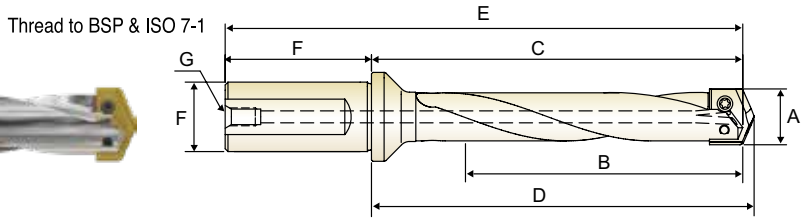
# SPADE DRILLS

Z**EXHF SERIES
Z**EXSF SERIES

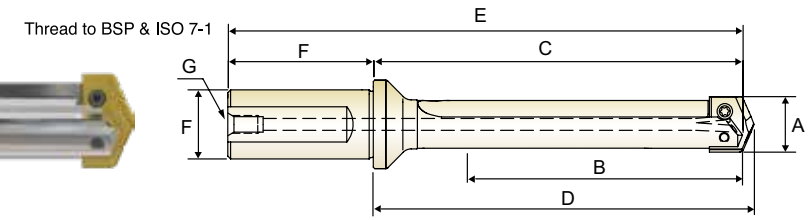
## FLANGED STRAIGHT SHANK HOLDERS

HALTER MIT ZYLINDERSCHAFT UND SPANNFLÄCHE
Porte-plaquette à collerette queue cylindrique
PUNTE ATTACCO CILINDRICO FLANGIATO




## EXTENDED LENGTH - Helical Flute (Metric)

| Series | EDP No. | Drill Insert Range | Max. Drill Depth | Body Length | Ref. Length | Overall Length | Shank | | Pipe Tap |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Dia. | Length | |
| | | A | B | C | D | E | F | | G |
| Y | ZY0EXHF020M | 9.5 ~ 11.0 | 111.1 | 140.5 | 142.9 | 190.5 | 20.0 | 50.0 | 1/8 |
| Z | ZZ0EXHF020M | 11.5 ~ 12.5 | 111.1 | 140.5 | 142.9 | 190.5 | 20.0 | 50.0 | 1/8 |
| 0 | Z00EXHF020M | 13.0 ~ 17.5 | 114.3 | 142.9 | 145.7 | 192.9 | 20.0 | 50.0 | 1/8 |
| 0.5 | Z05EXHF020M | 15.5 ~ 17.5 | 114.3 | 142.9 | 145.7 | 192.9 | 20.0 | 50.0 | 1/8 |
| 1 | Z10EXHF025M | 18.0 ~ 24.0 | 269.9 | 307.2 | 310.8 | 363.2 | 25.0 | 56.0 | 1/8 |
| 1.5 | Z15EXHF025M | 22.0 ~ 24.0 | 269.9 | 307.2 | 310.8 | 363.2 | 25.0 | 56.0 | 1/8 |
| 2 | Z20EXHF032M | 25.0 ~ 35.0 | 288.9 | 331.8 | 335.4 | 391.8 | 32.0 | 60.0 | 1/4 |
| 2.5 | Z25EXHF032M | 30.0 ~ 35.0 | 288.9 | 331.8 | 335.4 | 391.8 | 32.0 | 60.0 | 1/4 |




## EXTENDED LENGTH - Straight Flute (Metric)

| Series | EDP No. | Drill Insert Range | Max. Drill Depth | Body Length | Ref. Length | Overall Length | Shank | | Pipe Tap |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Dia. | Length | |
| | | A | B | C | D | E | F | | G |
| 3 | Z30EXSF040M | 36.0 ~ 47.0 | 349.3 | 401.6 | 406.4 | 471.6 | 40.0 | 70.0 | 1/4 |
| 4 | Z40EXSF040M | 48.0 ~ 65.0 | 422.3 | 471.5 | 476.3 | 541.5 | 40.0 | 70.0 | 1/4 |

# SELECTION GUIDE

YG HOLEMAKING TOOLS

| SERIES | 1~8 | Y,Z,0,1~4 | Y,Z,0,1,2 |
|---|---|---|---|
| TOOL MATERIAL | HSS M4 | SUPER HSS T15 | PREMIUM HSS M48 |
| POINT | STANDARD | STANDARD | STANDARD |
| SIZE MIN | Ø17.86(#1) | Ø9.5(#Y) | Ø9.5(#Y) |
| SIZE MAX | Ø114.3(#8) | Ø65.09(#4) | Ø35(#2) |
| PAGE | A286 | A292 | A297 |
| SURFACE TREATMENT | TiN / TiCN / TiAlN | | |

Please visit globalyg1.com/mat for material search

# INSERTS & HOLDERS
# SPADE DRILLS

For General Machines and Drilling Large Diameters
Longer Tool Life and High Productivity

◎ : Excellent ○ : Good

Recommended cutting conditions : p.A375

| ISO | VDI 3323 | Material Description | Composition / Structure / Heat Treatment | | HB | HRc | | | |
|---|---|---|---|---|---|---|---|---|---|
| P | 1 | Non-alloy steel | About 0.15% C | Annealed | 125 | | ○ | ◎ | ◎ |
| | 2 | | About 0.45% C | Annealed | 190 | 13 | ○ | ◎ | ◎ |
| | 3 | | About 0.45% C | Quenched & Tempered | 250 | 25 | ○ | ◎ | ◎ |
| | 4 | | About 0.75% C | Annealed | 270 | 28 | ○ | ◎ | ◎ |
| | 5 | | About 0.75% C | Quenched & Tempered | 300 | 32 | | | |
| | 6 | Low alloy steel | | Annealed | 180 | 10 | ○ | ◎ | ◎ |
| | 7 | | | Quenched & Tempered | 275 | 29 | ○ | ◎ | ◎ |
| | 8 | | | Quenched & Tempered | 300 | 32 | | ○ | ◎ |
| | 9 | | | Quenched & Tempered | 350 | 38 | | ○ | ◎ |
| | 10 | High alloyed steel, and tool steel | | Annealed | 200 | 15 | | ○ | ◎ |
| | 11 | | | Quenched & Tempered | 325 | 35 | | ○ | ◎ |
| M | 12 | Stainless steel | Ferritic / Martensitic | Annealed | 200 | 15 | ◎ | ○ | |
| | 13 | | Martensitic | Quenched & Tempered | 240 | 23 | ◎ | ○ | |
| | 14 | | Austenitic | | 180 | 10 | ◎ | ○ | |
| K | 15 | Grey cast iron | Pearlitic / ferritic | | 180 | 10 | ◎ | ○ | ○ |
| | 16 | | Pearlitic (Martensitic) | | 260 | 26 | ○ | ◎ | ◎ |
| | 17 | Nodular cast iron | Ferritic | | 160 | 3 | ◎ | ○ | ○ |
| | 18 | | Pearlitic | | 250 | 25 | ○ | ◎ | ◎ |
| | 19 | Malleable cast iron | Ferritic | | 130 | | ◎ | ○ | ○ |
| | 20 | | Pearlitic | | 230 | 21 | ○ | ◎ | ◎ |
| N | 21 | Aluminum-wrought alloy | Not Curable | | 60 | | ◎ | ○ | ○ |
| | 22 | | Curable | Hardened | 100 | | ◎ | ○ | ○ |
| | 23 | Aluminum-cast, alloyed | ≤ 12% Si, Not Curable | | 75 | | | | |
| | 24 | | ≤ 12% Si, Curable | Hardened | 90 | | | | |
| | 25 | | > 12% Si, Not Curable | | 130 | | | | |
| | 26 | Copper and Copper Alloys (Bronze / Brass) | Cutting Alloys, PB>1% | | 110 | | | | |
| | 27 | | CuZn, CuSnZn (Brass) | | 90 | | ◎ | ○ | ○ |
| | 28 | | CuSn, lead-free copper and electrolytic copper | | 100 | | | | |
| | 29 | Non Metallic Materials | Duroplastic, Fiber Reinforced Plastic | | | | | | |
| | 30 | | Rubber, Wood, etc. | | | | | | |
| S | 31 | Heat Resistant Super Alloys | Fe Based | Annealed | 200 | 15 | | ◎ | ◎ |
| | 32 | | | Cured | 280 | 30 | | ○ | ◎ |
| | 33 | | Ni or Co Based | Annealed | 250 | 25 | | ○ | ◎ |
| | 34 | | | Cured | 350 | 38 | | ○ | ◎ |
| | 35 | | | Cast | 320 | 34 | | ○ | ◎ |
| | 36 | Titanium Alloys | Pure Titanium | | 400 Rm | | | | |
| | 37 | | Alpha + Beta Alloys | Hardened | 1050 Rm | | | | |
| H | 38 | Hardened steel | | Hardened | 550 | 55 | | ○ | ◎ |
| | 39 | | | Hardened | 630 | 60 | | | |
| | 40 | Chilled Cast Iron | | Cast | 400 | 42 | | | |
| | 41 | Hardened Cast Iron | | Hardened | 550 | 55 | | | |

| | | | |
|---|---|---|---|
| TAPER SHANK |  | TAPER SHANK HOLDERS - INCH/METRIC | A364 |
| FLANGED SHANK |  | FLANGED STRAIGHT SHANK HOLDERS - INCH/METRIC | A364 |
| STRAIGHT SHANK |  | STRAIGHT SHANK HOLDERS - INCH | A382 |

| Y,Z,0,1,2 | Y,Z,0,1~3 | Y,Z,0,1~3 | 1~3 | Y,Z,0,1~3 | Y,Z,0,1,2 | Y,Z,0,1,2 | Y,Z,0,1~3 | Y,Z,0,1~3 | Y,Z,0,1,2 | |
|---|---|---|---|---|---|---|---|---|---|---|
| CARBIDE K10 | CARBIDE K20 | CARBIDE P40 | HSS M4 | SUPER HSS T15 | PREMIUM HSS M48 | CARBIDE K10 | CARBIDE K20 | CARBIDE P40 | SUPER COBALT T15 | |
| STANDARD | STANDARD | STANDARD | SM-POINT | SM-POINT | SM-POINT | SM-POINT | SM-POINT | SM-POINT | FALT BOTTOM | |
| Ø9.5(#Y) | Ø9.5(#Y) | Ø9.5(#Y) | Ø17.86(#1) | Ø9.5(#Y) | Ø9.5(#Y) | Ø9.5(#Y) | Ø9.5(#Y) | Ø9.5(#Y) | Ø9.5(#Y) | |
| Ø35(#2) | Ø47.63(#3) | Ø47.63(#3) | Ø47.63(#3) | Ø47.63(#3) | Ø35(#2) | Ø35(#2) | Ø47.63(#3) | Ø47.63(#3) | Ø35(#2) | |
| **A300** | **A303** | **A307** | **A312** | **A315** | **A319** | **A322** | **A325** | **A329** | **A361** | |
| TiN / TiCN / TiAlN | | | | | | | | | TiN / Hardslick / TiAlN | |
|  |  |  |  |  |  |  |  |  |  | |
| | ○ | ◎ | ○ | ◎ | ◎ | | ○ | ◎ | ◎ | 1 |
| | ○ | ◎ | ○ | ◎ | ◎ | | ○ | ◎ | ◎ | 2 |
| | ○ | ◎ | ○ | ◎ | ◎ | | ○ | ◎ | ◎ | 3 |
| | ○ | ◎ | ○ | ◎ | ◎ | | ○ | ◎ | ◎ | 4 |
| | | | | | | | | | | 5 |
| | ○ | ◎ | ○ | ◎ | ◎ | | ○ | ◎ | ◎ | 6 P |
| | ○ | ◎ | ○ | ◎ | ◎ | | ○ | ◎ | ◎ | 7 |
| | ○ | ◎ | | ○ | ◎ | | ○ | ◎ | ○ | 8 |
| | ○ | ◎ | | ○ | ◎ | | ○ | ◎ | ○ | 9 |
| | ○ | ◎ | | ○ | ◎ | | ○ | ◎ | ○ | 10 |
| | ○ | ◎ | | ○ | ◎ | | ○ | ◎ | ○ | 11 |
| | ◎ | ○ | ◎ | ○ | | | ◎ | ○ | ○ | 12 |
| | ◎ | ○ | ◎ | ○ | | | ◎ | ○ | ○ | 13 M |
| | ◎ | ○ | ◎ | ○ | | | ◎ | ○ | ○ | 14 |
| ◎ | ○ | ○ | ◎ | ○ | ○ | ◎ | ○ | ○ | ○ | 15 |
| ◎ | ○ | ○ | ○ | ◎ | ◎ | ◎ | ○ | ○ | ◎ | 16 |
| ◎ | ○ | ○ | ◎ | ○ | ○ | ◎ | ○ | ○ | ○ | 17 |
| ◎ | ○ | ○ | ○ | ◎ | ◎ | ◎ | ○ | ○ | ◎ | 18 K |
| ◎ | ○ | ○ | ◎ | ○ | ○ | ◎ | ○ | ○ | ○ | 19 |
| ◎ | ○ | ○ | ○ | ◎ | ◎ | ◎ | ○ | ○ | ◎ | 20 |
| | ◎ | ○ | ◎ | ○ | ○ | | ◎ | ○ | ○ | 21 |
| | ◎ | ○ | ◎ | ○ | ○ | | ◎ | ○ | ○ | 22 |
| | | | | | | | | | | 23 |
| | | | | | | | | | | 24 |
| | | | | | | | | | | 25 |
| | | | | | | | | | | 26 N |
| | ◎ | ○ | ◎ | ○ | ○ | | ◎ | ○ | ○ | 27 |
| | | | | | | | | | | 28 |
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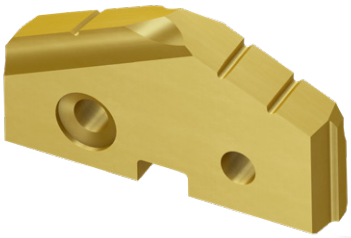
| | | | | | | | | | | 30 |
| | ◎ | ○ | | ◎ | ◎ | | ◎ | ○ | ◎ | 31 |
| | ◎ | ○ | | ○ | ◎ | | ◎ | ○ | ○ | 32 |
| | ◎ | ○ | | ○ | ◎ | | ◎ | ○ | ○ | 33 |
| | ◎ | ○ | | ○ | ◎ | | ◎ | ○ | ○ | 34 S |
| | ◎ | ○ | | ○ | ◎ | | ◎ | ○ | ○ | 35 |
| | | | | | | | | | | 36 |
| | | | | | | | | | | 37 |
| | ○ | ◎ | | ○ | ◎ | | ○ | ◎ | ○ | 38 |
| | | | | | | | | | | 39 |
| | | | | | | | | | | 40 H |
| | | | | | | | | | | 41 |

| Coating | Characteristics |
|---|---|
| **H** | -First choice for excellent wear resistance and toughness<br>-Preventive of chipping due to cold welding<br>-Achieve high penetration rates even in deep holes with reliable tool life<br>-Coefficient of friction against steel : 0.25<br>-Color : Bronze |
| **TiN** | -Increased tool life over non-coating<br>-Improved wear resistance and high hardness<br>-For normal applications<br>-Coefficient of friction against steel : 0.4<br>-Color : Gold |

| Coating | Characteristics |
|---|---|
| **TiCN** | -Maximum working temperature up to 400°c<br>-Better wear resistance over non-coating<br>-Coefficient of friction against steel : 0.4<br>-Color : Blue-Grey |
| **TiAlN** | -Maximum working temperature up to 800°c<br>-Excellent heat and oxidation resisance<br>-Coefficient of friction against steel : 0.4<br>-Color : Violet-Grey |
| **Hardslick** | -Better chip evauation for tapping and drilling<br>-High hardness and improved lubrication<br>-Coefficient of friction against steel : 0.2<br>-Color : Black-Gery |

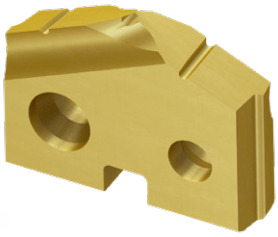
# SPADE DRILLS (Standard, SM-Point)

Reference page : p.A299 - p.A380



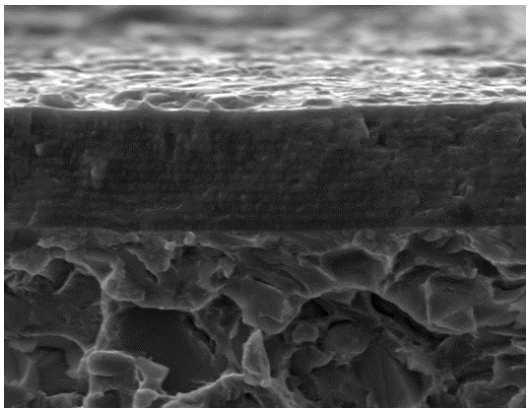
## Standard-Point

Standard Point
and Neutral Rake Angle for
**Stable Cutting**
**Self Centering**
**Chip Breaking**
**Rigidity on Center**



## SM-Point

Multiple Web Thinning for and Radius Back Face
for Increased Cutting Speed and Feed
**Wide Chip Space**
**Good Self-Centering**
**Less Tool Lead-off**
**Reduction in bell mouthing**




## Multi layered 'H'-coating
## Micro Grain Carbide Insert

Outstanding Productivity & Reliability

### H - Coating

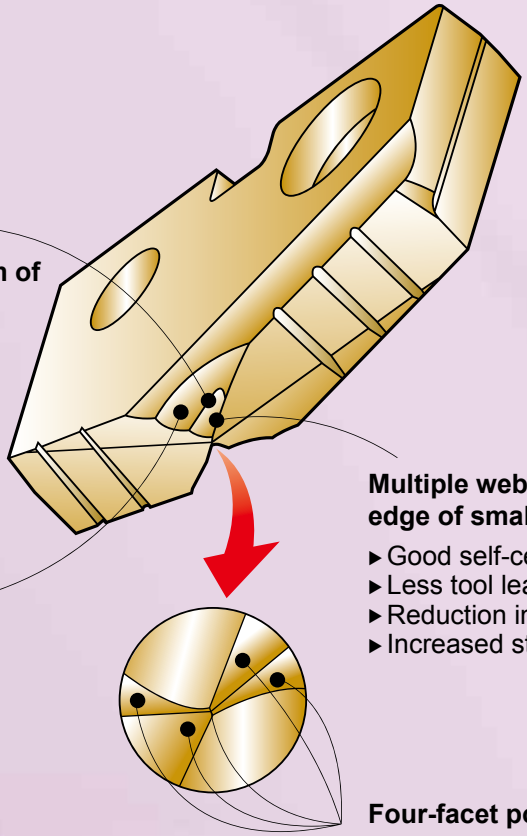
**(Upgraded AlCrN-Based : Multi-Layer coating)**

- Higher worn-out resistance and Lower friction
- Higher Cutting Speed and Feed
- Improved drill Hole Quality

# Special features of SM-Point Spade Drill

**This new "Hybrid Point" combines the strength of the standard point with additional "Web Thinning".**

**This new point increases stability, reduces thrust, improves centering and allows increased speeds and feeds.**



**Multiple thinning form at the bottom of the large thinning.**

- The optimum thinning for the difference from the cutting speed, the cutting quantity and the cutting load according to the distance from the drill point to the cutting edge.

**Radius back face**

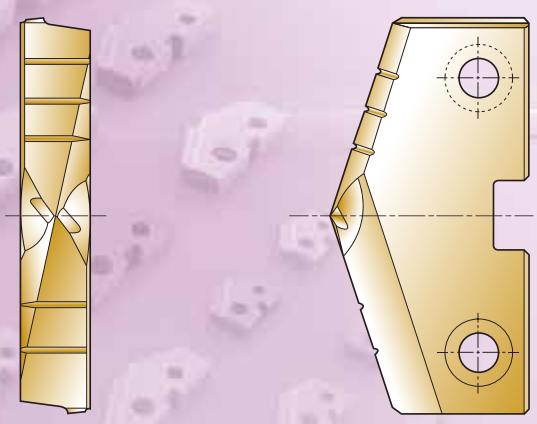
- Wide chip space

**Multiple web thinning with the cutting edge of small web thinning.**

- Good self-centering
- Less tool lead off
- Reduction in bell mouthing, thrust
- Increased stability

**Four-facet point**

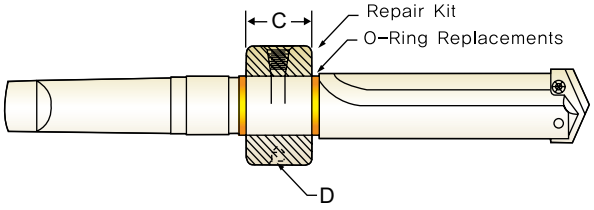
- Self-centering
- Less thrust force

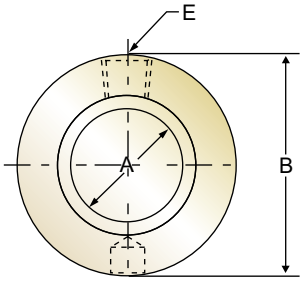


# SPADE DRILLS

**RECOMMENDED CUTTING CONDITIONS**
**EMPFOHLENE SCHNEIDKONDITIONEN**

## HOLDER ACCESSORIES
## ROTARY COOLANT ADAPTER (RCA) AND ACCESSORIES




### Inch

| Item No. | I.D. | O.D. | Length | Thread for Driving Rod | Pipe Tap | RCA Repair Kit Item No. | RCA O-Ring Replacements Item No. |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | | |
| PR110048 | 3/4 | 1-3/4 | 7/8 | 5/16-NC | ◈1/8 | PR210048 | PR310048 |
| PR110100 | 1 | 2-1/8 | 1-1/8 | 5/16-NC | ◈1/8 | PR210100 | PR310100 |
| PR110116 | 1-1/4 | 2-1/2 | 1-3/8 | 3/8-NC | ◈1/4 | PR210116 | PR310116 |
| PR110148 | 1-3/4 | 3 | 1-3/8 | 3/8-NC | ◈1/4 | PR210148 | PR310148 |
| PR110216 | 2-1/4 | 3-3/4 | 1-3/4 | 1/2-NC | ◈1/2 | PR210216 | PR310216 |

### Metric

| Item No. | I.D. | O.D. | Length | Thread for Driving Rod | Pipe Tap | RCA Repair Kit Item No. | RCA O-Ring Replacements Item No. |
|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | | |
| PR120190 | 19.05 | 44.45 | 22.23 | M8 ×1.25 | ◈1/8 | PR220190 | PR320190 |
| PR120254 | 25.40 | 53.97 | 28.57 | M8 ×1.25 | ◈1/8 | PR220254 | PR320254 |
| PR120317 | 31.75 | 63.50 | 34.92 | M10 ×1.5 | ◈1/4 | PR220317 | PR320317 |
| PR120444 | 44.45 | 76.20 | 34.92 | M10 ×1.5 | ◈1/4 | PR220444 | PR320444 |
| PR120571 | 57.15 | 95.27 | 44.45 | M12 ×1.75 | ◈1/2 | PR220571 | PR320571 |

◈ Thread to BSP & ISO 7-1

## TORX SCREWS

| Holder Series | Item No. | TORX Hand Driver | Drill Range Used With | |
|---|---|---|---|---|
| | | | Inch | Metric |
| Y | J07Y0010 | J05Y0070 | 3/8 ~ 27/64 | 9.5 mm ~ 11.0 mm |
| Z | J07Z0110 | | 7/16 ~ 1/2 | 11.5 mm ~ 12.5 mm |
| 0 | J0800210 | J0500080 | 33/64 ~ 11/16 | 13.0 mm ~ 17.5 mm |
| 0.5 | J0805310 | | 39/64 ~ 11/16 | 15.5 mm ~ 17.5 mm |
| 1 | J0910410 | J0510090 | 45/64 ~ 15/16 | 18.0 mm ~ 24.0 mm |
| 1.5 | J0915510 | | 55/64 ~ 15/16 | 22.0 mm ~ 24.0 mm |
| 2 | J1520610 | J0520150 | 31/32 ~ 1-3/8 | 25.0 mm ~ 35.0 mm |
| 2.5 | J1525710 | | 1-3/16 ~ 1-3/8 | 30.0 mm ~ 35.0 mm |
| 3,4 | J2030810 | J0530200 | 1-13/32 ~ 2-9/16 | 36.0 mm ~ 65.0 mm |
| 5 ~ 8 | J2550910 | J0550250 | 2-1/2 ~ 4-1/2 | 64.0 mm ~ 114.0 mm |

** Note : Replacement screws sold in packages(10 screws per package)

## SPADE DRILL HSS-M4

| ISO | VDI 3323 | Material Description | Vc(m/min) | | | Feed(mm/rev) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TiN | TiCN | TiAlN | Ø9.5-12.5 | Ø13-17.5 | Ø18-24 | Ø25-35 | Ø36-47 | Ø48-65 | Ø66-114 |
| P | 1 | Non-alloy steel | 54 | 67 | 75 | 0.15 | 0.22 | 0.28 | 0.37 | 0.46 | 0.56 | 0.67 |
| | 2 | | 49 | 58 | 69 | 0.13 | 0.19 | 0.24 | 0.34 | 0.43 | 0.50 | 0.57 |
| | 3 | | 45 | 56 | 63 | 0.13 | 0.19 | 0.23 | 0.34 | 0.43 | 0.50 | 0.58 |
| | 4 | | 45 | 56 | 63 | 0.13 | 0.19 | 0.23 | 0.34 | 0.43 | 0.50 | 0.58 |
| | 6 | Low alloy steel | 45 | 56 | 58 | 0.13 | 0.20 | 0.24 | 0.36 | 0.42 | 0.46 | 0.55 |
| | 7 | | 41 | 50 | 56 | 0.13 | 0.16 | 0.23 | 0.35 | 0.41 | 0.44 | 0.55 |
| M | 12 | Stainless steel | 20 | 23 | 29 | 0.12 | 0.18 | 0.20 | 0.24 | 0.30 | 0.36 | 0.46 |
| | 13 | | 20 | 23 | 29 | 0.12 | 0.18 | 0.20 | 0.24 | 0.30 | 0.36 | 0.46 |
| | 14 | | 24 | 29 | 34 | 0.14 | 0.20 | 0.23 | 0.26 | 0.36 | 0.41 | 0.50 |
| K | 15 | Grey cast iron | 48 | 58 | 70 | 0.14 | 0.26 | 0.35 | 0.45 | 0.56 | 0.64 | 0.68 |
| | 16 | | 29 | 35 | 41 | 0.10 | 0.15 | 0.16 | 0.23 | 0.28 | 0.35 | 0.40 |
| | 17 | Nodular cast iron | 48 | 58 | 70 | 0.14 | 0.26 | 0.35 | 0.45 | 0.56 | 0.64 | 0.68 |
| | 18 | | 35 | 44 | 52 | 0.13 | 0.17 | 0.23 | 0.3 | 0.35 | 0.43 | 0.50 |
| | 19 | Malleable cast iron | 52 | 64 | 75 | 0.16 | 0.30 | 0.40 | 0.49 | 0.59 | 0.69 | 0.75 |
| | 20 | | 35 | 44 | 52 | 0.13 | 0.17 | 0.23 | 0.30 | 0.35 | 0.43 | 0.50 |
| N | 21 | Aluminum-wrought alloy | 187 | 229 | 244 | 0.19 | 0.33 | 0.41 | 0.50 | 0.54 | 0.64 | 0.70 |
| | 22 | | 92 | 137 | 137 | 0.19 | 0.33 | 0.41 | 0.46 | 0.54 | 0.64 | 0.70 |
| | 27 | Copper and Copper Alloys (Bronze / Brass) | 95 | 128 | 142 | 0.19 | 0.31 | 0.43 | 0.53 | 0.64 | 0.74 | 0.79 |

▶ The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.
Speed and feed reductions (20% reduction in speed and 10% reduction in feed) are recommended.

# SPADE DRILLS

**RECOMMENDED CUTTING CONDITIONS**
**EMPFOHLENE SCHNEIDKONDITIONEN**

## SPADE DRILL HSS-T15

| ISO | VDI 3323 | Material Description | Vc(m/min) | | | Feed(mm/rev) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TiN | TiCN | TiAlN | Ø9.5-12.5 | Ø13-17.5 | Ø18-24 | Ø25-35 | Ø36-47 | Ø48-65 | Ø66-114 |
| P | 1 | Non-alloy steel | 54 | 67 | 75 | 0.15 | 0.22 | 0.28 | 0.37 | 0.46 | 0.56 | 0.67 |
| | 2 | | 49 | 58 | 69 | 0.13 | 0.19 | 0.24 | 0.34 | 0.43 | 0.50 | 0.57 |
| | 3 | | 45 | 56 | 63 | 0.13 | 0.19 | 0.23 | 0.34 | 0.43 | 0.50 | 0.58 |
| | 4 | | 45 | 56 | 63 | 0.13 | 0.19 | 0.23 | 0.34 | 0.43 | 0.50 | 0.58 |
| | 6 | Low alloy steel | 45 | 56 | 58 | 0.13 | 0.20 | 0.24 | 0.36 | 0.42 | 0.46 | 0.55 |
| | 7 | | 41 | 50 | 56 | 0.13 | 0.16 | 0.23 | 0.35 | 0.41 | 0.44 | 0.55 |
| | 8 | | 39 | 47 | 53 | 0.09 | 0.15 | 0.22 | 0.28 | 0.38 | 0.41 | 0.50 |
| | 9 | | 36 | 43 | 46 | 0.08 | 0.15 | 0.21 | 0.27 | 0.38 | 0.40 | 0.51 |
| | 10 | High alloyed steel, and tool steel | 25 | 34 | 36 | 0.08 | 0.17 | 0.20 | 0.24 | 0.30 | 0.37 | 0.39 |
| | 11 | | 19 | 27 | 29 | 0.08 | 0.14 | 0.18 | 0.19 | 0.25 | 0.29 | 0.34 |
| M | 12 | Stainless steel | 20 | 23 | 29 | 0.12 | 0.18 | 0.20 | 0.24 | 0.30 | 0.36 | 0.46 |
| | 13 | | 20 | 23 | 29 | 0.12 | 0.18 | 0.20 | 0.24 | 0.30 | 0.36 | 0.46 |
| | 14 | | 24 | 29 | 34 | 0.14 | 0.20 | 0.23 | 0.26 | 0.36 | 0.41 | 0.50 |
| K | 15 | Grey cast iron | 48 | 58 | 70 | 0.14 | 0.26 | 0.35 | 0.45 | 0.56 | 0.64 | 0.68 |
| | 16 | | 29 | 35 | 41 | 0.10 | 0.15 | 0.16 | 0.23 | 0.28 | 0.35 | 0.40 |
| | 17 | Nodular cast iron | 48 | 58 | 70 | 0.14 | 0.26 | 0.35 | 0.45 | 0.56 | 0.64 | 0.68 |
| | 18 | | 35 | 44 | 52 | 0.13 | 0.17 | 0.23 | 0.30 | 0.35 | 0.43 | 0.50 |
| | 19 | Malleable cast iron | 52 | 64 | 75 | 0.16 | 0.30 | 0.40 | 0.49 | 0.59 | 0.69 | 0.75 |
| | 20 | | 35 | 44 | 52 | 0.13 | 0.17 | 0.23 | 0.30 | 0.35 | 0.43 | 0.50 |
| N | 21 | Aluminum-wrought alloy | 187 | 229 | 244 | 0.19 | 0.33 | 0.41 | 0.50 | 0.54 | 0.64 | 0.70 |
| | 22 | | 92 | 137 | 137 | 0.19 | 0.33 | 0.41 | 0.46 | 0.54 | 0.64 | 0.70 |
| | 27 | Copper and Copper Alloys (Bronze / Brass) | 95 | 128 | 142 | 0.19 | 0.31 | 0.43 | 0.53 | 0.64 | 0.74 | 0.79 |
| S | 31 | Heat Resistant Super Alloys | 9 | 11 | 12 | 0.08 | 0.17 | 0.20 | 0.24 | 0.30 | 0.37 | 0.39 |
| | 32 | | 8 | 9 | 11 | 0.08 | 0.14 | 0.18 | 0.19 | 0.25 | 0.29 | 0.34 |
| | 33 | | 8 | 9 | 11 | 0.08 | 0.14 | 0.18 | 0.19 | 0.25 | 0.29 | 0.34 |
| | 34 | | 8 | 9 | 11 | 0.08 | 0.14 | 0.18 | 0.19 | 0.25 | 0.29 | 0.34 |
| | 35 | | 8 | 9 | 11 | 0.08 | 0.14 | 0.18 | 0.19 | 0.25 | 0.29 | 0.34 |
| H | 38 | Hardened steel | 20 | 23 | 29 | 0.12 | 0.18 | 0.20 | 0.24 | 0.30 | 0.36 | 0.46 |

▶ The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.
Speed and feed reductions (20% reduction in speed and 10% reduction in feed) are recommended.

RPM = rev./min.
FEED = mm/rev.

## SPADE DRILL HSS-M48

| ISO | VDI 3323 | Material Description | Vc(m/min) | | | Feed(mm/rev) | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | TiN | TiCN | TiAlN | Ø9.5-12.5 | Ø13-17.5 | Ø18-24 | Ø25-35 | Ø36-47 | Ø48-65 | Ø66-114 |
| P | 1 | Non-alloy steel | 54 | 67 | 75 | 0.15 | 0.22 | 0.28 | 0.37 | 0.46 | 0.56 | 0.67 |
| | 2 | | 49 | 58 | 69 | 0.13 | 0.19 | 0.24 | 0.34 | 0.43 | 0.50 | 0.57 |
| | 3 | | 45 | 56 | 63 | 0.13 | 0.19 | 0.23 | 0.34 | 0.43 | 0.50 | 0.58 |
| | 4 | | 45 | 56 | 63 | 0.13 | 0.19 | 0.23 | 0.34 | 0.43 | 0.50 | 0.58 |
| | 6 | Low alloy steel | 45 | 56 | 58 | 0.13 | 0.20 | 0.24 | 0.36 | 0.42 | 0.46 | 0.55 |
| | 7 | | 41 | 50 | 56 | 0.13 | 0.16 | 0.23 | 0.35 | 0.41 | 0.44 | 0.55 |
| | 8 | | 39 | 47 | 53 | 0.09 | 0.15 | 0.22 | 0.28 | 0.38 | 0.41 | 0.50 |
| | 9 | | 36 | 43 | 46 | 0.08 | 0.15 | 0.21 | 0.27 | 0.38 | 0.40 | 0.51 |
| | 10 | High alloyed steel, and tool steel | 25 | 34 | 36 | 0.08 | 0.17 | 0.20 | 0.24 | 0.30 | 0.37 | 0.39 |
| | 11 | | 19 | 27 | 29 | 0.08 | 0.14 | 0.18 | 0.19 | 0.25 | 0.29 | 0.34 |
| K | 15 | Grey cast iron | 48 | 58 | 70 | 0.14 | 0.26 | 0.35 | 0.45 | 0.56 | 0.64 | 0.68 |
| | 16 | | 29 | 35 | 41 | 0.10 | 0.15 | 0.16 | 0.23 | 0.28 | 0.35 | 0.40 |
| | 17 | Nodular cast iron | 48 | 58 | 70 | 0.14 | 0.26 | 0.35 | 0.45 | 0.56 | 0.64 | 0.68 |
| | 18 | | 35 | 44 | 52 | 0.13 | 0.17 | 0.23 | 0.30 | 0.35 | 0.43 | 0.50 |
| | 19 | Malleable cast iron | 52 | 64 | 75 | 0.16 | 0.30 | 0.40 | 0.49 | 0.59 | 0.69 | 0.75 |
| | 20 | | 35 | 44 | 52 | 0.13 | 0.17 | 0.23 | 0.30 | 0.35 | 0.43 | 0.50 |
| N | 21 | Aluminum-wrought alloy | 187 | 229 | 244 | 0.19 | 0.33 | 0.41 | 0.50 | 0.54 | 0.64 | 0.70 |
| | 22 | | 92 | 137 | 137 | 0.19 | 0.33 | 0.41 | 0.46 | 0.54 | 0.64 | 0.70 |
| | 27 | Copper and Copper Alloys (Bronze / Brass) | 95 | 128 | 142 | 0.19 | 0.31 | 0.43 | 0.53 | 0.64 | 0.74 | 0.79 |
| S | 31 | Heat Resistant Super Alloys | 9 | 11 | 12 | 0.08 | 0.17 | 0.20 | 0.24 | 0.30 | 0.37 | 0.39 |
| | 32 | | 8 | 9 | 11 | 0.08 | 0.14 | 0.18 | 0.19 | 0.25 | 0.29 | 0.34 |
| | 33 | | 8 | 9 | 11 | 0.08 | 0.14 | 0.18 | 0.19 | 0.25 | 0.29 | 0.34 |
| | 34 | | 8 | 9 | 11 | 0.08 | 0.14 | 0.18 | 0.19 | 0.25 | 0.29 | 0.34 |
| | 35 | | 8 | 9 | 11 | 0.08 | 0.14 | 0.18 | 0.19 | 0.25 | 0.29 | 0.34 |
| H | 38 | Hardened steel | 20 | 23 | 29 | 0.12 | 0.18 | 0.20 | 0.24 | 0.30 | 0.36 | 0.46 |

▶ The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.
Speed and feed reductions (20% reduction in speed and 10% reduction in feed) are recommended.

# SPADE DRILLS

**RECOMMENDED CUTTING CONDITIONS**
**EMPFOHLENE SCHNEIDKONDITIONEN**

## SPADE DRILL CARBIDE-K10

| ISO | VDI 3323 | Material Description | Vc(m/min) | | | Feed(mm/rev) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | TiN | TiCN | TiAlN | Ø9.5~12.5 | Ø13~17.5 | Ø18~24 | Ø25~35 | Ø36~47 |
| K | 15 | Grey cast iron | 95 | 101 | 125 | 0.17 | 0.26 | 0.32 | 0.42 | 0.53 |
| | 16 | | 56 | 70 | 79 | 0.13 | 0.18 | 0.23 | 0.28 | 0.33 |
| | 17 | Nodular cast iron | 95 | 101 | 125 | 0.17 | 0.26 | 0.32 | 0.42 | 0.53 |
| | 18 | | 66 | 81 | 93 | 0.13 | 0.15 | 0.28 | 0.33 | 0.37 |
| | 19 | Malleable cast iron | 98 | 125 | 137 | 0.18 | 0.30 | 0.37 | 0.46 | 0.56 |
| | 20 | | 66 | 81 | 93 | 0.13 | 0.15 | 0.28 | 0.33 | 0.37 |

## SPADE DRILL CARBIDE-K20

| ISO | VDI 3323 | Material Description | Vc(m/min) | | | Feed(mm/rev) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | TiN | TiCN | TiAlN | Ø9.5-12.5 | Ø13-17.5 | Ø18-24 | Ø25-35 | Ø36-47 |
| P | 1 | Non-alloy steel | 94 | 110 | 119 | 0.20 | 0.24 | 0.31 | 0.42 | 0.46 |
| | 2 | | 76 | 82 | 96 | 0.15 | 0.22 | 0.29 | 0.36 | 0.40 |
| | 3 | | 66 | 70 | 84 | 0.15 | 0.22 | 0.28 | 0.36 | 0.40 |
| | 4 | | 66 | 70 | 84 | 0.15 | 0.22 | 0.28 | 0.36 | 0.40 |
| | 6 | Low alloy steel | 73 | 81 | 88 | 0.15 | 0.23 | 0.29 | 0.38 | 0.42 |
| | 7 | | 66 | 73 | 81 | 0.15 | 0.21 | 0.28 | 0.37 | 0.41 |
| | 8 | | 62 | 70 | 78 | 0.12 | 0.20 | 0.27 | 0.33 | 0.40 |
| | 9 | | 53 | 58 | 64 | 0.10 | 0.18 | 0.23 | 0.30 | 0.38 |
| | 10 | High alloyed steel, and tool steel | 50 | 56 | 67 | 0.09 | 0.18 | 0.22 | 0.28 | 0.31 |
| | 11 | | 37 | 46 | 50 | 0.09 | 0.18 | 0.22 | 0.28 | 0.31 |
| M | 12 | Stainless steel | 38 | 43 | 47 | 0.10 | 0.18 | 0.20 | 0.24 | 0.30 |
| | 13 | | 38 | 43 | 47 | 0.10 | 0.18 | 0.20 | 0.24 | 0.30 |
| | 14 | | 43 | 49 | 55 | 0.12 | 0.20 | 0.23 | 0.27 | 0.35 |
| K | 15 | Grey cast iron | 95 | 101 | 125 | 0.17 | 0.26 | 0.32 | 0.42 | 0.53 |
| | 16 | | 56 | 70 | 79 | 0.13 | 0.18 | 0.23 | 0.28 | 0.33 |
| | 17 | Nodular cast iron | 95 | 101 | 125 | 0.17 | 0.26 | 0.32 | 0.42 | 0.53 |
| | 18 | | 66 | 81 | 93 | 0.13 | 0.15 | 0.28 | 0.33 | 0.37 |
| | 19 | Malleable cast iron | 98 | 125 | 137 | 0.18 | 0.30 | 0.37 | 0.46 | 0.56 |
| | 20 | | 66 | 81 | 93 | 0.13 | 0.15 | 0.28 | 0.33 | 0.37 |
| N | 21 | Aluminum-wrought alloy | 366 | 396 | 427 | 0.24 | 0.38 | 0.45 | 0.50 | 0.53 |
| | 22 | | 244 | 290 | 291 | 0.22 | 0.33 | 0.40 | 0.45 | 0.48 |
| | 27 | Copper and Copper Alloys (Bronze / Brass) | 136 | 168 | 193 | 0.15 | 0.24 | 0.29 | 0.39 | 0.47 |
| S | 31 | Heat Resistant Super Alloys | 50 | 55 | 62 | 0.19 | 0.19 | 0.21 | 0.24 | 0.30 |
| | 32 | | 38 | 44 | 46 | 0.15 | 0.17 | 0.20 | 0.21 | 0.25 |
| | 33 | | 38 | 44 | 46 | 0.15 | 0.17 | 0.20 | 0.21 | 0.25 |
| | 34 | | 38 | 44 | 46 | 0.15 | 0.17 | 0.20 | 0.21 | 0.25 |
| | 35 | | 38 | 44 | 46 | 0.15 | 0.17 | 0.20 | 0.21 | 0.25 |
| H | 38 | Hardened steel | 38 | 43 | 47 | 0.10 | 0.18 | 0.20 | 0.24 | 0.30 |

▶ The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.
Speed and feed reductions (20% reduction in speed and 10% reduction in feed) are recommended.

# SPADE DRILLS

## RECOMMENDED CUTTING CONDITIONS
## EMPFOHLENE SCHNEIDKONDITIONEN

## SPADE DRILL FLAT BOTTOM HSS-T15

RPM = rev./min.
FEED = mm/rev.

| ISO | VDI 3323 | Material Description | Vc(m/min) | | Feed(mm/rev) | | | |
|---|---|---|---|---|---|---|---|---|
| | | | TiN | TiAlN | Ø9.5-12.5 | Ø13-17.5 | Ø18-24 | Ø25-35 |
| P | 1 | Non-alloy steel | 54 | 60 | 0.12 | 0.18 | 0.22 | 0.30 |
| | 2 | | 46 | 55 | 0.10 | 0.15 | 0.19 | 0.27 |
| | 3 | | 45 | 50 | 0.10 | 0.15 | 0.18 | 0.27 |
| | 4 | | 42 | 46 | 0.08 | 0.14 | 0.17 | 0.22 |
| | 6 | Low alloy steel | 45 | 46 | 0.10 | 0.16 | 0.19 | 0.29 |
| | 7 | | 40 | 45 | 0.10 | 0.13 | 0.18 | 0.28 |
| | 8 | | 38 | 42 | 0.07 | 0.12 | 0.18 | 0.22 |
| | 9 | | 34 | 37 | 0.06 | 0.12 | 0.17 | 0.22 |
| | 10 | High alloyed steel, and tool steel | 27 | 29 | 0.07 | 0.12 | 0.15 | 0.20 |
| | 11 | | 22 | 23 | 0.07 | 0.12 | 0.15 | 0.20 |
| M | 12 | Stainless steel | 23 | 25 | 0.13 | 0.15 | 0.18 | 0.22 |
| | 13 | | 23 | 25 | 0.13 | 0.15 | 0.18 | 0.22 |
| | 14 | | 26 | 29 | 0.17 | 0.18 | 0.20 | 0.23 |
| K | 15 | Grey cast iron | 51 | 60 | 0.12 | 0.21 | 0.29 | 0.40 |
| | 16 | | 38 | 48 | 0.10 | 0.14 | 0.20 | 0.25 |
| | 17 | Nodular cast iron | 51 | 60 | 0.12 | 0.21 | 0.29 | 0.40 |
| | 18 | | 38 | 48 | 0.10 | 0.14 | 0.20 | 0.25 |
| | 19 | Malleable cast iron | 56 | 66 | 0.13 | 0.25 | 0.35 | 0.41 |
| | 20 | | 38 | 48 | 0.10 | 0.14 | 0.20 | 0.25 |
| N | 21 | Aluminum-wrought alloy | 208 | 213 | 0.17 | 0.28 | 0.36 | 0.43 |
| | 22 | | 112 | 121 | 0.17 | 0.28 | 0.36 | 0.41 |
| | 27 | Copper and Copper Alloys (Bronze / Brass) | 48 | 70 | 0.15 | 0.26 | 0.37 | 0.45 |
| S | 31 | Heat Resistant Super Alloys | 20 | 10 | 0.06 | 0.14 | 0.16 | 0.19 |
| | 32 | | 7 | 9 | 0.06 | 0.11 | 0.14 | 0.15 |
| | 33 | | 7 | 9 | 0.06 | 0.11 | 0.14 | 0.15 |
| | 34 | | 7 | 9 | 0.06 | 0.11 | 0.14 | 0.15 |
| | 35 | | 7 | 9 | 0.06 | 0.11 | 0.14 | 0.15 |
| H | 38 | Hardened steel | 23 | 25 | 0.13 | 0.15 | 0.18 | 0.22 |

▶ The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.
Speed and feed reductions (20% reduction in speed and 10% reduction in feed) are recommended.

# SPADE DRILLS

## RECOMMENDED CUTTING CONDITIONS
## EMPFOHLENE SCHNEIDKONDITIONEN

## SPADE DRILL CARBIDE-P40

RPM = rev./min.
FEED = mm/rev.

| ISO | VDI 3323 | Material Description | Vc(m/min) | | | Feed(mm/rev) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | TiN | TiCN | TiAlN | Ø9.5-12.5 | Ø13-17.5 | Ø18-24 | Ø25-35 | Ø36-47 |
| P | 1 | Non-alloy steel | 94 | 110 | 119 | 0.20 | 0.24 | 0.31 | 0.42 | 0.46 |
| | 2 | | 76 | 82 | 96 | 0.15 | 0.22 | 0.29 | 0.36 | 0.40 |
| | 3 | | 66 | 70 | 84 | 0.15 | 0.22 | 0.28 | 0.36 | 0.40 |
| | 4 | | 66 | 70 | 84 | 0.15 | 0.22 | 0.28 | 0.36 | 0.40 |
| | 6 | Low alloy steel | 73 | 81 | 88 | 0.15 | 0.23 | 0.29 | 0.38 | 0.42 |
| | 7 | | 66 | 73 | 81 | 0.15 | 0.21 | 0.28 | 0.37 | 0.41 |
| | 8 | | 62 | 70 | 78 | 0.12 | 0.20 | 0.27 | 0.33 | 0.40 |
| | 9 | | 53 | 58 | 64 | 0.10 | 0.18 | 0.23 | 0.30 | 0.38 |
| | 10 | High alloyed steel, and tool steel | 50 | 56 | 67 | 0.09 | 0.18 | 0.22 | 0.28 | 0.31 |
| | 11 | | 37 | 46 | 50 | 0.09 | 0.18 | 0.22 | 0.28 | 0.31 |
| M | 12 | Stainless steel | 38 | 43 | 47 | 0.10 | 0.18 | 0.20 | 0.24 | 0.30 |
| | 13 | | 38 | 43 | 47 | 0.10 | 0.18 | 0.20 | 0.24 | 0.30 |
| | 14 | | 43 | 49 | 55 | 0.12 | 0.20 | 0.23 | 0.27 | 0.35 |
| K | 15 | Grey cast iron | 95 | 101 | 125 | 0.17 | 0.26 | 0.32 | 0.42 | 0.53 |
| | 16 | | 56 | 70 | 79 | 0.13 | 0.18 | 0.23 | 0.28 | 0.33 |
| | 17 | Nodular cast iron | 95 | 101 | 125 | 0.17 | 0.26 | 0.32 | 0.42 | 0.53 |
| | 18 | | 66 | 81 | 93 | 0.13 | 0.15 | 0.28 | 0.33 | 0.37 |
| | 19 | Malleable cast iron | 98 | 125 | 137 | 0.18 | 0.30 | 0.37 | 0.46 | 0.56 |
| | 20 | | 66 | 81 | 93 | 0.13 | 0.15 | 0.28 | 0.33 | 0.37 |
| N | 21 | Aluminum-wrought alloy | 366 | 396 | 427 | 0.24 | 0.38 | 0.45 | 0.50 | 0.53 |
| | 22 | | 244 | 290 | 291 | 0.22 | 0.33 | 0.40 | 0.45 | 0.48 |
| | 27 | Copper and Copper Alloys (Bronze / Brass) | 136 | 168 | 193 | 0.15 | 0.24 | 0.29 | 0.39 | 0.47 |
| S | 31 | Heat Resistant Super Alloys | 50 | 55 | 62 | 0.19 | 0.19 | 0.21 | 0.24 | 0.30 |
| | 32 | | 38 | 44 | 46 | 0.15 | 0.17 | 0.20 | 0.21 | 0.25 |
| | 33 | | 38 | 44 | 46 | 0.15 | 0.17 | 0.20 | 0.21 | 0.25 |
| | 34 | | 38 | 44 | 46 | 0.15 | 0.17 | 0.20 | 0.21 | 0.25 |
| | 35 | | 38 | 44 | 46 | 0.15 | 0.17 | 0.20 | 0.21 | 0.25 |
| H | 38 | Hardened steel | 38 | 43 | 47 | 0.10 | 0.18 | 0.20 | 0.24 | 0.30 |

▶ The recommendations for speeds, feeds and other parameters presented in this chart are nominal recommendations and should be considered only as good starting points.
Speed and feed reductions (20% reduction in speed and 10% reduction in feed) are recommended.