

CUTTING PARAMETERS

INFO

GB205

| | | | | | |
|-----------|------------------------|------------------------|----------------------------|-----------------|-----------------|
| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | 0.5D x D | 0.5D x D | 0.3D x D | 0.5D x D |
| | Vc (m/min) | 50÷60 | 30÷50 | 20÷40 | 70÷90 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 1 | 0.004 | 0.003 | 0.003 | 0.005 |
| | 2 | 0.007 | 0.006 | 0.005 | 0.009 |
| | 3 | 0.010 | 0.009 | 0.008 | 0.013 |
| | 4 | 0.014 | 0.012 | 0.011 | 0.018 |
| | 5 | 0.018 | 0.015 | 0.014 | 0.023 |
| | 6 | 0.023 | 0.020 | 0.017 | 0.030 |
| | 8 | 0.030 | 0.026 | 0.023 | 0.039 |
| | 10 | 0.038 | 0.032 | 0.029 | 0.049 |
| 12 | 0.045 | 0.038 | 0.034 | 0.059 | |

< D3 mm: ap = 0.2D

| | | | | | |
|-----------|------------------------|------------------------|----------------------------|--------------------|--------------------|
| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.2D | 1.5D x 0.3D |
| | Vc (m/min) | 50÷60 | 30÷50 | 20÷40 | 70÷90 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 1 | 0.004 | 0.004 | 0.003 | 0.006 |
| | 2 | 0.009 | 0.007 | 0.007 | 0.011 |
| | 3 | 0.013 | 0.011 | 0.009 | 0.016 |
| | 4 | 0.018 | 0.015 | 0.013 | 0.023 |
| | 5 | 0.023 | 0.019 | 0.017 | 0.029 |
| | 6 | 0.029 | 0.024 | 0.022 | 0.037 |
| | 8 | 0.038 | 0.032 | 0.028 | 0.049 |
| | 10 | 0.048 | 0.040 | 0.036 | 0.062 |
| 12 | 0.056 | 0.048 | 0.042 | 0.073 | |

< D3 mm: ae = 0.2D

| | | | | | |
|-----------|------------------------|------------------------|----------------------------|--------------|--------------|
| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | D x D | D x D | D x D | D x D |
| | Vc (m/min) | 40÷50 | 30÷40 | 20÷30 | 60÷80 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 1 | 0.002 | 0.002 | 0.002 | 0.003 |
| | 2 | 0.004 | 0.004 | 0.003 | 0.006 |
| | 3 | 0.006 | 0.005 | 0.005 | 0.008 |
| | 4 | 0.009 | 0.007 | 0.007 | 0.011 |
| | 5 | 0.011 | 0.010 | 0.008 | 0.015 |
| | 6 | 0.014 | 0.012 | 0.011 | 0.019 |
| | 8 | 0.019 | 0.016 | 0.014 | 0.024 |
| | 10 | 0.024 | 0.020 | 0.018 | 0.031 |
| 12 | 0.028 | 0.024 | 0.021 | 0.037 | |

< D3 mm: ap = 0.5D

CARBIDE DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
MDTA
HF-VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

INFO

G2CS2

| <p>SLOTTING</p> | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|-----------------|------------------------|------------------------|----------------------------|-----------------|-----------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | 0.5D x D | 0.5D x D | 0.5D x D | 0.5D x D |
| | Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 100÷120 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 1 | 0.004 | 0.003 | 0.003 | 0.005 |
| | 2 | 0.008 | 0.007 | 0.006 | 0.010 |
| | 3 | 0.012 | 0.010 | 0.009 | 0.016 |
| | 4 | 0.016 | 0.014 | 0.012 | 0.021 |
| | 5 | 0.020 | 0.017 | 0.015 | 0.026 |
| | 6 | 0.025 | 0.021 | 0.019 | 0.033 |
| | 8 | 0.032 | 0.027 | 0.024 | 0.042 |
| | 10 | 0.038 | 0.032 | 0.029 | 0.049 |
| | 12 | 0.045 | 0.038 | 0.034 | 0.059 |
| | 14 | 0.052 | 0.044 | 0.039 | 0.068 |
| 16 | 0.060 | 0.051 | 0.045 | 0.078 | |
| 18 | 0.070 | 0.060 | 0.053 | 0.091 | |
| 20 | 0.080 | 0.068 | 0.060 | 0.104 | |

< D3 mm: ap = 0.2D

| <p>SIDE MILLING</p> | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|---------------------|------------------------|------------------------|----------------------------|--------------------|--------------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | 1.5D x 0.5D | 1.5D x 0.5D | 1.5D x 0.5D | 1.5D x 0.5D |
| | Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 100÷120 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 1 | 0.005 | 0.004 | 0.004 | 0.006 |
| | 2 | 0.010 | 0.008 | 0.007 | 0.012 |
| | 3 | 0.014 | 0.012 | 0.011 | 0.019 |
| | 4 | 0.019 | 0.016 | 0.014 | 0.025 |
| | 5 | 0.024 | 0.020 | 0.018 | 0.031 |
| | 6 | 0.030 | 0.026 | 0.023 | 0.039 |
| | 8 | 0.038 | 0.033 | 0.029 | 0.050 |
| | 10 | 0.046 | 0.039 | 0.034 | 0.059 |
| | 12 | 0.054 | 0.046 | 0.041 | 0.070 |
| | 14 | 0.062 | 0.053 | 0.047 | 0.081 |
| 16 | 0.072 | 0.061 | 0.054 | 0.094 | |
| 18 | 0.084 | 0.071 | 0.063 | 0.109 | |
| 20 | 0.096 | 0.082 | 0.072 | 0.125 | |

< D3 mm: ae = 0.2D

| <p>DRILLING</p> | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|-----------------|------------------------|------------------------|----------------------------|--------------|---------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | D x D | D x D | D x D | D x D |
| | Vc (m/min) | 70÷90 | 40÷60 | 25÷35 | 80÷100 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 1 | 0.002 | 0.002 | 0.002 | 0.003 |
| | 2 | 0.005 | 0.004 | 0.004 | 0.006 |
| | 3 | 0.007 | 0.006 | 0.005 | 0.009 |
| | 4 | 0.010 | 0.008 | 0.007 | 0.012 |
| | 5 | 0.012 | 0.010 | 0.009 | 0.016 |
| | 6 | 0.015 | 0.013 | 0.011 | 0.020 |
| | 8 | 0.019 | 0.016 | 0.014 | 0.025 |
| | 10 | 0.023 | 0.019 | 0.017 | 0.030 |
| | 12 | 0.027 | 0.023 | 0.020 | 0.035 |
| | 14 | 0.031 | 0.027 | 0.023 | 0.041 |
| 16 | 0.036 | 0.031 | 0.027 | 0.047 | |
| 18 | 0.042 | 0.036 | 0.032 | 0.055 | |
| 20 | 0.048 | 0.041 | 0.036 | 0.062 | |

< D3 mm: ap = 0.5D

CARBIDE DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
MDTA
HF-VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

INFO

G2WS2

| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|-----------|------------------------|------------------------|----------------------------|-----------------|--------------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | 0.5D x D | 0.5D x D | 0.5D x D | 0.5D x D |
| | Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 100÷120 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 3 | 0.012 | 0.010 | 0.009 | 0.016 |
| | 4 | 0.016 | 0.014 | 0.012 | 0.021 |
| | 5 | 0.020 | 0.017 | 0.015 | 0.026 |
| | 6 | 0.025 | 0.021 | 0.019 | 0.033 |
| | 8 | 0.032 | 0.027 | 0.024 | 0.042 |
| | 10 | 0.038 | 0.032 | 0.029 | 0.049 |
| | 12 | 0.045 | 0.038 | 0.034 | 0.059 |
| | 14 | 0.052 | 0.044 | 0.039 | 0.068 |
| | 16 | 0.060 | 0.051 | 0.045 | 0.078 |
| 18 | 0.070 | 0.060 | 0.053 | 0.091 | |
| 20 | 0.080 | 0.068 | 0.060 | 0.104 | |

< D3 mm: ap = 0.2D

CARBIDE DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|-----------|------------------------|------------------------|----------------------------|--------------------|--------------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | 1.5D x 0.5D | 1.5D x 0.5D | 1.5D x 0.5D | 1.5D x 0.5D |
| | Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 100÷120 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 3 | 0.014 | 0.012 | 0.011 | 0.019 |
| | 4 | 0.019 | 0.016 | 0.014 | 0.025 |
| | 5 | 0.024 | 0.020 | 0.018 | 0.031 |
| | 6 | 0.030 | 0.026 | 0.023 | 0.039 |
| | 8 | 0.038 | 0.033 | 0.029 | 0.050 |
| | 10 | 0.046 | 0.039 | 0.034 | 0.059 |
| | 12 | 0.054 | 0.046 | 0.041 | 0.070 |
| | 14 | 0.062 | 0.053 | 0.047 | 0.081 |
| | 16 | 0.072 | 0.061 | 0.054 | 0.094 |
| 18 | 0.084 | 0.071 | 0.063 | 0.109 | |
| 20 | 0.096 | 0.082 | 0.072 | 0.125 | |

< D3 mm: ae = 0.2D

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2
MDTA
HF-VH/UP
MEF
ALU
MEX/MH
UH/MH

| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|-----------|------------------------|------------------------|----------------------------|-----------------|--------------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | D x D | D x D | D x D | D x D |
| | Vc (m/min) | 70÷90 | 40÷60 | 25÷35 | 80÷100 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 3 | 0.007 | 0.006 | 0.005 | 0.009 |
| | 4 | 0.010 | 0.008 | 0.007 | 0.012 |
| | 5 | 0.012 | 0.010 | 0.009 | 0.016 |
| | 6 | 0.015 | 0.013 | 0.011 | 0.020 |
| | 8 | 0.019 | 0.016 | 0.014 | 0.025 |
| | 10 | 0.023 | 0.019 | 0.017 | 0.030 |
| | 12 | 0.027 | 0.023 | 0.020 | 0.035 |
| | 14 | 0.031 | 0.027 | 0.023 | 0.041 |
| | 16 | 0.036 | 0.031 | 0.027 | 0.047 |
| 18 | 0.042 | 0.036 | 0.032 | 0.055 | |
| 20 | 0.048 | 0.041 | 0.036 | 0.062 | |

< D3 mm: ap = 0.5D

HSS END-MILLS

CARBIDE BURRS

CUTTING PARAMETERS

INFO

G2210-G2211

| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|-----------|------------------------|------------------------|----------------------------|-----------------|-----------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | 0.5D x D | 0.5D x D | 0.5D x D | 0.5D x D |
| | Vc (m/min) | 70÷90 | 45÷65 | 30÷50 | 80÷120 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 2 | 0.007 | 0.006 | 0.005 | 0.009 |
| | 3 | 0.010 | 0.009 | 0.008 | 0.013 |
| | 4 | 0.014 | 0.012 | 0.011 | 0.018 |
| | 5 | 0.018 | 0.015 | 0.014 | 0.023 |
| | 6 | 0.023 | 0.019 | 0.017 | 0.029 |
| | 8 | 0.030 | 0.026 | 0.023 | 0.039 |
| | 10 | 0.035 | 0.030 | 0.026 | 0.046 |
| 12 | 0.041 | 0.035 | 0.031 | 0.053 | |

< D3 mm: ap = 0.2D

CARBIDE DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|-----------|------------------------|------------------------|----------------------------|--------------------|--------------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | 1.5D x 0.5D | 1.5D x 0.5D | 1.5D x 0.5D | 1.5D x 0.5D |
| | Vc (m/min) | 70÷90 | 45÷65 | 30÷50 | 80÷120 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 2 | 0.008 | 0.007 | 0.006 | 0.011 |
| | 3 | 0.012 | 0.010 | 0.009 | 0.016 |
| | 4 | 0.017 | 0.014 | 0.013 | 0.022 |
| | 5 | 0.022 | 0.018 | 0.016 | 0.028 |
| | 6 | 0.027 | 0.023 | 0.020 | 0.035 |
| | 8 | 0.036 | 0.031 | 0.027 | 0.047 |
| | 10 | 0.042 | 0.036 | 0.032 | 0.055 |
| 12 | 0.049 | 0.042 | 0.037 | 0.064 | |

< D3 mm: ae = 0.2D

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|-----------|------------------------|------------------------|----------------------------|--------------|---------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| | ap x ae | D x D | D x D | D x D | D x D |
| | Vc (m/min) | 60÷80 | 40÷60 | 25÷35 | 70÷100 |
| | D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| | 2 | 0.004 | 0.004 | 0.003 | 0.005 |
| | 3 | 0.006 | 0.005 | 0.005 | 0.008 |
| | 4 | 0.008 | 0.007 | 0.006 | 0.011 |
| | 5 | 0.011 | 0.009 | 0.008 | 0.014 |
| | 6 | 0.014 | 0.011 | 0.010 | 0.018 |
| | 8 | 0.018 | 0.015 | 0.014 | 0.023 |
| | 10 | 0.021 | 0.018 | 0.016 | 0.027 |
| 12 | 0.025 | 0.021 | 0.018 | 0.032 | |

< D3 mm: ap = 0.5D

CARBIDE END-MILLS

G2
MDTA
HF-VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

INFO

G2212

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|-----------------|-----------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 0.3D x D | 0.3D x D | 0.3D x D | 0.3D x D |
| Vc (m/min) | 55÷75 | 40÷60 | 20÷40 | 70÷90 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 8 | 0.026 | 0.022 | 0.020 | 0.034 |
| 10 | 0.032 | 0.027 | 0.024 | 0.042 |
| 12 | 0.036 | 0.031 | 0.027 | 0.047 |
| 14 | 0.042 | 0.036 | 0.032 | 0.055 |
| 16 | 0.048 | 0.041 | 0.036 | 0.062 |



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D |
| Vc (m/min) | 55÷75 | 40÷60 | 20÷40 | 70÷90 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 8 | 0.031 | 0.027 | 0.023 | 0.041 |
| 10 | 0.038 | 0.033 | 0.029 | 0.050 |
| 12 | 0.043 | 0.037 | 0.032 | 0.056 |
| 14 | 0.050 | 0.043 | 0.038 | 0.066 |
| 16 | 0.058 | 0.049 | 0.043 | 0.075 |

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|--------------|--------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | D x D | D x D | D x D | D x D |
| Vc (m/min) | 50÷70 | 35÷55 | 20÷30 | 60÷80 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 8 | 0.016 | 0.013 | 0.012 | 0.020 |
| 10 | 0.019 | 0.016 | 0.014 | 0.025 |
| 12 | 0.022 | 0.018 | 0.016 | 0.028 |
| 14 | 0.025 | 0.021 | 0.019 | 0.033 |
| 16 | 0.029 | 0.024 | 0.022 | 0.037 |

CARBIDE
END-MILLS

G2
MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

GB305

CARBIDE DRILLS

- PU-HPU
- TA-4HTA
- SUH
- ALH
- HRC
- SUH MINI
- HL
- HSD
- C-SD-TA



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|-----------------|-----------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 0.5D x D | 0.5D x D | 0.5D x D | 0.5D x D |
| Vc (m/min) | 50÷60 | 30÷50 | 20÷40 | 70÷90 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.003 | 0.003 | 0.002 | 0.004 |
| 2 | 0.006 | 0.005 | 0.004 | 0.008 |
| 3 | 0.009 | 0.007 | 0.006 | 0.011 |
| 4 | 0.012 | 0.010 | 0.009 | 0.016 |
| 5 | 0.015 | 0.013 | 0.012 | 0.020 |
| 6 | 0.020 | 0.017 | 0.015 | 0.026 |
| 8 | 0.026 | 0.022 | 0.019 | 0.033 |
| 10 | 0.032 | 0.028 | 0.024 | 0.042 |
| 12 | 0.038 | 0.033 | 0.029 | 0.050 |

< D3 mm: ap = 0.2D

HSS DRILLS

- LFTA
- SUTA
- HSS-HSS/CO



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D |
| Vc (m/min) | 50÷70 | 40÷60 | 20÷40 | 80÷100 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.004 | 0.003 | 0.003 | 0.005 |
| 2 | 0.007 | 0.006 | 0.005 | 0.009 |
| 3 | 0.010 | 0.009 | 0.008 | 0.013 |
| 4 | 0.014 | 0.012 | 0.011 | 0.019 |
| 5 | 0.018 | 0.016 | 0.014 | 0.024 |
| 6 | 0.024 | 0.020 | 0.018 | 0.031 |
| 8 | 0.031 | 0.026 | 0.023 | 0.040 |
| 10 | 0.039 | 0.033 | 0.029 | 0.051 |
| 12 | 0.046 | 0.039 | 0.035 | 0.060 |

< D3 mm: ae = 0.1D

CARBIDE END-MILLS

- G2
- MDTA
- HF VH/UP
- MEF
- ALU
- MEX/MH
- UH/MH

HSS END-MILLS

CARBIDE BURRS

INFO

G2CSH3

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|-----------------|-----------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 0.5D x D | 0.5D x D | 0.5D x D | 0.5D x D |
| Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 80÷120 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.003 | 0.003 | 0.002 | 0.004 |
| 2 | 0.006 | 0.005 | 0.005 | 0.008 |
| 3 | 0.009 | 0.008 | 0.007 | 0.012 |
| 4 | 0.013 | 0.011 | 0.009 | 0.016 |
| 5 | 0.016 | 0.013 | 0.012 | 0.020 |
| 6 | 0.019 | 0.016 | 0.014 | 0.024 |
| 8 | 0.025 | 0.021 | 0.019 | 0.033 |
| 10 | 0.031 | 0.027 | 0.023 | 0.041 |
| 12 | 0.040 | 0.034 | 0.030 | 0.052 |
| 14 | 0.046 | 0.039 | 0.035 | 0.060 |
| 16 | 0.056 | 0.048 | 0.042 | 0.073 |
| 18 | 0.065 | 0.055 | 0.049 | 0.085 |
| 20 | 0.075 | 0.064 | 0.056 | 0.098 |

< D3 mm: ap = 0.2D

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D |
| Vc (m/min) | 90÷110 | 60÷80 | 40÷60 | 110÷130 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.004 | 0.003 | 0.003 | 0.005 |
| 2 | 0.008 | 0.006 | 0.006 | 0.010 |
| 3 | 0.011 | 0.010 | 0.008 | 0.015 |
| 4 | 0.015 | 0.013 | 0.011 | 0.020 |
| 5 | 0.019 | 0.016 | 0.014 | 0.024 |
| 6 | 0.023 | 0.019 | 0.017 | 0.029 |
| 8 | 0.030 | 0.026 | 0.023 | 0.039 |
| 10 | 0.038 | 0.032 | 0.028 | 0.049 |
| 12 | 0.048 | 0.041 | 0.036 | 0.062 |
| 14 | 0.056 | 0.047 | 0.042 | 0.072 |
| 16 | 0.068 | 0.057 | 0.051 | 0.088 |
| 18 | 0.078 | 0.066 | 0.059 | 0.101 |
| 20 | 0.090 | 0.077 | 0.068 | 0.117 |

< D3 mm: ae = 0.1D

CARBIDE
END-MILLS

G2
MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

G2WSH3

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|-----------------|-----------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 0.5D x D | 0.5D x D | 0.5D x D | 0.5D x D |
| Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 80÷120 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 3 | 0.009 | 0.008 | 0.007 | 0.012 |
| 4 | 0.013 | 0.011 | 0.009 | 0.016 |
| 5 | 0.016 | 0.013 | 0.012 | 0.020 |
| 6 | 0.019 | 0.016 | 0.014 | 0.024 |
| 8 | 0.025 | 0.021 | 0.019 | 0.033 |
| 10 | 0.031 | 0.027 | 0.023 | 0.041 |
| 12 | 0.040 | 0.034 | 0.030 | 0.052 |
| 14 | 0.046 | 0.039 | 0.035 | 0.060 |
| 16 | 0.056 | 0.048 | 0.042 | 0.073 |
| 18 | 0.065 | 0.055 | 0.049 | 0.085 |
| 20 | 0.075 | 0.064 | 0.056 | 0.098 |

< D3 mm: ap = 0.2D

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D |
| Vc (m/min) | 90÷110 | 60÷80 | 40÷60 | 110÷130 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 3 | 0.011 | 0.010 | 0.008 | 0.015 |
| 4 | 0.015 | 0.013 | 0.011 | 0.020 |
| 5 | 0.019 | 0.016 | 0.014 | 0.024 |
| 6 | 0.023 | 0.019 | 0.017 | 0.029 |
| 8 | 0.030 | 0.026 | 0.023 | 0.039 |
| 10 | 0.038 | 0.032 | 0.028 | 0.049 |
| 12 | 0.048 | 0.041 | 0.036 | 0.062 |
| 14 | 0.056 | 0.047 | 0.042 | 0.072 |
| 16 | 0.068 | 0.057 | 0.051 | 0.088 |
| 18 | 0.078 | 0.066 | 0.059 | 0.101 |
| 20 | 0.090 | 0.077 | 0.068 | 0.117 |

< D3 mm: ae = 0.1D

CARBIDE
END-MILLS

G2
MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

G2310-11-12

cylindrical shank, 3 flutes, long

OSAWA
NORM

N

MG
PV200

<45
HRC

45°

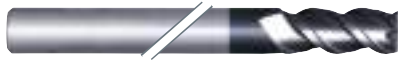
SQUARE

Z3

INFO



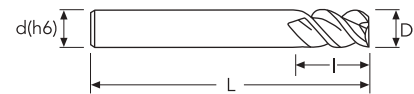
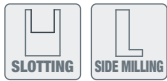
G2310



G2311-G2312

| | | | | | |
|---|---|---|---|---|---|
| P | M | K | N | S | H |
| ★ | ☆ | ★ | ☆ | | |

★ 1st choice ☆ suitable



| D | D Tol. | C | C Tol. | d(h6) | I | I1 | L | z | EDP No. | Stock |
|----|----------|---|--------|-------|----|----|-----|---|----------|-------|
| 2 | 0/-0.030 | | | 4 | 9 | | 75 | 3 | G2310020 | ● |
| 3 | 0/-0.030 | | | 4 | 15 | | 75 | 3 | G2310030 | ● |
| 4 | 0/-0.030 | | | 4 | 20 | | 75 | 3 | G2310040 | ● |
| 5 | 0/-0.030 | | | 6 | 25 | | 75 | 3 | G2310050 | ● |
| 6 | 0/-0.030 | | | 6 | 25 | | 75 | 3 | G2310060 | ● |
| 4 | 0/-0.030 | | | 6 | 25 | | 100 | 3 | G2311040 | ● |
| 5 | 0/-0.030 | | | 6 | 30 | | 100 | 3 | G2311050 | ● |
| 6 | 0/-0.030 | | | 6 | 30 | | 100 | 3 | G2311060 | ● |
| 7 | 0/-0.030 | | | 8 | 35 | | 100 | 3 | G2311070 | ● |
| 8 | 0/-0.035 | | | 8 | 35 | | 100 | 3 | G2311080 | ● |
| 9 | 0/-0.035 | | | 10 | 40 | | 100 | 3 | G2311090 | ● |
| 10 | 0/-0.035 | | | 10 | 40 | | 100 | 3 | G2311100 | ● |
| 11 | 0/-0.035 | | | 12 | 45 | | 100 | 3 | G2311110 | ● |
| 12 | 0/-0.035 | | | 12 | 45 | | 100 | 3 | G2311120 | ● |
| 8 | 0/-0.035 | | | 8 | 40 | | 150 | 3 | G2312080 | ● |
| 10 | 0/-0.035 | | | 10 | 50 | | 150 | 3 | G2312100 | ● |
| 12 | 0/-0.035 | | | 12 | 50 | | 150 | 3 | G2312120 | ● |
| 16 | 0/-0.040 | | | 16 | 70 | | 150 | 3 | G2312160 | ● |
| 20 | 0/-0.040 | | | 20 | 80 | | 150 | 3 | G2312200 | ● |

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE
END-MILLS

G2
MDTA
HF-VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

G2310-G2311

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|-----------------|-----------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 0.5D x D | 0.5D x D | 0.5D x D | 0.5D x D |
| Vc (m/min) | 60÷80 | 35÷55 | 25÷35 | 80÷100 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 2 | 0.006 | 0.005 | 0.004 | 0.007 |
| 3 | 0.008 | 0.007 | 0.006 | 0.011 |
| 4 | 0.011 | 0.010 | 0.008 | 0.015 |
| 5 | 0.014 | 0.012 | 0.011 | 0.018 |
| 6 | 0.017 | 0.014 | 0.013 | 0.022 |
| 8 | 0.023 | 0.019 | 0.017 | 0.029 |
| 10 | 0.028 | 0.024 | 0.021 | 0.037 |
| 12 | 0.036 | 0.031 | 0.027 | 0.047 |

< D3 mm: ap = 0.2D

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D |
| Vc (m/min) | 70÷90 | 45÷65 | 30÷50 | 80÷120 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 2 | 0.007 | 0.006 | 0.005 | 0.009 |
| 3 | 0.011 | 0.009 | 0.008 | 0.014 |
| 4 | 0.014 | 0.012 | 0.011 | 0.018 |
| 5 | 0.018 | 0.015 | 0.013 | 0.023 |
| 6 | 0.021 | 0.018 | 0.016 | 0.027 |
| 8 | 0.028 | 0.024 | 0.021 | 0.037 |
| 10 | 0.035 | 0.030 | 0.026 | 0.046 |
| 12 | 0.045 | 0.038 | 0.034 | 0.059 |

< D3 mm: ae = 0.1D

G2312

CARBIDE
END-MILLS

G2
MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D |
| Vc (m/min) | 55÷75 | 40÷60 | 20÷40 | 70÷90 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 8 | 0.020 | 0.017 | 0.015 | 0.026 |
| 10 | 0.025 | 0.021 | 0.019 | 0.033 |
| 12 | 0.032 | 0.027 | 0.024 | 0.042 |
| 14 | 0.037 | 0.031 | 0.028 | 0.048 |
| 16 | 0.045 | 0.038 | 0.034 | 0.059 |

HSS
END-MILLS

CARBIDE
BURRS

INFO

GB405

CARBIDE
DRILLS

- PU-HPU
- TA-4HTA
- SUH
- ALH
- HRC
- SUH MINI
- HL
- HSD
- C-SD-TA



| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------|------------------------|------------------------|----------------------------|--------------------|--------------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D |
| Vc (m/min) | 50÷70 | 40÷50 | 20÷40 | 80÷100 | |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.003 | 0.003 | 0.002 | 0.004 | |
| 2 | 0.006 | 0.006 | 0.005 | 0.008 | |
| 3 | 0.010 | 0.008 | 0.007 | 0.013 | |
| 4 | 0.013 | 0.011 | 0.010 | 0.017 | |
| 5 | 0.016 | 0.014 | 0.012 | 0.021 | |
| 6 | 0.020 | 0.017 | 0.015 | 0.026 | |
| 8 | 0.026 | 0.022 | 0.019 | 0.034 | |
| 10 | 0.031 | 0.026 | 0.023 | 0.040 | |
| 12 | 0.036 | 0.031 | 0.027 | 0.047 | |

< D3 mm: ae = 0.1D

HSS
DRILLS

- LFTA
- SUTA
- HSS-HSS/CO

CARBIDE
END-MILLS

G2

- MDTA
- HF VH/UP
- MEF
- ALU
- MEX/MH
- UH/MH

HSS
END-MILLS

CARBIDE
BURRS

G2CS4

cylindrical shank, 4 flutes



OSAWA
NORM

N

MG
PV200

<45
HRC

30°

SQUARE

Z4

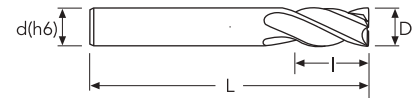
INFO

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

| | | | | | |
|---|---|---|---|---|---|
| P | M | K | N | S | H |
| ★ | ☆ | ★ | ☆ | | |

★ 1st choice ☆ suitable



| D | D Tol. | C | C Tol. | d(h6) | l | l1 | L | z | EDP No. | Stock |
|------|----------|---|--------|-------|-----|----|-----|---|----------|-------|
| 1 | 0/-0.020 | | | 4 | 3 | | 50 | 4 | G2CS4010 | ● |
| 1.5 | 0/-0.020 | | | 4 | 4.5 | | 50 | 4 | G2CS4015 | ● |
| 2 | 0/-0.020 | | | 4 | 6 | | 50 | 4 | G2CS4020 | ● |
| 2.5 | 0/-0.020 | | | 4 | 7 | | 50 | 4 | G2CS4025 | ● |
| 3 | 0/-0.020 | | | 4 | 8 | | 50 | 4 | G2CS4030 | ● |
| 3.5 | 0/-0.020 | | | 4 | 10 | | 50 | 4 | G2CS4035 | ● |
| 4 | 0/-0.020 | | | 4 | 11 | | 50 | 4 | G2CS4040 | ● |
| 4.5 | 0/-0.020 | | | 6 | 13 | | 50 | 4 | G2CS4045 | ● |
| 5 | 0/-0.020 | | | 6 | 13 | | 50 | 4 | G2CS4050 | ● |
| 5.5 | 0/-0.020 | | | 6 | 13 | | 50 | 4 | G2CS4055 | ● |
| 6 | 0/-0.020 | | | 6 | 15 | | 50 | 4 | G2CS4060 | ● |
| 6.5 | 0/-0.025 | | | 8 | 17 | | 60 | 4 | G2CS4065 | ● |
| 7 | 0/-0.025 | | | 8 | 17 | | 60 | 4 | G2CS4070 | ● |
| 7.5 | 0/-0.025 | | | 8 | 17 | | 60 | 4 | G2CS4075 | ● |
| 8 | 0/-0.025 | | | 8 | 20 | | 60 | 4 | G2CS4080 | ● |
| 8.5 | 0/-0.025 | | | 10 | 23 | | 75 | 4 | G2CS4085 | ● |
| 9 | 0/-0.025 | | | 10 | 23 | | 75 | 4 | G2CS4090 | ● |
| 9.5 | 0/-0.025 | | | 10 | 25 | | 75 | 4 | G2CS4095 | ● |
| 10 | 0/-0.025 | | | 10 | 30 | | 75 | 4 | G2CS4100 | ● |
| 10.5 | 0/-0.025 | | | 12 | 25 | | 75 | 4 | G2CS4105 | ● |
| 11 | 0/-0.025 | | | 12 | 30 | | 75 | 4 | G2CS4110 | ● |
| 11.5 | 0/-0.025 | | | 12 | 28 | | 75 | 4 | G2CS4115 | ● |
| 12 | 0/-0.025 | | | 12 | 30 | | 75 | 4 | G2CS4120 | ● |
| 12.5 | 0/-0.030 | | | 14 | 26 | | 83 | 4 | G2CS4125 | ● |
| 13 | 0/-0.030 | | | 14 | 26 | | 83 | 4 | G2CS4130 | ● |
| 13.5 | 0/-0.030 | | | 14 | 26 | | 83 | 4 | G2CS4135 | ● |
| 14 | 0/-0.030 | | | 14 | 26 | | 83 | 4 | G2CS4140 | ● |
| 14.5 | 0/-0.030 | | | 16 | 32 | | 92 | 4 | G2CS4145 | ● |
| 15 | 0/-0.030 | | | 16 | 32 | | 92 | 4 | G2CS4150 | ● |
| 15.5 | 0/-0.030 | | | 16 | 32 | | 92 | 4 | G2CS4155 | ● |
| 16 | 0/-0.030 | | | 16 | 32 | | 92 | 4 | G2CS4160 | ● |
| 17 | 0/-0.030 | | | 20 | 40 | | 100 | 4 | G2CS4170 | ● |
| 18 | 0/-0.030 | | | 20 | 40 | | 100 | 4 | G2CS4180 | ● |
| 19 | 0/-0.030 | | | 20 | 40 | | 100 | 4 | G2CS4190 | ● |
| 20 | 0/-0.030 | | | 20 | 40 | | 100 | 4 | G2CS4200 | ● |
| 22 | 0/-0.030 | | | 25 | 40 | | 100 | 4 | G2CS4220 | ● |
| 25 | 0/-0.030 | | | 25 | 40 | | 100 | 4 | G2CS4250 | ● |

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE
END-MILLS

G2
MDTA
HF-VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

G2CS4

CARBIDE DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D |
| Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 100÷120 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.004 | 0.003 | 0.003 | 0.005 |
| 2 | 0.007 | 0.006 | 0.005 | 0.009 |
| 3 | 0.010 | 0.009 | 0.008 | 0.013 |
| 4 | 0.013 | 0.011 | 0.010 | 0.017 |
| 5 | 0.016 | 0.014 | 0.012 | 0.021 |
| 6 | 0.019 | 0.016 | 0.014 | 0.025 |
| 8 | 0.025 | 0.021 | 0.019 | 0.033 |
| 10 | 0.032 | 0.027 | 0.024 | 0.042 |
| 12 | 0.040 | 0.034 | 0.030 | 0.052 |
| 14 | 0.047 | 0.040 | 0.035 | 0.061 |
| 16 | 0.054 | 0.046 | 0.041 | 0.070 |
| 18 | 0.060 | 0.051 | 0.045 | 0.078 |
| 20 | 0.065 | 0.055 | 0.049 | 0.085 |
| 22 | 0.073 | 0.062 | 0.055 | 0.095 |
| 25 | 0.083 | 0.071 | 0.062 | 0.108 |

< D3 mm: ae = 0.1D

HSS DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE END-MILLS

G2

MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS END-MILLS

CARBIDE BURRS

INFO

G2WS4

CARBIDE
DRILLS
 PU-HPU
 TA-4HTA
 SUH
 ALH
 HRC
 SUH MINI
 HL
 HSD
 C-SD-TA


| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------|---------------------------|------------------------|----------------------------|--------------------|--------------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D |
| Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 100÷120 | |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 3 | 0.010 | 0.009 | 0.008 | 0.013 | |
| 4 | 0.013 | 0.011 | 0.010 | 0.017 | |
| 5 | 0.016 | 0.014 | 0.012 | 0.021 | |
| 6 | 0.019 | 0.016 | 0.014 | 0.025 | |
| 8 | 0.025 | 0.021 | 0.019 | 0.033 | |
| 10 | 0.032 | 0.027 | 0.024 | 0.042 | |
| 12 | 0.040 | 0.034 | 0.030 | 0.052 | |
| 14 | 0.047 | 0.040 | 0.035 | 0.061 | |
| 16 | 0.054 | 0.046 | 0.041 | 0.070 | |
| 18 | 0.060 | 0.051 | 0.045 | 0.078 | |
| 20 | 0.065 | 0.055 | 0.049 | 0.085 | |

HSS
DRILLS
 LFTA
 SUTA
 HSS-HSS/CO
CARBIDE
END-MILLS

G2

 MDTA
 HF VH/UP
 MEF
 ALU
 MEX/MH
 UH/MH
HSS
END-MILLSCARBIDE
BURRS

G2410-11-12-13

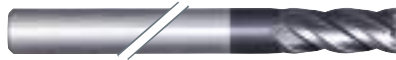
cylindrical shank, 4 flutes, long



INFO



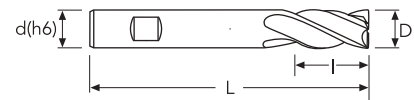
G2410



G2411-G2412-G2413



★ 1st choice ☆ suitable



CARBIDE DRILLS

- PU-HPU
- TA-4HTA
- SUH
- ALH
- HRC
- SUH MINI
- HL
- HSD
- C-SD-TA

| D | D Tol. | C | C Tol. | d(h6) | l | l1 | L | z | EDP No. | Stock |
|-----|----------|---|--------|-------|----|----|-----|---|----------|-------|
| 2 | 0/-0.030 | | | 4 | 9 | | 75 | 4 | G2410020 | ● |
| 2.5 | 0/-0.030 | | | 4 | 10 | | 75 | 4 | G2410025 | ● |
| 3 | 0/-0.030 | | | 4 | 15 | | 75 | 4 | G2410030 | ● |
| 3.5 | 0/-0.030 | | | 4 | 15 | | 75 | 4 | G2410035 | ● |
| 4 | 0/-0.030 | | | 4 | 20 | | 75 | 4 | G2410040 | ● |
| 4.5 | 0/-0.030 | | | 6 | 20 | | 75 | 4 | G2410045 | ● |
| 5 | 0/-0.030 | | | 6 | 25 | | 75 | 4 | G2410050 | ● |
| 6 | 0/-0.030 | | | 6 | 25 | | 75 | 4 | G2410060 | ● |
| 3 | 0/-0.030 | | | 6 | 15 | | 100 | 4 | G2411030 | ● |
| 4 | 0/-0.030 | | | 6 | 25 | | 100 | 4 | G2411040 | ● |
| 5 | 0/-0.030 | | | 6 | 30 | | 100 | 4 | G2411050 | ● |
| 6 | 0/-0.030 | | | 6 | 30 | | 100 | 4 | G2411060 | ● |
| 7 | 0/-0.030 | | | 8 | 35 | | 100 | 4 | G2411070 | ● |
| 8 | 0/-0.035 | | | 8 | 35 | | 100 | 4 | G2411080 | ● |
| 9 | 0/-0.035 | | | 10 | 40 | | 100 | 4 | G2411090 | ● |
| 10 | 0/-0.035 | | | 10 | 40 | | 100 | 4 | G2411100 | ● |
| 11 | 0/-0.035 | | | 12 | 45 | | 100 | 4 | G2411110 | ● |
| 12 | 0/-0.035 | | | 12 | 45 | | 100 | 4 | G2411120 | ● |
| 8 | 0/-0.035 | | | 8 | 40 | | 150 | 4 | G2412080 | ● |
| 10 | 0/-0.035 | | | 10 | 50 | | 150 | 4 | G2412100 | ● |
| 12 | 0/-0.035 | | | 12 | 50 | | 150 | 4 | G2412120 | ● |
| 16 | 0/-0.040 | | | 16 | 70 | | 150 | 4 | G2412160 | ● |
| 18 | 0/-0.040 | | | 20 | 80 | | 150 | 4 | G2412180 | ● |
| 20 | 0/-0.040 | | | 20 | 80 | | 150 | 4 | G2412200 | ● |
| 16 | 0/-0.040 | | | 16 | 40 | | 200 | 4 | G2413160 | ● |
| 20 | 0/-0.040 | | | 20 | 40 | | 200 | 4 | G2413200 | ● |

HSS DRILLS

- LFTA
- SUTA
- HSS-HSS/CO

CARBIDE END-MILLS

- G2
- MDTA
- HF-VH/UP
- MEF
- ALU
- MEX/MH
- UH/MH

HSS END-MILLS

CARBIDE BURRS

● stock standard ○ non-standard stock ▽ stock exhaustion

INFO

G2410-G2411

| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------|---------------------------|--------------------|------------------------|----------------------------|--------------------|
| | | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC |
| ap x ae | | 1.5D x 0.1D | 1.5D x 0.1D | 1.5D x 0.1D | 1.5D x 0.1D |
| Vc (m/min) | | 70+90 | 45+65 | 30+50 | 80+120 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 2 | 0.006 | 0.005 | 0.005 | 0.008 | |
| 3 | 0.009 | 0.008 | 0.007 | 0.012 | |
| 4 | 0.012 | 0.010 | 0.009 | 0.015 | |
| 5 | 0.014 | 0.012 | 0.011 | 0.019 | |
| 6 | 0.017 | 0.015 | 0.013 | 0.022 | |
| 8 | 0.023 | 0.019 | 0.017 | 0.029 | |
| 10 | 0.029 | 0.024 | 0.022 | 0.037 | |
| 12 | 0.036 | 0.031 | 0.027 | 0.047 | |

< D3 mm: ae = 0.1D

CARBIDE
DRILLS
 PU-HPU
 TA-4HTA
 SUH
 ALH
 HRC
 SUH MINI
 HL
 HSD
 C-SD-TA

G2412-G2413

| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------|---------------------------|--------------------|------------------------|----------------------------|--------------------|
| | | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC |
| ap x ae | | 1.5D x 0.1D | 1.5D x 0.1D | 1.5D x 0.1D | 1.5D x 0.1D |
| Vc (m/min) | | 55+75 | 40+60 | 20+40 | 70+90 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 8 | 0.020 | 0.017 | 0.015 | 0.026 | |
| 10 | 0.026 | 0.022 | 0.019 | 0.033 | |
| 12 | 0.032 | 0.027 | 0.024 | 0.042 | |
| 14 | 0.038 | 0.032 | 0.028 | 0.049 | |
| 16 | 0.043 | 0.037 | 0.032 | 0.056 | |
| 20 | 0.065 | 0.055 | 0.049 | 0.085 | |

HSS
DRILLS
 LFTA
 SUTA
 HSS-HSS/CO
CARBIDE
END-MILLS

G2

 MDTA
 HF VH/UP
 MEF
 ALU
 MEX/MH
 UH/MH
HSS
END-MILLSCARBIDE
BURRS

INFO

G2CSHM

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | |
|------------|---------------------------|------------------------|----------------------------|----------|--|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.1D | 1.5D x 0.1D | 1.5D x 0.1D | | |
| Vc (m/min) | 100÷120 | 70÷90 | 50÷70 | | |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | | |
| 6 | 0.016 | 0.014 | 0.012 | | |
| 8 | 0.020 | 0.017 | 0.015 | | |
| 10 | 0.025 | 0.021 | 0.019 | | |
| 12 | 0.030 | 0.026 | 0.023 | | |
| 14 | 0.035 | 0.030 | 0.026 | | |
| 16 | 0.040 | 0.034 | 0.030 | | |
| 20 | 0.050 | 0.043 | 0.038 | | |

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE
END-MILLS

G2

MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

G2CSFR

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



D6-8: Z3
D10-20: Z4

| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | |
|------------|---------------------------|--------------------|------------------------|----------------------------|---------|
| | | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC |
| ap x ae | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D | | |
| Vc (m/min) | 70÷90 | 50÷70 | 30÷50 | | |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | | |
| 6 | 0.030 | 0.026 | 0.023 | | |
| 8 | 0.045 | 0.038 | 0.034 | | |
| 10 | 0.060 | 0.051 | 0.045 | | |
| 12 | 0.072 | 0.061 | 0.054 | | |
| 14 | 0.085 | 0.072 | 0.064 | | |
| 16 | 0.096 | 0.082 | 0.072 | | |
| 20 | 0.120 | 0.102 | 0.090 | | |

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE
END-MILLS

G2

MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

G2WSFR

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | |
|---------------------------|--------------------|------------------------|----------------------------|---------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC |
| ap x ae | 1.5D x 0.3D | 1.5D x 0.3D | 1.5D x 0.3D | |
| Vc (m/min) | 70÷90 | 50÷70 | 30÷50 | |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | |
| 6 | 0.030 | 0.026 | 0.023 | |
| 8 | 0.045 | 0.038 | 0.034 | |
| 10 | 0.060 | 0.051 | 0.045 | |
| 12 | 0.072 | 0.061 | 0.054 | |
| 14 | 0.085 | 0.072 | 0.064 | |
| 16 | 0.096 | 0.082 | 0.072 | |
| 20 | 0.120 | 0.102 | 0.090 | |

D6-8: Z3
D10-20: Z4

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE
END-MILLS

G2

MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

G2CS2R

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|-----------------|-----------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 0.5D x D | 0.5D x D | 0.5D x D | 0.5D x D |
| Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 100÷120 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.004 | 0.003 | 0.003 | 0.005 |
| 2 | 0.008 | 0.007 | 0.006 | 0.010 |
| 3 | 0.012 | 0.010 | 0.009 | 0.016 |
| 4 | 0.016 | 0.014 | 0.012 | 0.021 |
| 5 | 0.020 | 0.017 | 0.015 | 0.026 |
| 6 | 0.025 | 0.021 | 0.019 | 0.033 |
| 8 | 0.032 | 0.027 | 0.024 | 0.042 |
| 10 | 0.038 | 0.032 | 0.029 | 0.049 |
| 12 | 0.045 | 0.038 | 0.034 | 0.059 |

< D3 mm: ap = 0.2D

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.5D | 1.5D x 0.5D | 1.5D x 0.5D | 1.5D x 0.5D |
| Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 100÷120 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.005 | 0.004 | 0.004 | 0.006 |
| 2 | 0.010 | 0.008 | 0.007 | 0.012 |
| 3 | 0.014 | 0.012 | 0.011 | 0.019 |
| 4 | 0.019 | 0.016 | 0.014 | 0.025 |
| 5 | 0.024 | 0.020 | 0.018 | 0.031 |
| 6 | 0.030 | 0.026 | 0.023 | 0.039 |
| 8 | 0.038 | 0.033 | 0.029 | 0.050 |
| 10 | 0.046 | 0.039 | 0.034 | 0.059 |
| 12 | 0.054 | 0.046 | 0.041 | 0.070 |

< D3 mm: ae = 0.2D

CARBIDE
END-MILLS

G2
MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH



| Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|------------------------|----------------------------|--------------|---------------|
| Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | D x D | D x D | D x D | D x D |
| Vc (m/min) | 70÷90 | 40÷60 | 25÷35 | 80÷100 |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.002 | 0.002 | 0.002 | 0.003 |
| 2 | 0.005 | 0.004 | 0.004 | 0.006 |
| 3 | 0.007 | 0.006 | 0.005 | 0.009 |
| 4 | 0.010 | 0.008 | 0.007 | 0.012 |
| 5 | 0.012 | 0.010 | 0.009 | 0.016 |
| 6 | 0.015 | 0.013 | 0.011 | 0.020 |
| 8 | 0.019 | 0.016 | 0.014 | 0.025 |
| 10 | 0.023 | 0.019 | 0.017 | 0.030 |
| 12 | 0.027 | 0.023 | 0.020 | 0.035 |

< D3 mm: ap = 0.5D

CARBIDE
BURRS

G2CS4R

cylindrical shank, 4 flutes, corner radius



OSAWA
NORM

N

MG
PV200

<45
HRC

30°

RADIUS

Z4

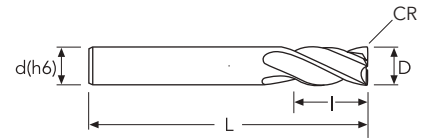
INFO

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA

| | | | | | |
|---|---|---|---|---|---|
| P | M | K | N | S | H |
| ★ | ☆ | ★ | ☆ | | |

★ 1st choice ☆ suitable



| D | D Tol. | CR | CR Tol. | d(h6) | l | l1 | L | z | EDP No. | Stock |
|-----|----------|------|----------|-------|----|----|----|---|-------------|-------|
| 1 | 0/-0.020 | 0.20 | +/-0.010 | 4 | 2 | | 50 | 4 | G2CS4R02010 | ● |
| 1.5 | 0/-0.020 | 0.20 | +/-0.010 | 4 | 3 | | 50 | 4 | G2CS4R02015 | ● |
| 1.5 | 0/-0.020 | 0.50 | +/-0.010 | 4 | 3 | | 50 | 4 | G2CS4R05015 | ● |
| 2 | 0/-0.020 | 0.20 | +/-0.010 | 4 | 4 | | 50 | 4 | G2CS4R02020 | ● |
| 2 | 0/-0.020 | 0.50 | +/-0.010 | 4 | 4 | | 50 | 4 | G2CS4R05020 | ● |
| 2.5 | 0/-0.020 | 0.20 | +/-0.010 | 4 | 5 | | 50 | 4 | G2CS4R02025 | ● |
| 2.5 | 0/-0.020 | 0.50 | +/-0.010 | 4 | 5 | | 50 | 4 | G2CS4R05025 | ● |
| 3 | 0/-0.020 | 0.20 | +/-0.010 | 4 | 6 | | 50 | 4 | G2CS4R02030 | ● |
| 3 | 0/-0.020 | 0.50 | +/-0.010 | 4 | 6 | | 50 | 4 | G2CS4R05030 | ● |
| 3 | 0/-0.020 | 1.00 | +/-0.010 | 4 | 6 | | 50 | 4 | G2CS4R10030 | ● |
| 4 | 0/-0.020 | 0.20 | +/-0.010 | 4 | 8 | | 50 | 4 | G2CS4R02040 | ● |
| 4 | 0/-0.020 | 0.50 | +/-0.010 | 4 | 8 | | 50 | 4 | G2CS4R05040 | ● |
| 4 | 0/-0.020 | 1.00 | +/-0.010 | 4 | 8 | | 50 | 4 | G2CS4R10040 | ● |
| 5 | 0/-0.020 | 0.50 | +/-0.010 | 6 | 10 | | 50 | 4 | G2CS4R05050 | ● |
| 5 | 0/-0.020 | 1.00 | +/-0.010 | 6 | 10 | | 50 | 4 | G2CS4R10050 | ● |
| 6 | 0/-0.020 | 0.20 | +/-0.010 | 6 | 12 | | 50 | 4 | G2CS4R02060 | ● |
| 6 | 0/-0.020 | 0.50 | +/-0.010 | 6 | 12 | | 50 | 4 | G2CS4R05060 | ● |
| 6 | 0/-0.020 | 1.00 | +/-0.010 | 6 | 12 | | 50 | 4 | G2CS4R10060 | ● |
| 6 | 0/-0.020 | 1.50 | +/-0.010 | 6 | 12 | | 50 | 4 | G2CS4R15060 | ● |
| 6 | 0/-0.020 | 2.00 | +/-0.010 | 6 | 12 | | 50 | 4 | G2CS4R20060 | ● |
| 8 | 0/-0.025 | 0.50 | +/-0.010 | 8 | 16 | | 60 | 4 | G2CS4R05080 | ● |
| 8 | 0/-0.025 | 1.00 | +/-0.010 | 8 | 16 | | 60 | 4 | G2CS4R10080 | ● |
| 8 | 0/-0.025 | 1.50 | +/-0.010 | 8 | 16 | | 60 | 4 | G2CS4R15080 | ● |
| 8 | 0/-0.025 | 2.00 | +/-0.010 | 8 | 16 | | 60 | 4 | G2CS4R20080 | ● |
| 10 | 0/-0.025 | 0.50 | +/-0.010 | 10 | 20 | | 75 | 4 | G2CS4R05100 | ● |
| 10 | 0/-0.025 | 1.00 | +/-0.010 | 10 | 20 | | 75 | 4 | G2CS4R10100 | ● |
| 10 | 0/-0.025 | 1.50 | +/-0.010 | 10 | 20 | | 75 | 4 | G2CS4R15100 | ● |
| 10 | 0/-0.025 | 2.00 | +/-0.010 | 10 | 20 | | 75 | 4 | G2CS4R20100 | ● |
| 10 | 0/-0.025 | 2.50 | +/-0.010 | 10 | 20 | | 75 | 4 | G2CS4R25100 | ● |
| 10 | 0/-0.025 | 3.00 | +/-0.010 | 10 | 20 | | 75 | 4 | G2CS4R30100 | ● |
| 12 | 0/-0.025 | 0.50 | +/-0.010 | 12 | 24 | | 75 | 4 | G2CS4R05120 | ● |
| 12 | 0/-0.025 | 1.00 | +/-0.010 | 12 | 24 | | 75 | 4 | G2CS4R10120 | ● |
| 12 | 0/-0.025 | 1.50 | +/-0.010 | 12 | 24 | | 75 | 4 | G2CS4R15120 | ● |
| 12 | 0/-0.025 | 2.00 | +/-0.010 | 12 | 24 | | 75 | 4 | G2CS4R20120 | ● |
| 12 | 0/-0.025 | 2.50 | +/-0.010 | 12 | 24 | | 75 | 4 | G2CS4R25120 | ● |
| 12 | 0/-0.025 | 3.00 | +/-0.010 | 12 | 24 | | 75 | 4 | G2CS4R30120 | ● |

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE
END-MILLS

G2
MDTA
HF-VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

G2CS4R

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------|------------------------|------------------------|----------------------------|--------------------|--------------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D |
| Vc (m/min) | 80÷100 | 50÷70 | 30÷50 | 100÷120 | |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.004 | 0.003 | 0.003 | 0.005 | 0.005 |
| 2 | 0.007 | 0.006 | 0.005 | 0.009 | 0.009 |
| 3 | 0.010 | 0.009 | 0.008 | 0.013 | 0.013 |
| 4 | 0.013 | 0.011 | 0.010 | 0.017 | 0.017 |
| 5 | 0.016 | 0.014 | 0.012 | 0.021 | 0.021 |
| 6 | 0.019 | 0.016 | 0.014 | 0.025 | 0.025 |
| 8 | 0.025 | 0.021 | 0.019 | 0.033 | 0.033 |
| 10 | 0.032 | 0.027 | 0.024 | 0.042 | 0.042 |
| 12 | 0.040 | 0.034 | 0.030 | 0.052 | 0.052 |

< D3 mm: ae = 0.1D

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE
END-MILLS

G2

MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

G2CL4R

CARBIDE
DRILLS

- PU-HPU
- TA-4HTA
- SUH
- ALH
- HRC
- SUH MINI
- HL
- HSD
- C-SD-TA



| | Material Group ISO 513 | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------|---------------------------|------------------------|----------------------------|--------------------|--------------------|
| | Hardness/Rm | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D | 1.5D x 0.2D |
| Vc (m/min) | 55÷75 | 40÷60 | 20÷40 | 70÷90 | |
| D (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.004 | 0.003 | 0.003 | 0.004 | |
| 2 | 0.006 | 0.005 | 0.005 | 0.007 | |
| 3 | 0.009 | 0.008 | 0.007 | 0.010 | |
| 4 | 0.012 | 0.010 | 0.009 | 0.013 | |
| 5 | 0.015 | 0.013 | 0.011 | 0.017 | |
| 6 | 0.017 | 0.014 | 0.013 | 0.019 | |
| 8 | 0.023 | 0.020 | 0.017 | 0.030 | |
| 10 | 0.029 | 0.025 | 0.022 | 0.038 | |
| 12 | 0.036 | 0.031 | 0.027 | 0.047 | |

< D3 mm: ae = 0.1D

HSS
DRILLS

- LFTA
- SUTA
- HSS-HSS/CO

CARBIDE
END-MILLS

G2

- MDTA
- HF VH/UP
- MEF
- ALU
- MEX/MH
- UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

GB255

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|--------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | | 0.1D x 0.1D | 0.1D x 0.1D | 0.1D x 0.1D | 0.1D x 0.1D |
| Vc (m/min) | | 50÷70 | 35÷55 | 20÷40 | 80÷120 |
| D (mm) | D(eff.) (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.60 | 0.030 | 0.023 | 0.021 | 0.036 |
| 2 | 1.20 | 0.040 | 0.030 | 0.028 | 0.048 |
| 3 | 1.80 | 0.050 | 0.038 | 0.035 | 0.060 |
| 4 | 2.40 | 0.060 | 0.045 | 0.042 | 0.072 |
| 5 | 3.00 | 0.070 | 0.053 | 0.049 | 0.084 |
| 6 | 3.60 | 0.080 | 0.060 | 0.056 | 0.096 |
| 8 | 4.80 | 0.090 | 0.068 | 0.063 | 0.108 |
| 10 | 6.00 | 0.105 | 0.079 | 0.074 | 0.126 |
| 12 | 7.20 | 0.120 | 0.090 | 0.084 | 0.144 |

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE
END-MILLS

G2

MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

G2CSB2

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|--------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | | 0.1D x 0.1D | 0.1D x 0.1D | 0.1D x 0.1D | 0.1D x 0.1D |
| Vc (m/min) | | 80÷100 | 60÷80 | 40÷60 | 110÷130 |
| D (mm) | D(eff.) (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.60 | 0.030 | 0.023 | 0.021 | 0.036 |
| 2 | 1.20 | 0.040 | 0.030 | 0.028 | 0.048 |
| 3 | 1.80 | 0.050 | 0.038 | 0.035 | 0.060 |
| 4 | 2.40 | 0.060 | 0.045 | 0.042 | 0.072 |
| 5 | 3.00 | 0.070 | 0.053 | 0.049 | 0.084 |
| 6 | 3.60 | 0.080 | 0.060 | 0.056 | 0.096 |
| 8 | 4.80 | 0.090 | 0.068 | 0.063 | 0.108 |
| 10 | 6.00 | 0.105 | 0.079 | 0.074 | 0.126 |
| 12 | 7.20 | 0.120 | 0.090 | 0.084 | 0.144 |
| 16 | 9.60 | 0.150 | 0.113 | 0.105 | 0.180 |
| 20 | 12.00 | 0.180 | 0.135 | 0.126 | 0.216 |

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO

CARBIDE
END-MILLS

G2

MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

G2250

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|--------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | | 0.1D x 0.1D | 0.1D x 0.1D | 0.1D x 0.1D | 0.1D x 0.1D |
| Vc (m/min) | | 70÷90 | 50÷70 | 40÷50 | 100÷120 |
| D (mm) | D(eff.) (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.60 | 0.027 | 0.020 | 0.019 | 0.032 |
| 2 | 1.20 | 0.036 | 0.027 | 0.025 | 0.043 |
| 3 | 1.80 | 0.045 | 0.034 | 0.032 | 0.054 |
| 4 | 2.40 | 0.054 | 0.041 | 0.038 | 0.065 |
| 5 | 3.00 | 0.063 | 0.047 | 0.044 | 0.076 |
| 6 | 3.60 | 0.072 | 0.054 | 0.050 | 0.086 |
| 8 | 4.80 | 0.081 | 0.061 | 0.057 | 0.097 |
| 10 | 6.00 | 0.095 | 0.071 | 0.066 | 0.113 |
| 12 | 7.20 | 0.108 | 0.081 | 0.076 | 0.130 |

G2251

HSS
DRILLS

LFTA
SUTA
HSS-HSS/CO



| Material Group ISO 513 | | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|--------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | | 0.1D x 0.1D | 0.1D x 0.1D | 0.1D x 0.1D | 0.1D x 0.1D |
| Vc (m/min) | | 60÷80 | 40÷60 | 35÷45 | 90÷110 |
| D (mm) | D(eff.) (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 6 | 3.60 | 0.058 | 0.044 | 0.041 | 0.070 |
| 8 | 4.80 | 0.066 | 0.049 | 0.046 | 0.079 |
| 10 | 6.00 | 0.077 | 0.057 | 0.054 | 0.092 |
| 12 | 7.20 | 0.087 | 0.066 | 0.061 | 0.105 |
| 16 | 9.60 | 0.122 | 0.092 | 0.085 | 0.146 |
| 20 | 12.00 | 0.146 | 0.110 | 0.102 | 0.175 |

CARBIDE
END-MILLS

G2

MDTA
HF VH/UP
MEF
ALU
MEX/MH
UH/MH

HSS
END-MILLS

CARBIDE
BURRS

INFO

G2CSB4

CARBIDE
DRILLS

PU-HPU
TA-4HTA
SUH
ALH
HRC
SUH MINI
HL
HSD
C-SD-TA



| Material Group ISO 513 | | P1 P2 K1 | P3 P4 P7 M1 K2 | P5 M2 K3 | N1 N2 N3 N4 |
|------------------------|--------------|------------------------|----------------------------|--------------------|--------------------|
| Hardness/Rm | | ≤700 N/mm ² | 600÷1000 N/mm ² | ≤35 HRC | |
| ap x ae | | 0.1D x 0.3D | 0.1D x 0.3D | 0.1D x 0.3D | 0.1D x 0.3D |
| Vc (m/min) | | 80÷100 | 60÷80 | 40÷60 | 110÷130 |
| D (mm) | D(eff.) (mm) | fz (mm/z) | fz (mm/z) | fz (mm/z) | fz (mm/z) |
| 1 | 0.60 | 0.030 | 0.023 | 0.021 | 0.036 |
| 2 | 1.20 | 0.040 | 0.030 | 0.028 | 0.048 |
| 3 | 1.80 | 0.050 | 0.038 | 0.035 | 0.060 |
| 4 | 2.40 | 0.060 | 0.045 | 0.042 | 0.072 |
| 5 | 3.00 | 0.070 | 0.053 | 0.049 | 0.084 |
| 6 | 3.60 | 0.080 | 0.060 | 0.056 | 0.096 |
| 8 | 4.80 | 0.090 | 0.068 | 0.063 | 0.108 |
| 10 | 6.00 | 0.105 | 0.079 | 0.074 | 0.126 |
| 12 | 7.20 | 0.120 | 0.090 | 0.084 | 0.144 |
| 16 | 9.60 | 0.150 | 0.113 | 0.105 | 0.180 |
| 20 | 12.00 | 0.180 | 0.135 | 0.126 | 0.216 |

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DRILLS

LFTA
SUTA
HSS-HSS/CO

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END-MILLS

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UH/MH

HSS
END-MILLS

CARBIDE
BURRS