN10 | CBN20 |
| VBMW 110202 | | 6.35 | 2.38 | 0.2 | 2.9 | + | + |
| VBMW 110204 | | 6.35 | 2.38 | 0.4 | 2.9 | + | + |
| VBMW 160402 | | 9.52 | 4.76 | 0.2 | 4.4 | + | + |
| VBMW 160404 | | 9.52 | 4.76 | 0.4 | 4.4 | + | + |
| VBMW 160408 | | 9.52 | 4.76 | 0.8 | 4.4 | + | + |

VNMA M

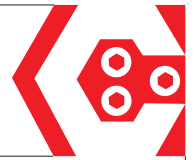


| Type | Dimensions (mm) | | | | PCBN | | |
|---------------|-----------------|------|------|-----|------|-------|-------|
| | ISO | d | s | r | d1 | CBN10 | CBN20 |
| VNMA 160404-M | | 9.52 | 4.76 | 0.4 | 3.81 | + | + |
| VNMA 160408-M | | 9.52 | 4.76 | 0.8 | 3.81 | + | + |
| VNMA 160412-M | | 9.52 | 4.76 | 1.2 | 3.81 | + | + |

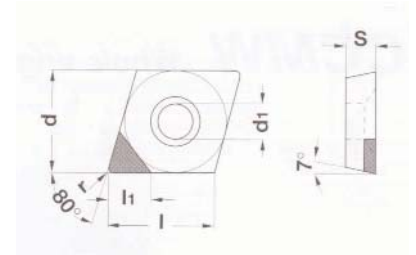
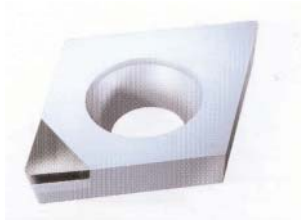
VNMA MW



| Type | Dimensions (mm) | | | | PCBN | | |
|----------------|-----------------|------|------|-----|------|-------|-------|
| | ISO | d | s | r | d1 | CBN10 | CBN20 |
| VNMA 160404-MW | | 9.52 | 4.76 | 0.4 | 3.81 | + | + |
| VNMA 160408-MW | | 9.52 | 4.76 | 0.8 | 3.81 | + | + |
| VNMA 160412-MW | | 9.52 | 4.76 | 1.2 | 3.81 | + | + |
| VNMA 160416-MW | | 9.52 | 4.76 | 1.6 | 3.81 | + | + |

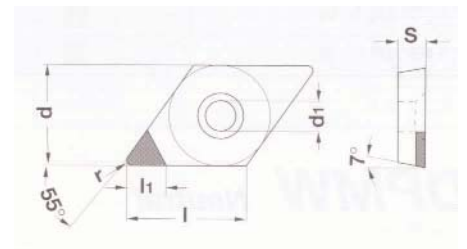
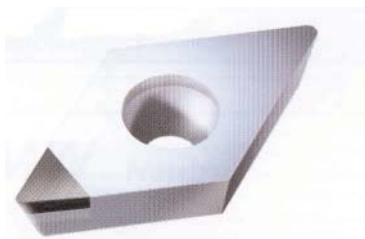


CCMW

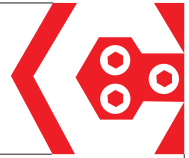


| Type | Dimensions (mm) | | | | PCD | | |
|-------------|-----------------|------|-----|-----|-----|-------|-------|
| | ISO | d | s | r | d1 | PCD10 | PCD20 |
| CCMW 060202 | 6.35 | 2.38 | 0.2 | 2.8 | + | + | + |
| CCMW 060204 | 6.35 | 2.38 | 0.4 | 2.8 | + | + | + |
| CCMW 060208 | 6.35 | 2.38 | 0.8 | 2.8 | + | + | + |
| CCMW 09T302 | 9.52 | 3.97 | 0.2 | 4.4 | + | + | + |
| CCMW 09T304 | 9.52 | 3.97 | 0.4 | 4.4 | + | + | + |
| CCMW 09T308 | 9.52 | 3.97 | 0.8 | 4.4 | + | + | + |
| CCMW 120404 | 12.7 | 4.76 | 0.4 | 5.5 | + | + | + |
| CCMW 120408 | 12.7 | 4.76 | 0.8 | 5.5 | + | + | + |

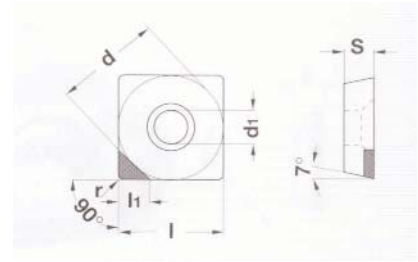
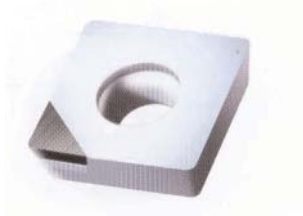
DCMW



| Type | Dimensions (mm) | | | | PCD | | |
|-------------|-----------------|------|-----|-----|-----|-------|-------|
| | ISO | d | s | r | d1 | PCD10 | PCD20 |
| DCMW 070201 | 6.35 | 2.38 | 0.1 | 2.8 | + | + | + |
| DCMW 070202 | 6.35 | 2.38 | 0.2 | 2.8 | + | + | + |
| DCMW 070204 | 6.35 | 2.38 | 0.4 | 2.8 | + | + | + |
| DCMW 070208 | 6.35 | 2.38 | 0.8 | 2.8 | + | + | + |
| DCMW 110302 | 9.52 | 3.18 | 0.2 | 4.4 | + | + | + |
| DCMW 110304 | 9.52 | 3.18 | 0.4 | 4.4 | + | + | + |
| DCMW 110308 | 9.52 | 3.18 | 0.8 | 4.4 | + | + | + |
| DCMW 11T301 | 9.52 | 3.97 | 0.1 | 4.4 | + | + | + |
| DCMW 11T302 | 9.52 | 3.97 | 0.2 | 4.4 | + | + | + |
| DCMW 11T304 | 9.52 | 3.97 | 0.4 | 4.4 | + | + | + |
| DCMW 11T308 | 9.52 | 3.97 | 0.8 | 4.4 | + | + | + |
| DCMW 11T312 | 9.52 | 3.97 | 1.2 | 4.4 | + | + | + |
| DCMW 150404 | 12.7 | 4.76 | 0.4 | 5.5 | + | + | + |
| DCMW 150408 | 12.7 | 4.76 | 0.8 | 5.5 | + | + | + |

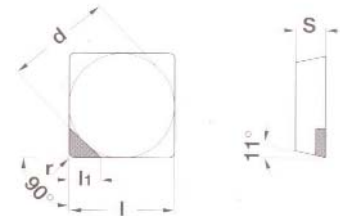


SCMW

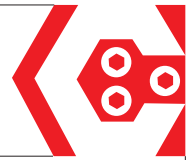


| Type | Dimensions (mm) | | | | PCD | | |
|-------------|-----------------|------|-----|-----|-------|-------|-------|
| ISO | d | s | r | d1 | PCD10 | PCD20 | PCD30 |
| SCMW 09T304 | 9.52 | 3.97 | 0.4 | 4.4 | + | + | + |
| SCMW 09T308 | 9.52 | 3.97 | 0.8 | 4.4 | + | + | + |
| SCMW 09T312 | 9.52 | 3.97 | 1.2 | 4.4 | + | + | + |
| SCMW 120404 | 12.7 | 4.76 | 0.4 | 5.5 | + | + | + |
| SCMW 120408 | 12.7 | 4.76 | 0.8 | 5.5 | + | + | + |
| SCMW 120412 | 12.7 | 4.76 | 1.2 | 5.5 | + | + | + |

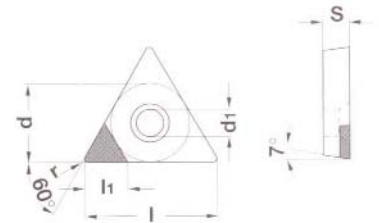
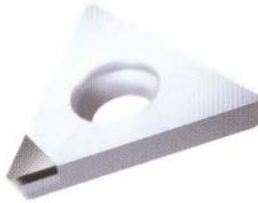
SPGN



| Type | Dimensions (mm) | | | | PCD | | |
|-------------|-----------------|------|-----|----|-------|-------|-------|
| ISO | d | s | r | d1 | PCD10 | PCD20 | PCD30 |
| SPGN 090304 | 9.52 | 3.18 | 0.4 | - | + | + | + |
| SPGN 090308 | 9.52 | 3.18 | 0.8 | - | + | + | + |
| SPGN 120304 | 12.7 | 3.18 | 0.4 | - | + | + | + |
| SPGN 120308 | 12.7 | 3.18 | 0.8 | - | + | + | + |
| SPGN 120312 | 12.7 | 3.18 | 1.2 | - | + | + | + |

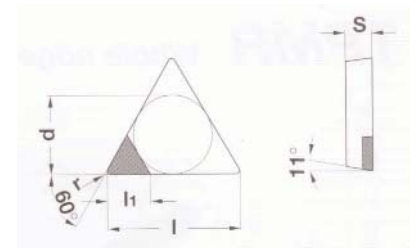


TCMW

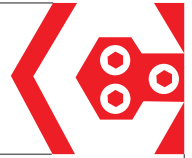


| Type | Dimensions (mm) | | | | PCD | | |
|-------------|-----------------|------|-----|-----|-------|-------|-------|
| | d | s | r | d1 | PCD10 | PCD20 | PCD30 |
| ISO | | | | | | | |
| TCMW 090202 | 5.56 | 2.38 | 0.2 | 2.5 | + | + | + |
| TCMW 090204 | 5.56 | 2.38 | 0.4 | 2.5 | + | + | + |
| TCMW 090208 | 5.56 | 2.38 | 0.8 | 2.5 | + | + | + |
| TCMW 110202 | 6.35 | 2.38 | 0.2 | 2.8 | + | + | + |
| TCMW 110204 | 6.35 | 2.38 | 0.4 | 2.8 | + | + | + |
| TCMW 110208 | 6.35 | 2.38 | 0.8 | 2.8 | + | + | + |
| TCMW 16T304 | 9.52 | 3.97 | 0.4 | 4.4 | + | + | + |
| TCMW 16T308 | 9.52 | 3.97 | 0.8 | 4.4 | + | + | + |
| TCMW 16T312 | 9.52 | 3.97 | 1.2 | 4.4 | + | + | + |

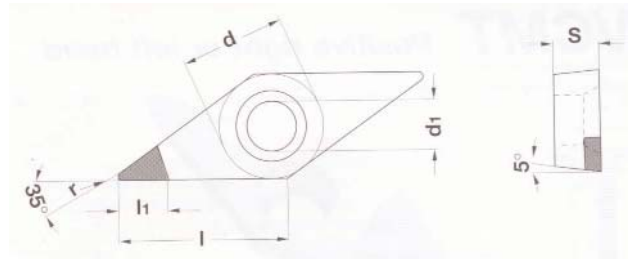
TPGN



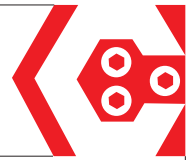
| Type | Dimensions (mm) | | | | PCD | | |
|-------------|-----------------|------|-----|----|-------|-------|-------|
| | d | s | r | d1 | PCD10 | PCD20 | PCD30 |
| ISO | | | | | | | |
| TPGN 090204 | 5.56 | 2.38 | 0.4 | - | + | + | + |
| TPGN 090208 | 5.56 | 2.38 | 0.8 | - | + | + | + |
| TPGN 110204 | 6.35 | 2.38 | 0.4 | - | + | + | + |
| TPGN 110208 | 6.35 | 2.38 | 0.8 | - | + | + | + |
| TPGN 110302 | 6.35 | 3.18 | 0.2 | - | + | + | + |
| TPGN 110304 | 6.35 | 3.18 | 0.4 | - | + | + | + |
| TPGN 110308 | 6.35 | 3.18 | 0.8 | - | + | + | + |
| TPGN 160304 | 9.52 | 3.18 | 0.4 | - | + | + | + |
| TPGN 160308 | 9.52 | 3.18 | 0.8 | - | + | + | + |
| TPGN 160312 | 9.52 | 3.18 | 1.2 | - | + | + | + |



VBMW

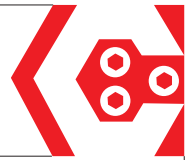


| Type | Dimensions (mm) | | | | PCD | | | |
|-------------|-----------------|------|------|-----|-----|-------|-------|-------|
| | ISO | d | s | r | d1 | PCD10 | PCD20 | PCD30 |
| VBMW 110202 | | 6.35 | 2.38 | 0.2 | 2.9 | + | + | + |
| VBMW 110204 | | 6.35 | 2.38 | 0.4 | 2.9 | + | + | + |
| VBMW 110208 | | 6.35 | 2.38 | 0.8 | 2.9 | + | + | + |
| VBMW 160402 | | 9.52 | 4.76 | 0.2 | 4.4 | + | + | + |
| VBMW 160404 | | 9.52 | 4.76 | 0.4 | 4.4 | + | + | + |
| VBMW 160408 | | 9.52 | 4.76 | 0.8 | 4.4 | + | + | + |
| VBMW 160412 | | 9.52 | 4.76 | 1.2 | 4.4 | + | + | + |



Grade Comparison

| Grade | Comadex | SangYong | NTK | CeramTec | Kennametal | Sandvik | Toshiba | Kyocera | Mitsubishi | Sumitomo |
|----------|---------|----------|-----|----------|------------|---------|---------|---------|------------|----------|
| P | CBN10 | SBN1000 | B16 | WBN100 | KD120 | CB50 | BX950 | KBN65B | MB710 | BN500 |
| | | | B22 | | | | | KBN900 | MB730 | BN600 |
| | CBN19 | SBN2000 | B20 | WBN600 | KD050 | CB20 | BX450 | KBN410 | | BN800 |
| | | | | | | | | B24 | KBN25B | MB810 |
| N | CBN20 | SBN2000 | B20 | WBN600 | KD050 | CB20 | BX450 | KBN510 | MB820 | BN250 |
| | | | | | | | | KBN525 | MB835 | BNC80 |
| P | PCD10 | SPD1000 | | | | | DX120 | KPD002 | MD230 | DA200 |
| | PCD20 | SPD2000 | | | KD100 | CD10 | DX140 | KPD010 | MD220 | DA150 |
| | | | | | KD1415 | | | | | |
| D | PCD30 | SPD3000 | PD1 | | KD100 | | DX160 | KPD025 | MD205 | DA90 |
| | | | | | | | DX180 | | | |



CBN Grades

| Grade | CBN80/CBN81 | CBN30/CBN31 | CBN32 | CBN19/CBN20 |
|--|---|---|---|---|
| CBN% | 50-55 | 60-65 | 90-95 | 90-95 |
| Binder | TiC, Al ₂ O ₃ | TiN, Al ₂ O ₃ | W, Al, Co | W, Al, Co |
| Hardness (Hv) | 2800-3000 | 3000-3200 | 3800-4000 | 3800-4000 |
| K _{IC} (MPam ^{1/2}) | 3.3-3.6 | 3.5-4.0 | 5.0-6.0 | 5.0-6.0 |
| Stability | Stable in Chemical wear | | Stable in physical wear | |
| Application | - Carbon steel - Alloy steel - Surface hardened steel | - Alloy steel - Hardened steel - Chilled cast iron - Ductile cast iron | - Gray cast iron - Tungsten carbide rolls - Chilled cast iron | - Gray cast iron - Tungsten carbide rolls - Chilled cast iron |

Cutting Condition

| Grade | | CBN80/CBN81 | CBN30/CBN31 | CBN32 | CBN19/CBN20 |
|-------------------------------|------------|-------------|-------------|-----------|-------------|
| Hardened Steel (HRc 30-55) | V (m/min) | 200-350 | 150-300 | 80-150 | 80-150 |
| | f (mm/rev) | 0.05-0.18 | 0.05-0.22 | 0.1-0.3 | 0.1-0.3 |
| | DOC (mm) | 0.1-0.5 | 0.1-0.5 | 0.2-1.0 | 0.2-1.0 |
| Chilled Cast Iron (HRc 50-70) | V (m/min) | | 80-150 | 50-120 | 50-120 |
| | f (mm/rev) | | 0.05-0.15 | 0.1-0.25 | 0.1-0.25 |
| | DOC (mm) | | 0.05-0.5 | 0.2-1.0 | 0.2-1.0 |
| Hardmetal (HRc 60-70) | V (m/min) | | | 20-50 | 20-50 |
| | f (mm/rev) | | | 0.05-0.2 | 0.05-0.2 |
| | DOC (mm) | | | 0.1-1.5 | 0.1-1.5 |
| Gray Cast Iron | V (m/min) | | | 400-1,200 | 400-1,200 |
| | f (mm/rev) | | | 0.1-0.3 | 0.1-0.3 |
| | DOC (mm) | | | 0.2-2.0 | 0.2-2.0 |
| Ductile Cast Iron | V (m/min) | 200-500 | 100-400 | | |
| | f (mm/rev) | 0.1-0.2 | 0.1-0.2 | | |
| | DOC (mm) | 0.1-1.0 | 0.1-1.0 | | |
| Carbide Alloy | V (m/min) | | | 10-40 | |
| | f (mm/rev) | | | 0.05-0.25 | |
| | DOC (mm) | | | 0.1-1.0 | |

S - Land (Chamfer + Hone)

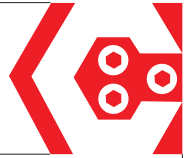
- Suitable for hard part turning
- Stronger edge than T-Land, with more resistance to chipping and fracture
- Perfect surface finish
- Feed rate must be greater than hone size



T - Land (Chamfer)

- T-land is a standard edge preparation for CBN
- Good alternative to S-land in hard part turning by slow cutting forces.





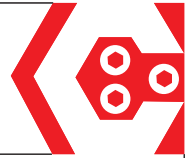
Recommended Cutting Condition

| Application | Grade | | Workpiece | Velocity (V) (m/min) | Feed (f) (mm/rev) | Depth (DOC) (mm) |
|-------------|----------------------|----------------------------|--|-------------------------|------------------------|------------------------|
| Turning | P | PCD10 | Plastic alloy | 300~1,000 | 0.05~0.25 | 0.05~3.00 |
| | | | Wood | 1,000~2,500 | 0.10~0.50 | 0.20~4.50 |
| | C | PCD20 PCD20 | Aluminium / Zinc / Copper | 600~1,000 | 0.05~0.25 | 0.05~0.30 |
| | | | Aluminium alloy (Si 4~8%) | 800~2,500 | 0.10~0.30 | 0.05~3.00 |
| D | PCD20,PCD30 PCD30 | Aluminium alloy (Si 9~14%) | 500~1,290 | 0.10~0.30 | 0.05~3.00 | |
| | | (Si 16~18%) | 300~600 | 0.10~0.30 | 0.05~3.00 | |
| | | PCD30 | Powered Carbide Piece Sintered Cabide | 50~250 20~40 | 0.10~0.40 0.05~0.20 | 0.10~4.00 0.02~0.45 |

| | | | |
|-----|-------|---|--|
| PCD | PCD10 | Machining with fine surface finish Particle Size : 4~5µm | Machining of aluminium and wood Gives fine surface finish in turning operation |
| | PCD20 | Ultra high hardness Great wear resistance Particle Size : 8~9µm | The first choice of PCD grades Turning operation of aluminium and copper alloy Machining aluminium alloy with lower percentage of Si |
| | PCD30 | Maching with interruption Particle Size : 15~22µm | Milling operation of aluminium alloy Maching ultra fine alloy and powder sintered metal cutting of composities |

Application Range

| | Cast Iron | Hard steel | Non-Ferrous metal | Wood |
|-----|---------------------|--------------------------------------|----------------------------------|-------|
| | K01 K10 K20 K30 K40 | Hardened Steel Powder sintered alloy | Aluminium Zinc Copper Composites | |
| PCD | | PCD30 | PCD10 | PCD10 |
| | | | PCD20 | |
| | | | PCD30 | |

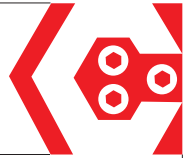


Hardness Conversion Table

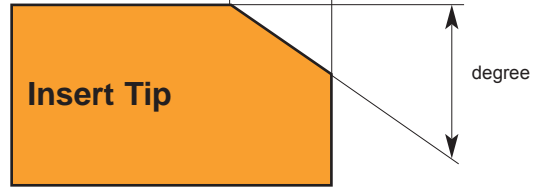
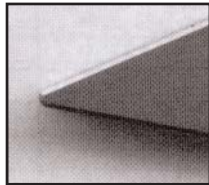
| Brinell 3,000Kgf (HB) | Rockwell | | | | Vickers 50Kgf (HV) | Shore's (HS) | Tensile Strength | Brinell 3,000Kgf (HB) | Rockwell | | | | Vickers 50Kgf (HV) | Shore's (HS) | Tensile Strength |
|-----------------------------|--------------------------------|-----------------------------------|---------------------------------|---------------------------------|--------------------------|-----------------|---------------------|-----------------------------|--------------------------------|-----------------------------------|---------------------------------|---------------------------------|--------------------------|-----------------|---------------------|
| | A Scale 60Kgf Diamond | B Scale 100Kg 1/16"steel | C Scale 150Kgf Diamond | D Scale 100Kgf Diamond | | | | | A Scale 60Kgf Diamond | B Scale 100Kg 1/16"Steel | C Scale 150Kgf Diamond | D Scale 100Kgf Diamond | | | |
| 767 | 85.6 | | 68.0 | 76.9 | 940 | 97 | | 331 | 68.1 | (108.5) | 35.5 | 51.9 | 350 | 48 | 112 |
| 757 | 85.3 | | 67.5 | 76.5 | 920 | 96 | | 331 | 67.5 | (108.5) | 35.5 | 51.0 | 339 | 47 | 108 |
| 745 | 85.0 | | 67.0 | 76.1 | 900 | 95 | | 311 | 66.9 | (107.5) | 33.1 | 50.0 | 28 | 46 | 105 |
| 733 | 84.7 | | 66.4 | 75.7 | 880 | 93 | | 302 | 66.3 | (107.0) | 32.1 | 49.3 | 319 | 45 | 103 |
| 722 | 84.4 | | 65.9 | 75.3 | 860 | 92 | | 293 | 65.7 | (106.0) | 30.9 | 48.3 | 309 | 43 | 99 |
| 712 | 84.1 | | 65.3 | 74.8 | 840 | 91 | | 285 | 65.3 | (105.5) | 29.3 | 47.6 | 301 | | 97 |
| 710 | 83.8 | | 64.7 | 74.3 | 820 | 90 | | 277 | 64.6 | (104.5) | 28.8 | 46.7 | 292 | 41 | 94 |
| 698 | 83.4 | | 64.0 | 73.8 | 800 | 88 | | 269 | 64.1 | (104.0) | 27.6 | 45.9 | 284 | 40 | 91 |
| 684 | 83.0 | | 63.3 | 73.3 | 780 | 87 | | 262 | 63.6 | (103.0) | 26.6 | 45.0 | 276 | 39 | 89 |
| 682 | 82.6 | | 62.5 | 72.6 | 760 | 86 | | 255 | 63.0 | (102.0) | 25.4 | 44.2 | 269 | 38 | 86 |
| 670 | 82.2 | | 61.8 | 72.1 | 740 | | | 248 | 62.5 | (101.0) | 24.2 | 43.2 | 261 | 37 | 84 |
| 656 | 82.2 | | 61.7 | 72.0 | 737 | 84 | | 241 | 61.8 | 100.0 | 22.8 | 42.0 | 253 | 36 | 82 |
| 653 | 81.8 | | 61.0 | 71.5 | 720 | 83 | | 235 | 61.4 | 99.0 | 21.7 | 41.4 | 247 | 35 | 80 |
| 647 | 81.3 | | 60.1 | 70.8 | 700 | | | 229 | 60.8 | 98.2 | 20.5 | 40.5 | 241 | 34 | 78 |
| 638 | 81.2 | | 60.0 | 70.7 | 697 | 81 | | 223 | | 97.3 | (18.8) | | 234 | | |
| 630 | 81.1 | | 59.7 | 70.5 | 690 | | | 217 | | 96.4 | (17.5) | | 228 | 33 | 74 |
| 627 | 80.8 | | 59.2 | 70.1 | 680 | 80 | | 212 | | 95.5 | (16.0) | | 222 | | 72 |
| 601 | 80.6 | | 58.8 | 69.8 | 670 | | | 207 | | 94.6 | (15.2) | | 218 | 32 | 70 |
| 578 | 80.5 | | 58.7 | 68.7 | 640 | 77 | | 201 | | 93.8 | (13.8) | | 212 | 31 | 69 |
| 555 | 79.8 | | 57.3 | 68.7 | 640 | 77 | | 197 | | 92.8 | (12.7) | | 207 | 30 | 67 |
| 534 | 79.1 | | 56.0 | 67.7 | 615 | 75 | | 192 | | 91.9 | (11.5) | | 202 | 29 | 65 |
| 514 | 79.1 | | 56.0 | 67.7 | 615 | 75 | | 187 | | 90.7 | (10.0) | | 196 | | 63 |
| 495 | 78.4 | | 54.7 | 66.7 | 591 | 73 | 210 | 183 | | 90.0 | (9.0) | | 192 | 28 | 63 |
| 477 | 77.8 | | 53.5 | 65.8 | 569 | 71 | 202 | 179 | | 89.0 | (8.0) | | 188 | 27 | 61 |
| 461 | 76.9 | | 52.1 | 64.7 | 547 | 70 | 193 | 174 | | 87.8 | (6.4) | | 182 | | 60 |
| 444 | 76.3 | | 51.0 | 63.8 | 528 | 68 | 186 | 170 | | 86.8 | (5.4) | | 178 | 26 | 58 |
| 429 | 75.6 | | 49.6 | 62.7 | 508 | 66 | 177 | 167 | | 86.0 | (4.4) | | 175 | | 57 |
| 415 | 74.9 | | 48.5 | 61.7 | 491 | 65 | 170 | 163 | | 85.0 | (3.3) | | 171 | 25 | 56 |
| 401 | 74.2 | | 47.1 | 60.8 | 472 | 63 | 162 | 156 | | 82.9 | (0.9) | | 163 | | 53 |
| 388 | 73.4 | | 45.7 | 59.7 | 455 | 61 | 154 | 149 | | 80.8 | | | 156 | | 51 |
| 375 | 72.8 | | 44.5 | 58.8 | 440 | 59 | 149 | 143 | | 78.7 | | | 150 | 22 | 50 |
| 363 | 72.0 | | 43.1 | 57.8 | 425 | 58 | 132 | 137 | | 76.4 | | | 143 | 21 | 47 |
| 352 | 71.4 | | 41.8 | 56.8 | 410 | 56 | 136 | 131 | | 74.0 | | | 137 | | 46 |
| 341 | 70.6 | | 40.4 | 55.7 | 396 | 54 | 129 | 126 | | 72.0 | | | 132 | 20 | 44 |
| | 70.0 | | 39.1 | 54.6 | 383 | 52 | 124 | 121 | | 69.8 | | | 127 | 19 | 42 |
| | 69.3 | (110.0) | 37.9 | 53.8 | 372 | 51 | 120 | 116 | | 67.6 | | | 122 | 18 | 41 |
| | 68.7 | (109.0) | 36.6 | 52.8 | 360 | 50 | 115 | 111 | | 65.7 | | | 117 | 15 | 39 |

Properties of Elements

| Element | Density (g/cm³) | Hardness (Kg/mm²) | Young's Modulus (x10³Kg/mm²) | Thermal Expansion Coefficient (10⁻⁶/°C) | Melting Point (°C) | Element | Density (g/cm³) | Hardness (Kg/mm²) | Young's Modulus (x10³Kg/mm²) | Thermal Expansion Coefficient (10⁻⁶/°C) | Melting Point (°C) |
|---------|--------------------|----------------------|------------------------------------|--|--------------------------|---------|--------------------|----------------------|------------------------------------|--|--------------------------|
| WC | 15.60 | 2,150 | 70 | 5.1 | 2,900 | Al203 | 3.98 | 3,000 | 42 | 8.5 | 2,050 |
| TiC | 4.94 | 3,200 | 46 | 7.6 | 3,200 | CBN | 3.48 | 4,500 | 71 | 4.7 | |
| TaC | 14.50 | 1,800 | 29 | 6.6 | 3,800 | Diamond | 3.52> | 9,000 | 99 | 3.1 | |
| NbC | 8.20 | 2,050 | 35 | 6.8 | 3,500 | Co | 8.90 | | 10~18 | 12.3 | 1,495 |
| TiN | 5.43 | 2,000 | 26 | 9.2 | 2,950 | Ni | 8.90 | | 20 | 13.3 | 1,455 |

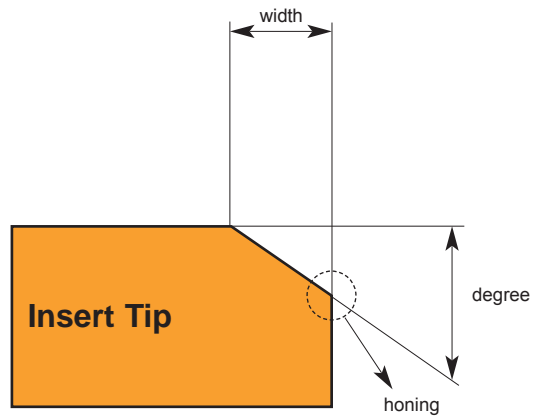
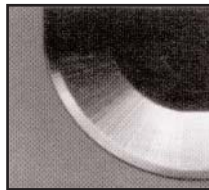


T - Champfer



| Chamfer degree (°C) | Chamfer Width (mm) | | Honing (µm) |
|---------------------|--------------------|--|-------------|
| 10 | 0,20 | | No Honing |

S - Champfer



| Chamfer degree (°C) | Chamfer Width (mm) | Chamfer Width (mm) | Horning (µm) |
|---------------------|--------------------|--------------------|--------------|
| 20 | 0,20 | Xdegree (°C) | 20 |

For Champfer, see page 4



Comadex Cutting Tools b.v.

Zepto 2
6902 KE Zevenaar, Holland

Tel: +31(0) 316-243 990

Fax: +31(0) 316-342 680

E-mail : info@comadex.nl

www.comadex.nl