



NTK

CUTTING TOOLS

FOR THE STEEL MILL INDUSTRY 8000



App for iOS



App for ANDROID










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Insert Materials, Characteristics, and Applications

Ceramic Series

| | Grade / Coating | Physical Properties | | | | | | Applications |
|---|--|------------------------------|-----------------|----------------------------|---------------------------|---|------------------------------------|--|
| | | Density g/cm ³ | Hardness HRA | Bending Strength MPa | Young's Modulus GPa | Thermal Expansion Coefficient X10 ⁻⁶ /K | Thermal Conductivity W/m · K | |
| Alumina + TiC based | HC2  | 4.3 | 94.5 | 800 | 420 | 7.9 | 21 | General purpose grade; cost effective Semi-finishing to finishing of cast iron mill rolls Machining of hardened materials |
| | HC5  | 4.3 | 95.0 | 900 | 420 | 7.8 | 25 | Roughing to finishing cast iron and steel mill rolls. Turning of hardened steels up to 62Rc. |
| | HC7  | 4.6 | 95.0 | 1100 | 420 | 7.9 | 23 | Turning of hardened steels in the 50-62Rc range. (demanding applications) Semi-finishing and finishing of cast iron |
| | ZC7  TiN | 4.6 | 95.0 | 1100 | 420 | 7.9 | 23 | Machining hardened materials even in soft to hard turning applications (50-62Rc) Semi-finishing and finishing cast iron; chilled iron |
| | ZC4  TiN | 4.6 | 95.5 | 1000 | 420 | 7.8 | 25 | Finish machining of hardened materials (62-70Rc) |
| SiAlON | SX9  | 3.3 | 93.5 | 1200 | 330 | 3.0 | 15 | Semi finishing cast iron and ductile rolls |
| Whisker (Al ₂ O ₃ +SiC) | WA1  | 3.7 | 94.5 | 1200 | 400 | 7.0 | 35 | Roughing to Semi-finishing of carbide mill rolls. Roughing of hardened rolls.(45-62Rc) Semi finishing to finishing of cast iron |

CBN

| | Grade | Style | Main Binder | CBN Volume | Coating | Applications |
|---------------------------|--|--------|-------------|------------|---------|--|
| CBN (Cubic Boron Nitride) | B99  | Solid | AlN | 93% | — | High speed cast iron and mill roll machining |
| | B30  | Brazed | Ti | 95% | — | Semi-finishing of carbide mill rolls. Semi-finishing to finishing of cast iron. |

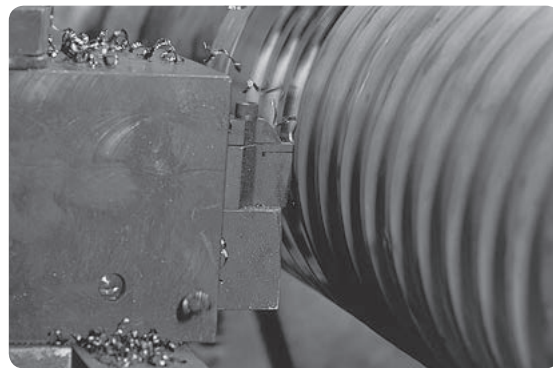
Types, Applications and Features of Rolls

| Mill Rolls | Applications | Features |
|--|--|--|
| Forged rolls <ul style="list-style-type: none"> ● Cr-Mo-based ● High-speed-steel-based ● Carbide-based | Bloom-milling at heavy rolling load. Work rolls for rough cold rolling, and rolls for reinforcement. | Strong and relatively high in heat resistance. |
| Cast iron rolls <ul style="list-style-type: none"> ● Carbide based | Semi-rolling or finishing that requires a very heavy load. | More wear-resistant and high-heat-resistant than steel in between ordinary steel and cast- iron-based steel. |
| Cast Steel rolls <ul style="list-style-type: none"> ● Adamite roll for deep profile ● Chilled roll for boards and wire steel process ● Grain roll for steel finishing process boards (Resistant to thermal crack) ● Ductile roll for boards, profile steel, and bar wire steel process (Rollsfor roughingand finishing use) ● Special cast iron roll | Wide range of applications from bloom-milling and semi-rolling to finishing. | Suitable for the applications that require heat resistance and strength. Suitable for the applications that require wear resistance. |
| Carbide rolls | <ul style="list-style-type: none"> ● Pinch mills ● Wire rod ● Wire flatterer or forming ● ERW tube mills ● Turks heads ● Hot & Cold rolls ● Work reducing rolls | Preferred in abrasive operations. High wear capabilities. |

Machining Mill Rolls with NTK Ceramics and CBN's

Features

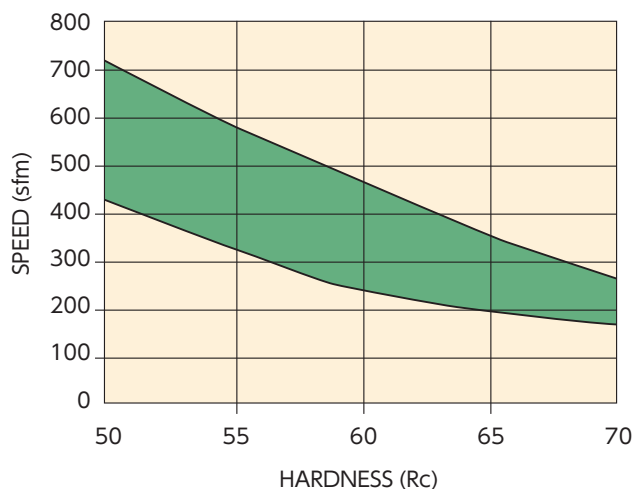
- In addition to our general purpose ceramic HC2 grade, NTK offers HC5, and HC7 for higher productivity
- WA1's wear resistance is an advantage when roughing carbide and hardened rolls
- ZC7 covers a wide range of applications such as carburized or induction hardened steels.
- ZC4 performs the best in hardened material applications from 55-70 Hc



Recommended Cutting Conditions

| Roll Material | Grade | | Cutting speed (SFM) | | | Feed (IPR) | Depth of cut (inch) | DRY | WET | |
|---------------------------------|---------|------------|----------------------|--------|-----|------------|---------------------|-----------|-----|---|
| | | | Shore Hardness Scale | | | | | | | |
| | | | 55-65 | 65-72 | 72- | | | | | |
| Steel ex. D2 | Ceramic | HC7 | 450-600 | 100% | 80% | 60% | .004-.012 | .025-.075 | ● | |
| | Ceramic | HC5 | 450-600 | 100% | 80% | 60% | .004-.012 | .025-.075 | ● | |
| | Ceramic | HC2 | 350-450 | 100% | 80% | 60% | .004-.012 | .025-.075 | ● | |
| Chilled Cast Iron | Ceramic | HC7 | 450-600 | 100% | 80% | 60% | .004-.012 | .025-.075 | ● | |
| | Ceramic | HC5 | 450-600 | 100% | 80% | 60% | .004-.012 | .025-.075 | ● | |
| | Ceramic | HC2 | 350-450 | 100% | 80% | 60% | .004-.012 | .025-.075 | ● | |
| Ductile Cast iron | Ceramic | HC7 | 300-600 | 100% | 80% | 60% | .004-.012 | .025-.075 | ● | |
| | Ceramic | HC5 | 300-600 | 100% | 80% | 60% | .004-.012 | .025-.075 | ● | |
| | Ceramic | HC2 | 250-450 | | | | .004-.012 | .025-.075 | ● | |
| | Ceramic | SX9 | 300-600 | | | | .004-.012 | .025-.075 | ● | |
| Carbide | CBN | B99 | 100-200 | | | | .004-.012 | .010 | ● | |
| | Whisker | WA1 | 150-500 | | | | .004-.012 | .010-.080 | ● | |
| CPM Rolls ex. Powdered Metal | Ceramic | ZC4 | 400-500 | | | | .004-.012 | .025-.075 | ● | |
| | Ceramic | HC7 | 400-500 | | | | .004-.012 | .025-.075 | ● | |
| Continuous cuts 30-62 HRc | Ceramic | ZC7 | 130-700 | Finish | | | .003-.008 | .005-.030 | ● | ● |
| Continuous cuts 55-70 HRc | Ceramic | ZC4 | 130-700 | Finish | | | .003-.008 | .005-.030 | ● | ● |

Recommended Speed Chart

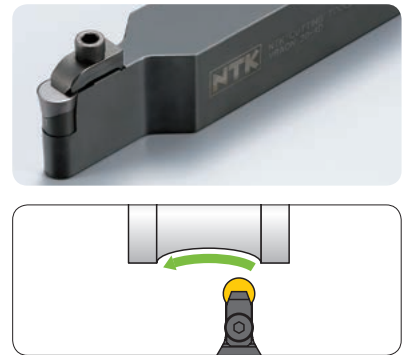


Recommended Feed Chart

| Nose radius | Depth of cut (inch) | Feed (IPR) | |
|-------------|---------------------|------------|------------|
| | | 30 micro | 60 micro |
| 1/64 | -.007 | .002-.003 | .003-.004 |
| 1/32 | -.015 | .003-.004 | .004-.005 |
| 3/64 | -.020 | .004-.005 | .005-.0065 |
| 1/16 | -.030 | .004-.0055 | .006-.0075 |
| 1/4 | -.080 | .007-.010 | .010-.014 |

Machining Mill Rolls with NTK Ceramics and CBN's

VRAON for RCGX inserts



| U.S. rebar size chart | | | |
|-----------------------|-------------|------------------|--------|
| Imperial bar size | Metric size | Nominal diameter | |
| | | (inch) | (mm) |
| #2 | #6 | 0.250 = 1/4 | 6.35 |
| #3 | #10 | 0.375 = 3/8 | 9.525 |
| #4 | #13 | 0.500 = 1/2 | 12.7 |
| #5 | #16 | 0.625 = 5/8 | 15.875 |
| #6 | #19 | 0.750 = 3/4 | 19.05 |
| #8 | #25 | 1.000 = 1 | 25.4 |

Key Points for Machining Mill Rolls

- **Hardness of the roll is an important factor. As the roll gets harder the SFM should be reduced.**
- **RCGX style inserts are the preferred insert for rigidity and cost savings.**
- **If making multiple passes with one edge, vary your DOC to move the wear on the insert edge and reduce notch wear.**
- **If you encounter chatter, increase your feed rate. Variable RPM controllers are helpful to reduce harmonics.**
- **Heavy chatter is often a sign of tooling being above centerline.**
- **Chilled and ductile iron rolls are typically softer and short chipping materials. Even after running in the mill, these rolls rarely exceed a 67 Shore hardness.**
- **Tool steel and CPM rolls run quite similar and are normally over 100 Shore hardness. These rolls have a higher Chrome and Cobalt content and are considered a longer chipping material. The combination of the material type and hardness require a slower speed to run successfully.**
- **RCGX 103 & 104 feed rate runs best at .006 IPR (0.15 mm/rev).**

Troubleshooting for Hard Turning with Ceramic Inserts

| | Case | Possible cause | Action required |
|-----------|----------------|--|--|
| Insert | VB wear | <ul style="list-style-type: none"> ● Cutting speed is too high ● Feed rate is too low ● Improper nose radius | <ul style="list-style-type: none"> ● Decrease cutting speed ● Increase feed rate ● Enlarge nose radius |
| | Wear on face | <ul style="list-style-type: none"> ● Improper cutting condition ● Improper honed edge | <ul style="list-style-type: none"> ● Decrease cutting speed ● Reduce angle of honed edge |
| | Flaking | <ul style="list-style-type: none"> ● Improper cutting condition ● Improper honed edge | <ul style="list-style-type: none"> ● Reduce honed edge ● Use insert without round honing ● Decrease feed rate ● Increase cutting speed |
| | Fracture | <ul style="list-style-type: none"> ● Improper cutting condition ● Improper honed edge ● Use of coolant | <ul style="list-style-type: none"> ● Decrease feed rate ● Enlarge honed edge ● Put round honing on edge ● Stop coolant |
| Workpiece | Chattering | <ul style="list-style-type: none"> ● Too high tool pressure ● Shortage of workpiece and/or tool rigidity ● Cutting speed is too low | <ul style="list-style-type: none"> ● Decrease feed rate ● Enlarge relief angle ● Shorten the length of tool overhang ● Increase cutting speed ● Reduce honed edge |
| | Surface finish | <ul style="list-style-type: none"> ● Feed rate is too high ● Nose radius is too small ● Wear of insert | <ul style="list-style-type: none"> ● Decrease feed rate ● Enlarge nose radius ● Use insert with wiper flat ● Decrease cutting speed |

Tooling for Mill Rolls

CDH.. Inserts

CDH

● : 1st Choice ● : 2nd choice


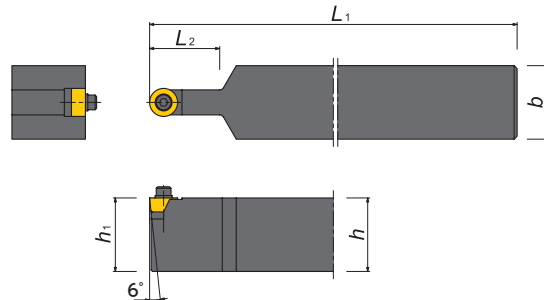
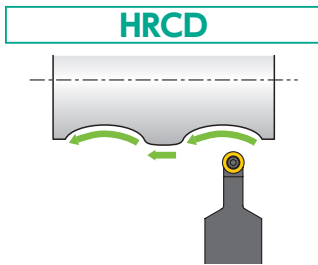


Diagram showing a CDH insert with dimensions: U (width), T (height), and a 6° chamfer angle.

| Item Number | ISO Item Number | IC | T | H | Ceramics | | |
|----------------|------------------|-------|-----|------|---------------|-----|-----|
| | | | | | Alumina - TiC | | |
| | | | | | HC2 | HC5 | HC7 |
| CDH 22 P2810 | CDH 1207 P07010 | 1/2 | 1/4 | .125 | ● | ● | ● |
| CDH 33 P6015 | CDH 1909 P15015 | 3/4 | 3/8 | .250 | ○ | | |
| CDH 33 Q6010 | CDH 1909 Q15010 | 3/4 | 3/8 | .250 | ● | | |
| CDH 33 Q6010B | CDH 1909 Q15010B | 3/4 | 3/8 | .250 | | ● | ● |
| CDH 42 P8015 | CDH 2512 P20015 | 1 | 1/2 | .266 | | | ● |
| CDH 42 P12010 | CDH 2512 P30010G | 1 | 1/2 | .266 | ● | ● | |
| CDH 43 P6010 | CDH 2519 P15015 | 1 | 3/4 | .266 | ● | | |
| CDH 515 P7110B | CDH 3209 P18010B | 1-1/4 | 3/8 | .391 | ● | | |
| CDH 515 P7110 | CDH 3209 P18010 | 1-1/4 | 3/8 | .391 | ● | | |
| CDH 515 P8015 | CDH 3209 P20015 | 1-1/4 | 3/8 | .391 | | | ● |
| CDH 515 Q7110 | CDH 3209 Q18010 | 1-1/4 | 3/8 | .391 | ● | ● | ● |
| CDH 53 P8015 | CDH 3219 P20015 | 1-1/4 | 3/4 | .391 | | | ● |
| CDH 53 Q9515 | CDH 3219 Q24015 | 1-1/4 | 3/4 | .391 | ● | ● | |



Inch Holders

| Item Number | Stock | Dimensions (inch) | | | | | Insert | Clamp Screw | Washer | Shim | Wrench |
|-------------|-------|-------------------|-----|----------------|----------------|----------------|------------------|-----------------|--------|---|--------|
| | | h | b | L ₁ | h ₁ | L ₂ | | | | | |
| HRCD-22-IN | ● | 2.0 | 2.0 | 12.0 | 2.0 | 1.0 | CDH 22 | CS0316 | W120 | HACDH22 | LW-2.5 |
| HRCD-33-IN | ● | 2.0 | 2.0 | 12.0 | 2.0 | 1.0 | CDH 33 | CS0625 | W110 | HACDH33 | LW-5 |
| HRCD-42-IN | ● | 2.0 | 2.0 | 12.0 | 2.0 | 1.0 | CDH 42 | 1/4-20UNC×1-1/4 | W106 | HACDH42 | LWU-4 |
| HRCD-43-IN | ● | 2.0 | 2.0 | 12.0 | 2.0 | 1.0 | CDH 43 | 1/4-20UNC×1-1/2 | | HACDH43 | |
| HRCD-53-IN | ● | 2.0 | 2.0 | 12.0 | 2.0 | 1.0 | CDH 53 / CDH 515 | 3/8-16UNC×1-1/2 | W107 | HACDH53 [CDH53] HACDH515 [CDH515] (OP) | LWU-5 |

Metric Holders

| Item Number | Stock | Dimensions (mm) | | | | | Insert | Clamp Screw | Washer | Shim | Wrench |
|-------------|-------|-----------------|----|----------------|----------------|----------------|--------|-------------|--------|---------|--------|
| | | h | b | L ₁ | h ₁ | L ₂ | | | | | |
| HRCD-22 | ○ | 50 | 50 | 300 | 50 | 30 | CDH 22 | CS0316 | W120 | HACDH22 | LW-2.5 |
| HRCD-33 | ○ | 50 | 50 | 300 | 50 | 30 | CDH 33 | CS0625 | W110 | HACDH33 | LW-5 |

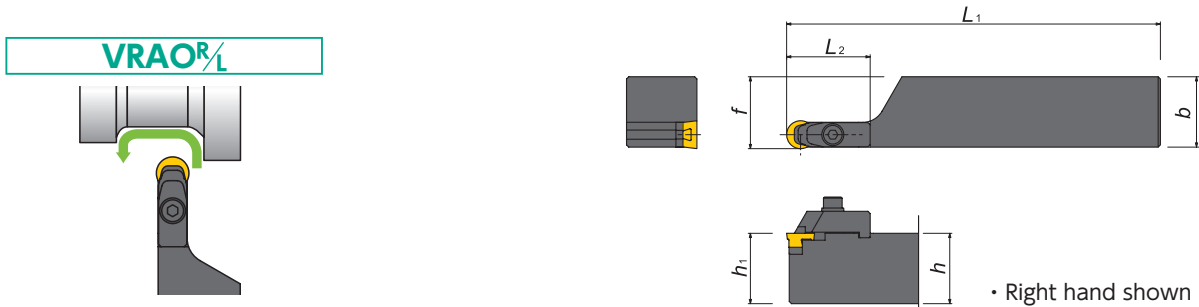
● : Stock ● : Stock (Newly added) ■ : While stocks last R L : Stock (Right / Left-hand only) R L : Stock (Right / Left-hand only, Newly added) ○ : 1-2 week delivery ○ : 1-2 week delivery (Newly added) ● : Coolant through (R) : 1-2 week delivery (Right / Left-hand only) (R) : 1-2 week delivery (Right / Left-hand only, Newly added)

Tooling for Mill Rolls

RCGX

● : 1st Choice ● : 2nd choice

| Item Number | ISO Item Number | IC | T | θ | Ceramics | | | | | | CBN |
|----------------|--------------------|------|------|----------|---------------|-----|-----|-----|---------|--------|-----|
| | | | | | Alumina - TiC | | | | Whisker | SIALON | |
| | | | | | HC2 | HC5 | HC7 | ZC4 | WA1 | SX9 | |
| RCGX 101 P2010 | | 3/16 | .240 | 90 | ● | | | | | | |
| RCGX 102 P4815 | | 1/4 | .309 | 120 | ● | ● | ● | | | | ● |
| RCGX 102 T0225 | | 1/4 | .309 | 120 | | | | | | ● | |
| RCGX 102 T0820 | | 1/4 | .309 | 120 | ● | | | | | | |
| RCGX 103 P4815 | | 3/8 | .309 | 120 | ● | ● | ● | | | | ● |
| RCGX 103 P8015 | | 3/8 | .309 | 120 | | ● | ● | | | | |
| RCGX 103 T0820 | | 3/8 | .309 | 120 | ● | | | | | | |
| RCGX 103 T0825 | | 3/8 | .309 | 120 | | | | ● | | | |
| RCGX 103 T1625 | | 3/8 | .309 | 120 | | | | ● | | | |
| RCGX 104 P4815 | | 1/2 | .312 | 120 | ● | ● | ● | | | | ● |
| RCGX 104 P6015 | | 1/2 | .312 | 120 | | | | | | | |
| RCGX 104 P8015 | | 1/2 | .312 | 120 | | ● | ● | | | | |
| RCGX 104 T0820 | | 1/2 | .312 | 120 | ● | | | | | | |
| RCGX 104 T1625 | | 1/2 | .312 | 120 | | | | ● | | | |
| RCGX 45 E02 | RCGX 120700 E004 | 1/2 | 5/16 | 120 | | | | | ● | | |
| RCGX 45 T0220 | RCGX 120700 T00520 | 1/2 | 5/16 | 120 | | | | | ● | | |
| RCGX 45 T0320 | RCGX 120700 T00820 | 1/2 | 5/16 | 120 | | | | | ● | | |
| RCGX 45 T0420 | RCGX 120700 T01020 | 1/2 | 5/16 | 120 | | | | | ● | | |
| RCGX 45 Z0620 | RCGX 120700 Z01520 | 1/2 | 5/16 | 120 | | | | | ● | | |
| RCGX 45 Z0820 | RCGX 120700 Z02020 | 1/2 | 5/16 | 120 | | | | | ● | | |
| RCGX 105 P4815 | | 5/8 | .388 | 120 | ● | ● | ● | | | | ● |
| RCGX 105 P8015 | | 5/8 | .388 | 120 | | ● | ● | | | | |
| RCGX 105 S8020 | | 5/8 | .388 | 120 | ● | | ● | ● | | | |
| RCGX 106 P4815 | | 3/4 | .388 | 120 | ● | ● | ● | | | | ● |
| RCGX 106 P8015 | | 3/4 | .388 | 120 | ● | ● | ● | | | | |
| RCGX 108 P8015 | | 1 | .461 | 140 | ● | | | | | | |

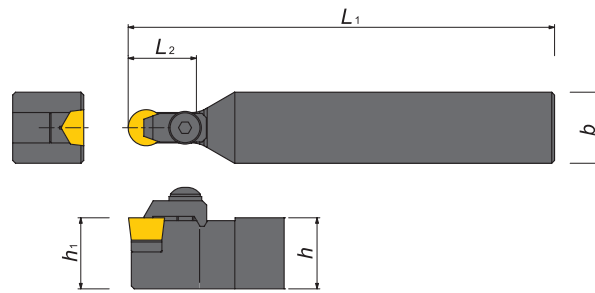
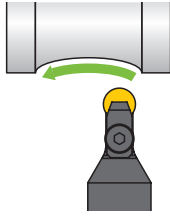


● Inch Holders

| Item Number | Stock | | Dimensions (inch) | | | | | Insert | Clamp | Shim | Clamp Screw | Shim Screw |
|---------------------------|-------|---|-------------------|------|----------------|----------------|----------------|--|--|--|-------------|------------|
| | R | L | h | b | L ₁ | h ₁ | L ₂ | | | | | |
| VRAO [®] L 16-2D | ● | ● | 1.00 | 1.00 | 6.00 | 1.00 | 1.00 | RCGX 102 RCGX 25 RCGX 25 RPGX 23 RPGX 25 | CL2RVRL (Clamp with a differential screw) | SM2RV (RCGX102. / R.GX.25) SM2RVS (R.GX23) (OP) | — | SC02C-08 |
| VRAO [®] L 20-2D | ● | ● | 1.25 | 1.25 | 6.00 | 1.25 | 1.00 | | | | | |
| VRAO [®] L 16-3D | ● | ● | 1.00 | 1.00 | 6.00 | 1.00 | 1.25 | RCGX 103 RCGX 35 RPGX 35 | CL3RV | SM3RV | SC10F-10 | SC05C-08 |
| VRAO [®] L 20-3D | ● | ● | 1.25 | 1.25 | 6.00 | 1.25 | 1.25 | | | | | SC05C-10 |
| VRAO [®] L 24-3E | ● | ● | 1.50 | 1.50 | 7.00 | 1.50 | 1.25 | | | | | |
| VRAO [®] L 16-4D | ● | ● | 1.00 | 1.00 | 6.00 | 1.00 | 1.50 | RCGX 104 RCGX 45 RPGX 45 | CL4RV | SM4RV | SC40F-12 | SC06C-08 |
| VRAO [®] L 20-4D | ● | ● | 1.25 | 1.25 | 6.00 | 1.25 | 1.50 | | | | | SC06C-10 |
| VRAO [®] L 24-4E | ● | ● | 1.50 | 1.50 | 7.00 | 1.50 | 1.50 | | | | | |

● : Stock
 ● : Stock (Newly added)
 ■ (R/L) : While stocks last
 R L : Stock (Right / Left-hand only)
 R L : Stock (Right / Left-hand only, Newly added)
 Ⓜ : Mirror finish
 ○ : 1-2 week delivery
 ○ : 1-2 week delivery (Newly added)
 ● : Coolant through
 Ⓜ : 1-2 week delivery (Right / Left-hand only)
 Ⓜ : 1-2 week delivery (Right / Left-hand only, Newly added)

VRAON



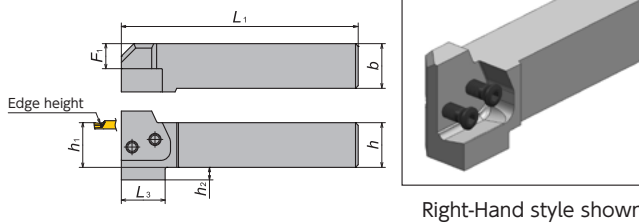
Inch Holders

| Item Number | Stock | Dimensions (inch) | | | | Insert | Clamp | Shim | Clamp Screw | Shim Screw |
|-------------|-------|-------------------|----------|-----------------------|-----------------------|--|---------|--|------------------|------------|
| | | <i>h</i> | <i>b</i> | <i>L</i> ₁ | <i>L</i> ₂ | | | | | |
| VRAON 16-2D | ● | 1.00 | 1.00 | 6.00 | 1.00 | RCGX 102 RCGX 23 RCGX 25 RPGX 23 RPGX 25 | CL2RVRL | SM2RV(RCGX102 / R.GX25) SM2RV5(R.GX23) (OP) | comes with clamp | SC02C-08 |
| VRAON 20-2D | ● | 1.25 | 1.25 | 6.00 | 1.00 | | | | | |
| VRAON 16-3D | ● | 1.00 | 1.00 | 6.00 | 1.25 | RCGX 103 RCGX 35 RPGX 35 | CL3RV | SM3RV | SC10F-10 | SC05C-08 |
| VRAON 20-3D | ● | 1.25 | 1.25 | 6.00 | 1.25 | | | | | SC05C-10 |
| VRAON 24-3E | ● | 1.50 | 1.50 | 7.00 | 1.25 | RCGX 104 RCGX 45 RPGX 45 | CL4RV | SM4RV | SC40F-12 | SC06C-08 |
| VRAON 16-4D | ● | 1.00 | 1.00 | 6.00 | 1.50 | | | | | SC06C-10 |
| VRAON 20-4D | ● | 1.25 | 1.25 | 6.00 | 1.50 | RCGX 105 | CL5RV | SM5RV | SC50F-16 | SC08C-10 |
| VRAON 24-4E | ● | 1.50 | 1.50 | 7.00 | 1.50 | | | | | |
| VRAON 20-5D | ● | 1.25 | 1.25 | 6.00 | 1.50 | RCGX 106 | CL6RV | SM6RV | SC50F-16 | SC10C-10 |
| VRAON 24-5E | ● | 1.50 | 1.50 | 7.00 | 1.50 | | | | | |
| VRAON 20-6F | ● | 1.25 | 1.25 | 8.00 | 1.75 | RCGX 108 | CL8RV | SM8RV | SC60F-16 | SC40C-10 |
| VRAON 24-6F | ● | 1.50 | 1.50 | 8.00 | 1.75 | | | | | |
| VRAON 20-8F | ● | 1.25 | 1.25 | 8.00 | 2.00 | | | | | |
| VRAON 24-8F | ● | 1.50 | 1.50 | 8.00 | 2.00 | | | | | |

Modular Holder Body

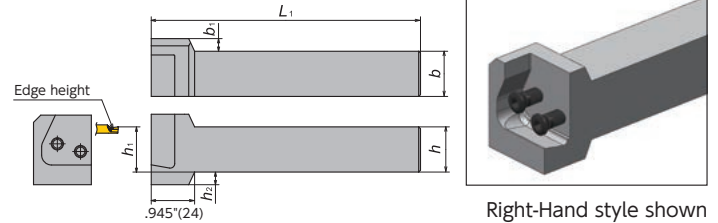
GTWP-H

Straight style toolholder



GKWP-H

L-style toolholder



Toolholder Body

| Holder Number | Stock | | Dimensions | | | | | | | | | | | Blade | Spare Parts | | | | | | |
|----------------------------|-------|---|------------|------|----------|------|-----------------------|------|-----------------------|-------|-----------------------|-------|-----------------------|-------|-----------------------|------|-------------|--------|--------|--------------|------|
| | R | L | <i>h</i> | | <i>b</i> | | <i>h</i> ₁ | | <i>L</i> ₁ | | <i>F</i> ₁ | | <i>h</i> ₂ | | <i>L</i> ₃ | | Clamp Screw | Wrench | | | |
| GTWP [®] /16-IN-H | ● | ● | 1.000 | — | 1.000 | — | 1.000 | — | 5.311 | 134.9 | 0.567 | 14.4 | 0.260 | 6.6 | 0.965 | 24.5 | — | — | GBRR/L | FS128-6.0×18 | LW-4 |
| GTWP [®] /20-IN-H | ● | ● | 1.250 | — | 1.250 | — | 1.250 | — | 6.311 | 160.3 | 0.817 | 20.75 | — | — | — | — | — | — | GBRR/L | FS128-6.0×18 | LW-4 |
| GTWP [®] /24-IN-H | ● | ● | 1.500 | — | 1.500 | — | 1.500 | — | 6.311 | 160.3 | 1.067 | 27.1 | — | — | — | — | — | — | GBRR/L | FS128-6.0×18 | LW-4 |
| GTWP [®] /32-IN-H | ● | ● | 2.000 | — | 2.000 | — | 2.000 | — | 6.311 | 160.3 | 1.567 | 39.8 | — | — | — | — | — | — | GBRR/L | FS128-6.0×18 | LW-4 |
| GTWP [®] /2020-H | ○ | ○ | 0.787 | 20.0 | 0.787 | 20.0 | 0.787 | 20.0 | 4.232 | 107.5 | 0.354 | 9 | 0.315 | 8 | 1.122 | 28.5 | — | — | GBRR/L | FS128-6.0×18 | LW-4 |
| GTWP [®] /2525-H | ● | ● | 0.984 | 25.0 | 0.984 | 25.0 | 0.984 | 25.0 | 5.217 | 132.5 | 0.551 | 14 | 0.276 | 7 | 0.965 | 24.5 | — | — | GBRR/L | FS128-6.0×18 | LW-4 |
| GTWP [®] /3232-H | ○ | ○ | 1.260 | 32.0 | 1.000 | 32.0 | 1.260 | 32.0 | 6.004 | 152.5 | 0.827 | 21 | — | — | — | — | — | — | GBRR/L | FS128-6.0×18 | LW-4 |

Toolholder Body

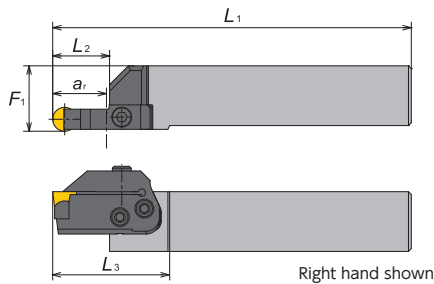
| Holder Number | Stock | | Dimensions | | | | | | | | | | | Blade | Spare Parts | | | | | | |
|----------------------------|-------|---|------------|------|----------|------|-----------------------|------|-----------------------|-------|-----------------------|-----|-----------------------|-------|-------------|--------|---|---|--------|--------------|------|
| | R | L | <i>h</i> | | <i>b</i> | | <i>h</i> ₁ | | <i>L</i> ₁ | | <i>b</i> ₁ | | <i>h</i> ₂ | | Clamp Screw | Wrench | | | | | |
| GKWP [®] /16-IN-H | ● | ● | 1.000 | — | 1.000 | — | 1.000 | — | 5.961 | 151.4 | 0.260 | 6.6 | 0.260 | 6.6 | — | — | — | — | GBRR/L | FS128-6.0×18 | LW-4 |
| GKWP [®] /20-IN-H | ● | ● | 1.250 | — | 1.250 | — | 1.250 | — | 6.961 | 176.8 | — | — | — | — | — | — | — | — | GBRR/L | FS128-6.0×18 | LW-4 |
| GKWP [®] /2020-H | ○ | ○ | 0.787 | 20.0 | 0.787 | 20.0 | 0.787 | 20.0 | 4.882 | 124 | 0.472 | 12 | 0.315 | 8 | — | — | — | — | GBRR/L | FS128-6.0×18 | LW-4 |
| GKWP [®] /2525-H | ● | ● | 0.984 | 25.0 | 0.984 | 25.0 | 0.984 | 25.0 | 5.866 | 149 | 0.276 | 7 | 0.276 | 7 | — | — | — | — | GBRR/L | FS128-6.0×18 | LW-4 |
| GKWP [®] /3232-H | ○ | ○ | 1.260 | 32.0 | 1.000 | 32.0 | 1.260 | 32.0 | 6.654 | 169 | — | — | — | — | — | — | — | — | GBRR/L | FS128-6.0×18 | LW-4 |

Tooling for Mill Rolls

Blade

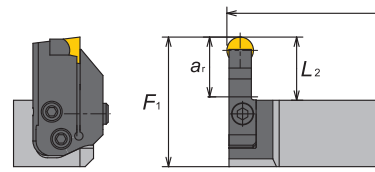
GBR

For GTWP

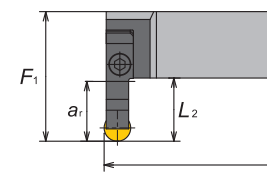


For GKWP

RH



LH



● Right hand

| Hand | Blade number | Stock | Insert | Dimensions (Inch) | | Holder | Dimensions (Inch) | | | | | | | |
|--------------|--------------|-------|-----------------------------|-------------------|----------------|--------------|-------------------|----------------|----------------|----------------|----------------|--|--|--|
| | | | | ar | L ₂ | | GTWPR-H | | | GKWPL-H | | | | |
| | | | | | | | L ₁ | L ₃ | F ₁ | L ₁ | F ₁ | | | |
| R | GBRR-R23-19 | ● | RCGX23 RPGX23 | .750 | .889 | GTWPR16-IN-H | 6.200 | 1.854 | 1.118 | 6.000 | 1.889 | | | |
| | | | | | | GKWPL16-IN-H | 6.200 | — | 1.368 | 7.000 | 2.139 | | | |
| | | | | | | GTWPR2020-H | 5.121 | 2.011 | .906 | 4.921 | 1.676 | | | |
| | | | | | | GKWPL2020-H | 5.121 | 2.011 | .906 | 4.921 | 1.676 | | | |
| | | | | | | GTWPR2525-H | 6.106 | 1.854 | 1.102 | 5.906 | 1.873 | | | |
| | | | | | | GKWPL2525-H | 6.106 | 1.854 | 1.102 | 5.906 | 1.873 | | | |
| | GBRR-R35-25 | ● | RCGX35 RPGX35 RCGX103 | 1.000 | 1.089 | GTWPR16-IN-H | 6.400 | 2.054 | 1.118 | 6.000 | 2.089 | | | |
| | | | | | | GKWPL16-IN-H | 6.400 | 2.054 | 1.118 | 6.000 | 2.089 | | | |
| | | | | | | GTWPR20-IN-H | 7.400 | — | 1.368 | 7.000 | 2.339 | | | |
| | | | | | | GKWPL20-IN-H | 7.400 | — | 1.368 | 7.000 | 2.339 | | | |
| | | | | | | GTWPR2020-H | 5.321 | 2.211 | .906 | 4.921 | 1.876 | | | |
| | | | | | | GKWPL2020-H | 5.321 | 2.211 | .906 | 4.921 | 1.876 | | | |
| | GBRR-R45-25 | ● | RCGX45 RPGX45 RCGX104 | 1.125 | 1.189 | GTWPR16-IN-H | 6.500 | 2.154 | 1.118 | 6.000 | 2.189 | | | |
| | | | | | | GKWPL16-IN-H | 6.500 | 2.154 | 1.118 | 6.000 | 2.189 | | | |
| | | | | | | GTWPR20-IN-H | 7.500 | — | 1.368 | 7.000 | 2.439 | | | |
| GKWPL20-IN-H | | | | | | 7.500 | — | 1.368 | 7.000 | 2.439 | | | | |
| GTWPR2020-H | | | | | | 5.421 | 2.311 | .906 | 4.921 | 1.976 | | | | |
| GKWPL2020-H | | | | | | 5.421 | 2.311 | .906 | 4.921 | 1.976 | | | | |
| | | | | | GTWPR2525-H | 6.406 | 2.154 | 1.102 | 5.906 | 2.173 | | | | |
| | | | | | GKWPL2525-H | 6.406 | 2.154 | 1.102 | 5.906 | 2.173 | | | | |
| | | | | | GTWPR3232-H | 7.193 | — | 1.378 | 6.693 | 2.449 | | | | |
| | | | | | GKWPL3232-H | 7.193 | — | 1.378 | 6.693 | 2.449 | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

● Left hand

| Hand | Blade number | Stock | Insert | Dimensions (Inch) | | Holder | Dimensions (Inch) | | | | | | | |
|--------------|--------------|-------|-----------------------------|-------------------|----------------|--------------|-------------------|----------------|----------------|----------------|----------------|--|--|--|
| | | | | ar | L ₂ | | GTWPL-H | | | GKWPL-H | | | | |
| | | | | | | | L ₁ | L ₃ | F ₁ | L ₁ | F ₁ | | | |
| L | GBRL-R23-19 | ● | RCGX23 RPGX23 | .750 | .889 | GTWPL16-IN-H | 6.200 | 1.854 | 1.118 | 6.000 | 1.889 | | | |
| | | | | | | GKWPR16-IN-H | 6.200 | 1.854 | 1.118 | 6.000 | 1.889 | | | |
| | | | | | | GTWPL20-IN-H | 7.200 | — | 1.368 | 7.000 | 2.139 | | | |
| | | | | | | GKWPR20-IN-H | 7.200 | — | 1.368 | 7.000 | 2.139 | | | |
| | | | | | | GTWPL2020-H | 5.121 | 2.011 | .906 | 4.921 | 1.676 | | | |
| | | | | | | GKWPR2020-H | 5.121 | 2.011 | .906 | 4.921 | 1.676 | | | |
| | GBRL-R35-25 | ● | RCGX35 RPGX35 RCGX103 | 1.000 | 1.089 | GTWPL16-IN-H | 6.400 | 2.054 | 1.118 | 6.000 | 2.089 | | | |
| | | | | | | GKWPR16-IN-H | 6.400 | 2.054 | 1.118 | 6.000 | 2.089 | | | |
| | | | | | | GTWPL20-IN-H | 7.400 | — | 1.368 | 7.000 | 2.339 | | | |
| | | | | | | GKWPR20-IN-H | 7.400 | — | 1.368 | 7.000 | 2.339 | | | |
| | | | | | | GTWPL2020-H | 5.321 | 2.211 | .906 | 4.921 | 1.876 | | | |
| | | | | | | GKWPR2020-H | 5.321 | 2.211 | .906 | 4.921 | 1.876 | | | |
| | GBRL-R45-28 | ● | RCGX45 RPGX45 RCGX104 | 1.125 | 1.189 | GTWPL16-IN-H | 6.500 | 2.154 | 1.118 | 6.000 | 2.189 | | | |
| | | | | | | GKWPR16-IN-H | 6.500 | 2.154 | 1.118 | 6.000 | 2.189 | | | |
| | | | | | | GTWPL20-IN-H | 7.500 | — | 1.368 | 7.000 | 2.439 | | | |
| GKWPR20-IN-H | | | | | | 7.500 | — | 1.368 | 7.000 | 2.439 | | | | |
| GTWPL2020-H | | | | | | 5.421 | 2.311 | .906 | 4.921 | 1.976 | | | | |
| GKWPR2020-H | | | | | | 5.421 | 2.311 | .906 | 4.921 | 1.976 | | | | |
| | | | | | GTWPL2525-H | 6.406 | 2.154 | 1.102 | 5.906 | 2.173 | | | | |
| | | | | | GKWPR2525-H | 6.406 | 2.154 | 1.102 | 5.906 | 2.173 | | | | |
| | | | | | GTWPL3232-H | 7.193 | — | 1.378 | 6.693 | 2.449 | | | | |
| | | | | | GKWPR3232-H | 7.193 | — | 1.378 | 6.693 | 2.449 | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |

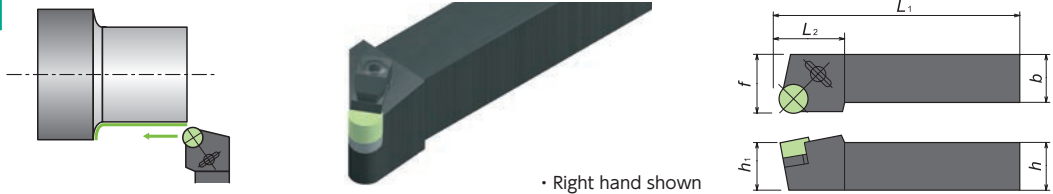
Tooling for Mill Rolls

RNG

● : 1st Choice ● : 2nd choice

| Item Number | ISO Item Number | IC | T | R | Ceramics | | | | | | Solid CBN | |
|---------------------|--------------------|-----|------|---|----------|---------------|-----|-----|-----|-----|-----------|-----|
| | | | | | Whisker | Alumina - TiC | | | | | | |
| | | | | | | WA1 | HC2 | HC5 | HC7 | ZC7 | | ZC4 |
| RNG 43 T0425 | RNGN 120400 T01025 | 1/2 | 3/16 | | | ○ | | | | ○ | | |
| RNG 43 T0525 | RNGN 120400 T01225 | 1/2 | 3/16 | | ● | | ● | | | | | |
| RNG 43 Z0520 | RNGN 120400 Z01220 | 1/2 | 3/16 | | | | | | | | | ● |
| RNG 43 T0820 | RNGN 120400 T02020 | 1/2 | 3/16 | | | | | | | | | |
| RNG 43 S0825 | RNGN 120400 S02025 | 1/2 | 3/16 | | | | | | | ● | | |
| RNG 43 T0825 | RNGN 120400 T02025 | 1/2 | 3/16 | | | | | | | | | |
| RNG 43 Z0825 | RNGN 120400 Z02025 | 1/2 | 3/16 | | | | ● | | | | | |
| RNG 43 T2820 | RNGN 120400 T07020 | 1/2 | 3/16 | | | | | | | | | |
| RNG 45 T0525 | RNGN 120700 T01225 | 1/2 | 5/16 | | ● | | | | | | | |
| RNG 45 Z0620 | RNGN 120700 Z01520 | 1/2 | 5/16 | | | | | | | | | |
| RNG 45 S0825 | RNGN 120700 S02025 | 1/2 | 5/16 | | | | | | | ● | | |
| RNG 45 T0825 | RNGN 120700 T02025 | 1/2 | 5/16 | | | | | | | | | |
| RNG 45 Z0825 | RNGN 120700 Z02025 | 1/2 | 5/16 | | | | ● | | ○ | | | |
| RNG 45 P2810 | RNGN 120700 P07010 | 1/2 | 5/16 | | | | | | | | | |
| RNG 64 T0825 | RNGN 190600 T02025 | 3/4 | 1/4 | | | | | | | | | |
| RNG 64 P6010 | RNGN 190600 P15010 | 3/4 | 1/4 | | | | | | | | | |
| RNG 65 T0420 | RNGN 190700 T01020 | 3/4 | 5/16 | | ● | | | | | | | |

CRGN



Inch Holders

| Item Number | Stock | | Dimensions (inch) | | | | | | Insert* |
|----------------------------------|-------|---|-------------------|------|----------------|----------------|------|----------------|--|
| | R | L | h | b | L ₁ | h ₁ | f | L ₂ | |
| CRGN^{R/L} 164 CD | ● | ● | 1.00 | 1.00 | 6.00 | 1.00 | 1.25 | 1.34 | RNG 45 (RNG 43) RNG 55 RNG 65 |
| CRGN^{R/L} 204 CD | ● | ● | 1.25 | 1.25 | 6.00 | 1.25 | 1.50 | 1.34 | |
| CRGN^{R/L} 165 CD | ● | ● | 1.00 | 1.00 | 6.00 | 1.00 | 1.25 | 1.34 | |
| CRGN^{R/L} 205 CD | ● | ● | 1.25 | 1.25 | 6.00 | 1.25 | 1.50 | 1.34 | |
| CRGN^{R/L} 206 CD | ● | ● | 1.25 | 1.25 | 6.00 | 1.25 | 1.50 | 1.65 | |

Spare Parts

| | Insert | Clamp | Blade | Shim | Shim Screw | Wrench |
|----------|---------------|-------|-------|--------------|------------|--------|
| Standard | RNG 45 | 2413 | 9414 | IRSN 43 | 1160 | LW-4 |
| | RNG 43 | | | IRSN 45 (OP) | | |
| Standard | RNG 55 | 2417 | | IRSN 53 | 1180 | |
| Standard | RNG 65 | | | | 3919 | |

VNGA

● : 1st Choice ● : 2nd choice

| Item Number | ISO Item Number | IC | T | R | Ceramics | | | | | | | |
|-----------------------|--------------------|-----|------|------|----------|---------------|-----|-----|-----|-----|-----|--|
| | | | | | Whisker | Alumina - TiC | | | | | | |
| | | | | | | WA1 | HC2 | HC5 | HC7 | ZC7 | ZC4 | |
| VNGA 431 T0425 | VNGA 220404 T01025 | 1/2 | 3/16 | .016 | | ● | | | | | | |
| VNGA 432 T0425 | VNGA 220408 T01025 | 1/2 | 3/16 | .031 | | ● | | | | | | |
| VNGA 433 T0425 | VNGA 220412 T01025 | 1/2 | 3/16 | .047 | | | ● | | | | | |
| VNGA 436 T0420 | VNGA 220424 T01020 | 1/2 | 3/16 | .094 | ● | | | | | | | |

● : Stock
● : Stock (Newly added)
■ : While stocks last

R L : Stock (Right / Left-hand only)
R L : Stock (Right / Left-hand only, Newly added)
M : Mirror finish

○ : 1-2 week delivery
○ : 1-2 week delivery (Newly added)
● : Coolant through

Ⓡ : 1-2 week delivery (Right / Left-hand only)
Ⓡ : 1-2 week delivery (Right / Left-hand only, Newly added)

Technical Data

Hardness Comparison Chart

| Vickers Hardness (HV) | Rockwell hardness | | | Brinell hardness, 10 mm balls, 3000 kgf load | Tungsten carbide ball | Shore hardness | Tensile strength Kgf/mm ² [N/m ²] Approximate value MPa (1) |
|-----------------------|---|--|---|--|-----------------------|----------------|--|
| | Scale A Load: 60 kgf brale indenter (HRA) | Scale C Load: 150 kgf brale indenter (HRC) | Scale B Load: 100 kgf Diameter 1/16" indenter (HRB) | | | | |
| 2200 | (95.1) | — | — | — | — | — | — |
| 2100 | (94.6) | — | — | — | — | — | — |
| 2000 | 94.2 | — | — | — | — | — | — |
| 1900 | 93.7 | (80.5) | — | — | — | — | — |
| 1800 | 93.2 | (79.2) | — | — | — | — | — |
| 1700 | 92.7 | (77.9) | — | — | — | — | — |
| 1600 | 91.8 | (76.6) | — | — | — | — | — |
| 1500 | 91.0 | (75.3) | — | — | — | — | — |
| 1450 | 90.4 | (74.6) | — | — | — | — | — |
| 1400 | 90.0 | 74.0 | — | — | — | — | — |
| 1350 | 89.6 | 73.4 | — | — | — | — | — |
| 1300 | 89.1 | 72.7 | — | — | — | — | — |
| 1250 | 88.6 | 72.1 | — | — | — | — | — |
| 1200 | 88.1 | 71.5 | — | — | — | — | — |
| 1150 | 87.6 | 70.9 | — | — | — | — | — |
| 1100 | 87.1 | 70.3 | — | — | — | — | — |
| 1050 | 86.6 | 69.6 | — | — | — | — | — |
| 1000 | 86.2 | 68.9 | — | — | — | — | — |
| 940 | 85.6 | 68.0 | — | — | 97 | — | — |
| 920 | 85.3 | 67.5 | — | — | 96 | — | — |
| 900 | 85.0 | 67.0 | — | — | 95 | — | — |
| 880 | 84.7 | 66.4 | — | (767) | 93 | — | — |
| 860 | 84.4 | 65.9 | — | (757) | 92 | — | — |
| 840 | 84.1 | 65.3 | — | (745) | 91 | — | — |
| 820 | 83.8 | 64.7 | — | (733) | 90 | — | — |
| 800 | 83.4 | 64.0 | — | (722) | 88 | — | — |
| 780 | 83.0 | 63.3 | — | (710) | 87 | — | — |
| 760 | 82.6 | 62.5 | — | (698) | 86 | — | — |
| 740 | 82.2 | 61.8 | — | (684) | 84 | — | — |
| 720 | 81.8 | 61.0 | — | (670) | 83 | — | — |
| 700 | 81.3 | 60.1 | — | (656) | 81 | — | — |
| 690 | 81.1 | 59.7 | — | (647) | — | — | — |
| 680 | 80.8 | 59.2 | — | (638) | 80 | — | — |
| 670 | 80.6 | 58.8 | — | 630 | — | — | — |
| 660 | 80.3 | 58.3 | — | 620 | 79 | — | — |
| 650 | 80.0 | 57.8 | — | 611 | — | — | — |
| 640 | 79.8 | 57.3 | — | 601 | 77 | — | — |
| 630 | 79.5 | 56.8 | — | 591 | — | — | — |
| 620 | 79.2 | 56.3 | — | 582 | 75 | — | — |
| 610 | 78.9 | 55.7 | — | 573 | — | — | — |
| 600 | 78.6 | 55.2 | — | 564 | 74 | — | — |
| 590 | 78.4 | 54.7 | — | 554 | — | — | — |
| 580 | 78.0 | 54.1 | — | 545 | 72 | — | — |
| 570 | 77.8 | 53.6 | — | 535 | — | — | — |
| 560 | 77.4 | 53.0 | — | 525 | 71 | — | — |
| 550 | 77.0 | 52.3 | — | 517 | — | — | — |
| 540 | 76.7 | 51.7 | — | 507 | 69 | — | — |
| 530 | 76.4 | 51.1 | — | 497 | — | — | — |
| 520 | 76.1 | 50.5 | — | 488 | 67 | — | — |
| 510 | 75.7 | 49.8 | — | 479 | — | — | — |
| 500 | 75.3 | 49.1 | — | 471 | 66 | — | — |

| Vickers Hardness (HV) | Rockwell hardness | | | Brinell hardness, 10 mm balls, 3000 kgf load | Tungsten carbide ball | Shore hardness | Tensile strength Kgf/mm ² [N/m ²] Approximate value MPa (1) |
|-----------------------|---|--|---|--|-----------------------|----------------|--|
| | Scale A Load: 60 kgf brale indenter (HRA) | Scale C Load: 150 kgf brale indenter (HRC) | Scale B Load: 100 kgf Diameter 1/16" indenter (HRB) | | | | |
| 490 | 74.9 | 48.4 | — | 460 | — | — | — |
| 480 | 74.5 | 47.7 | — | 452 | 64 | — | — |
| 470 | 74.1 | 46.9 | — | 442 | — | — | — |
| 460 | 73.6 | 46.1 | — | 433 | 62 | — | — |
| 450 | 73.3 | 45.3 | — | 425 | — | — | — |
| 440 | 72.8 | 44.5 | — | 415 | 59 | — | — |
| 430 | 72.3 | 43.6 | — | 405 | — | — | — |
| 420 | 71.8 | 42.7 | — | 397 | 57 | — | — |
| 410 | 71.4 | 41.8 | — | 388 | — | — | — |
| 400 | 70.8 | 40.8 | — | 379 | 55 | — | — |
| 390 | 70.3 | 39.8 | — | 369 | — | — | — |
| 380 | 69.8 | 38.8 | (110.0) | 360 | 52 | — | — |
| 370 | 69.2 | 37.7 | — | 350 | — | — | — |
| 360 | 68.7 | 36.6 | (109.0) | 341 | 50 | — | — |
| 350 | 68.1 | 35.5 | — | 331 | — | — | — |
| 340 | 67.6 | 34.4 | (108.0) | 322 | 47 | — | — |
| 330 | 67.0 | 33.3 | — | 313 | — | — | — |
| 320 | 66.4 | 32.2 | (107.0) | 303 | 45 | — | — |
| 310 | 65.8 | 31.0 | — | 294 | — | — | — |
| 300 | 65.2 | 29.8 | (105.5) | 284 | 42 | — | — |
| 295 | 64.8 | 29.2 | — | 280 | — | — | — |
| 290 | 64.5 | 28.5 | 104.5 | 275 | 41 | — | — |
| 285 | 64.2 | 27.8 | — | 270 | — | — | — |
| 280 | 63.8 | 27.0 | 103.5 | 265 | 40 | — | — |
| 275 | 63.5 | 26.4 | — | 261 | — | — | — |
| 270 | 63.1 | 25.6 | 102.0 | 256 | 38 | — | — |
| 265 | 62.7 | 24.8 | — | 252 | — | — | — |
| 260 | 62.4 | 24.0 | 101.0 | 247 | 37 | 825 | — |
| 255 | 62.0 | 23.1 | — | 243 | — | 805 | — |
| 250 | 61.6 | 22.2 | 99.5 | 238 | 36 | 795 | — |
| 245 | 61.2 | 21.3 | — | 233 | — | 780 | — |
| 240 | 60.7 | 20.3 | 98.1 | 228 | 34 | 765 | — |
| 230 | — | 18.0 | 96.7 | 219 | 33 | 730 | — |
| 220 | — | 15.7 | 95.0 | 209 | 32 | 695 | — |
| 210 | — | 13.4 | 93.4 | 200 | 30 | 670 | — |
| 200 | — | (11.0) | 91.5 | 190 | 29 | 635 | — |
| 190 | — | (8.5) | 89.5 | 181 | 28 | 605 | — |
| 180 | — | (6.0) | 87.1 | 171 | 26 | 580 | — |
| 170 | — | (3.0) | 85.0 | 162 | 25 | 545 | — |
| 160 | — | (0.0) | 81.7 | 152 | 24 | 515 | — |
| 150 | — | — | 78.7 | 143 | 22 | 490 | — |
| 140 | — | — | 75.0 | 133 | 21 | 455 | — |
| 130 | — | — | 71.2 | 124 | 20 | 425 | — |
| 120 | — | — | 66.7 | 114 | — | 390 | — |
| 110 | — | — | 52.3 | 105 | — | — | — |
| 100 | — | — | 56.2 | 95 | — | — | — |
| 95 | — | — | 52.0 | 90 | — | — | — |
| 90 | — | — | 48.0 | 86 | — | — | — |
| 85 | — | — | 41.0 | 81 | — | — | — |

(1) 1 MPa = 1 N/mm²

(2) This table is an excerpt from the JIS Iron and Steel Handbook

(3) Values in parentheses in the above table are not usually used

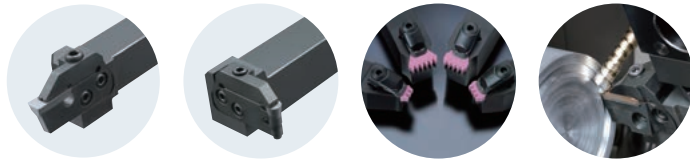
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