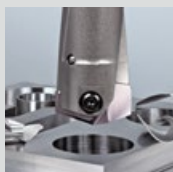


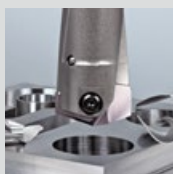
CONTENTS



General product information

[View](#)

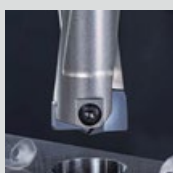
Added products



ø20 - 25.9 mm

Expansion of the DrillForceMeister line with a wider range of diameters - ø20 - 25.9 mm

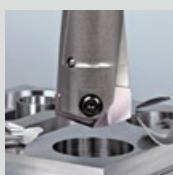
[View](#)



SMF

Expanded lineup with new SMF flat-edged drill head: ø20 – ø40 mm

[View](#)



SMP AH9130

SMP drill head expansion with grade AH9130

[View](#)

DrillLine

DRILL^{FORCE}**MEISTER**

www.tungaloy.com

Tungaloy Report No. 509-G

DRILLFORCE-MEISTER

Head-changeable drill for drilling large holes



Member IMC Group
Tungaloy



ACCELERATED MACHINING



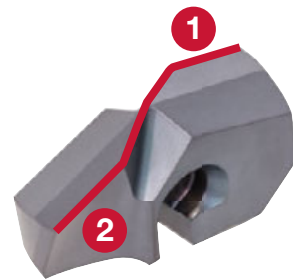


Unique clamping concept and two effective cutting edges on the drill head provide excellent hole quality and high productivity

Improves productivity and reliability in heavy drilling with unique drill head and clamping concept

Two effective cutting edges

- The drill head with two effective cutting edges provides high productivity and reliability



Optimized drill body

- The drill body has an optimized flute design for smooth chip evacuation and enhanced stiffness



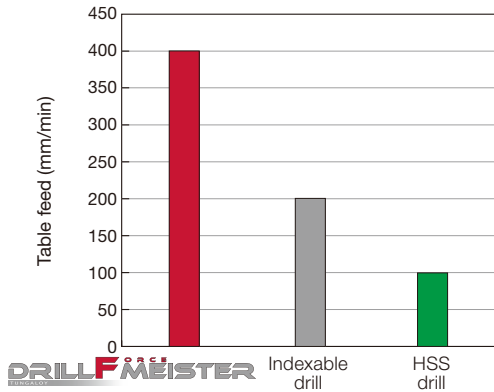
Unique clamping system

Easy and quick yet rigid and reliable clamping method for excellent hole quality and long tool life

- The drill head change is possible without removing the drill body from the tool holder or the spindle, eliminating re-adjustments
- Asymmetric shaped drill head not only secures stability in heavy machining but also error-proofs drill head installation
- The drill body has a wide supporting area for the drill head for rigid insert clamping
- By replacing the head screw regularly, the drill body can be used for an even longer period



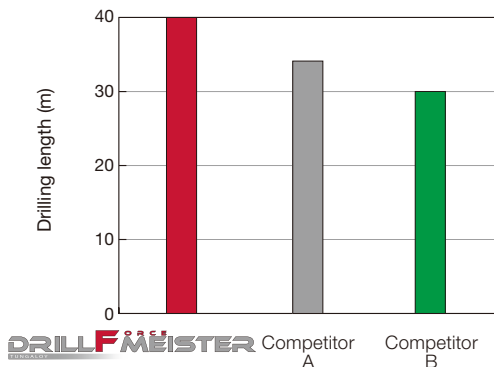
High productivity



Drill : $\phi 33$ mm, L/D = 5
 Workpiece material : S55C / C55

| | Cutting speed Vc (m/min) | Feed f (mm/rev) | Feed speed Vf (mm/min) |
|----------------------|-----------------------------|--------------------|---------------------------|
| DRILLFMEISTER | 100 | 0.4 | 430 |
| Indexable drill | 150 | 0.15 | 240 |
| HSS drill | 20 | 0.4 | 85 |

AH725, a highly reliable PVD grade



Drill : $\phi 26$ mm
 Workpiece material : S55C / C55
 Cutting speed : Vc = 100 m/min
 Feed : f = 0.35 mm/rev
 Drilling depth : H = 120 mm

AH725 achieves smooth and flat coating surface to improve resistance to build-up edge and chipping, thus extending tool life in heavy machining.

An smart combination of optimized edge preparation and dedicated PVD grade extends tool life in heavy drilling

AH725, a highly reliable PVD grade

AH725 **PREMIUMTEC**

Improved coating adhesion

Sub-micron grain carbide substrate with superior toughness and resistance to plastic-deformation

Super-flash coating:
Eliminates droplets on the surface

➔

Optimized edge preparation

- Enlarged images of the edges before use

The cutting edge is honed to enhance coating adhesion

No coating delamination

Honed edge

DRILLFMEISTER

Coating is delaminated

Chamfered edge
Competitor

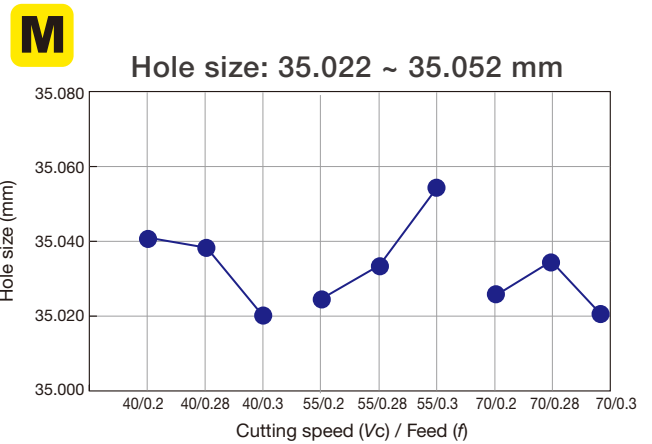
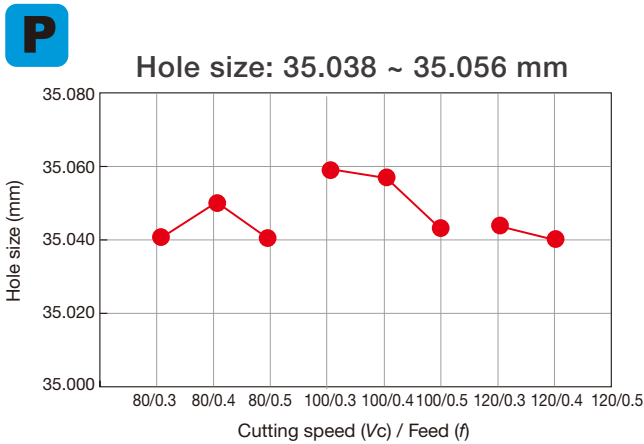
CUTTING PERFORMANCE

Hole size



The hole size is stable in various cutting conditions and materials

Drill : TIS350F40-5 (ø35 mm)
 Head : SMP350
 Grade : AH725
 Workpiece material : SCM440 / 42CrMo4, SUS304 / X5CrNi18-9
 Cutting speed : Vc = 80 - 120 m/min (SCM440 / 42CrMo4)
 Vc = 40 - 70 m/min (SUS304 / X5CrNi18-9)
 Feed : f = 0.3 - 0.5 mm/rev (SCM440 / 42CrMo4)
 f = 0.2 - 0.3 mm/rev (SUS304 / X5CrNi18-9)
 Drilling depth : H = 100 mm
 Machine : Horizontal M/C (BT50)
 Coolant : Wet (Internal)



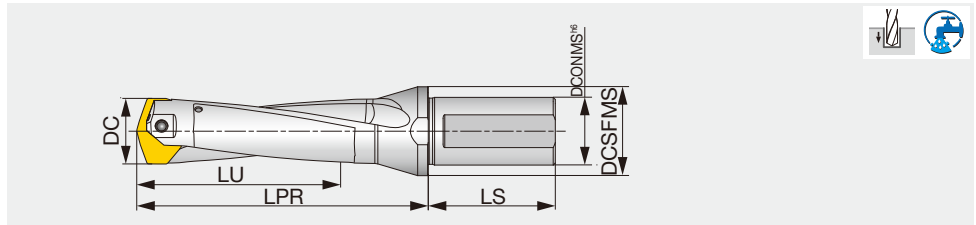
Chip control

DrillForceMeister provides good chip control even in drilling low carbon steel

| | | | |
|------------------|--------------------|--------------|--------------|
| 0.2 | | | |
| 0.3 | | | |
| 0.4 | | | |
| Feed: f (mm/rev) | DRILLFORCE MEISTER | Competitor A | Competitor B |

Drill : TIS260F32-5 (ø26 mm)
 Head : SMP260
 Grade : AH725
 Workpiece material : SS400 / E275A
 Cutting speed : Vc = 100 m/min
 Feed : f = 0.2 - 0.4 mm/rev
 Drilling depth : H = 100 mm
 Machine : Horizontal M/C (BT50)
 Coolant : Wet (Internal)

TIS L/D=3



| Designation | DC | DCONMS | DCSFMS | LU | LPR | LS | Pocket size | Head |
|-------------|-----------|--------|--------|-------|-------|----|-------------|--------|
| TIS260F32-3 | 26 - 26.9 | 32 | 40 | 82.7 | 117 | 60 | 26 | SMP26* |
| TIS270F32-3 | 27 - 27.9 | 32 | 40 | 85.9 | 120 | 60 | 27 | SMP27* |
| TIS280F32-3 | 28 - 28.9 | 32 | 40 | 89.1 | 128.4 | 60 | 28 | SMP28* |
| TIS290F32-3 | 29 - 29.9 | 32 | 40 | 92.3 | 131.4 | 60 | 29 | SMP29* |
| TIS300F32-3 | 30 - 30.9 | 32 | 42 | 95.5 | 134.7 | 60 | 30 | SMP30* |
| TIS310F32-3 | 31 - 31.9 | 32 | 42 | 98.6 | 137.7 | 60 | 31 | SMP31* |
| TIS320F40-3 | 32 - 32.9 | 40 | 48 | 101.8 | 143 | 68 | 32 | SMP32* |
| TIS330F40-3 | 33 - 33.9 | 40 | 48 | 105 | 146 | 68 | 33 | SMP33* |
| TIS340F40-3 | 34 - 34.9 | 40 | 48 | 108.2 | 149 | 68 | 34 | SMP34* |
| TIS350F40-3 | 35 - 35.9 | 40 | 48 | 111.4 | 152.4 | 68 | 35 | SMP35* |
| TIS360F40-3 | 36 - 36.9 | 40 | 48 | 114.6 | 155.4 | 68 | 36 | SMP36* |
| TIS370F40-3 | 37 - 37.9 | 40 | 48 | 117.7 | 158.4 | 68 | 37 | SMP37* |
| TIS380F40-3 | 38 - 38.9 | 40 | 50 | 120.9 | 166.9 | 68 | 38 | SMP38* |
| TIS390F40-3 | 39 - 39.9 | 40 | 50 | 124.1 | 169.9 | 68 | 39 | SMP39* |
| TIS400F40-3 | 40 - 41 | 40 | 50 | 127.3 | 172.9 | 68 | 40 | SMP40* |

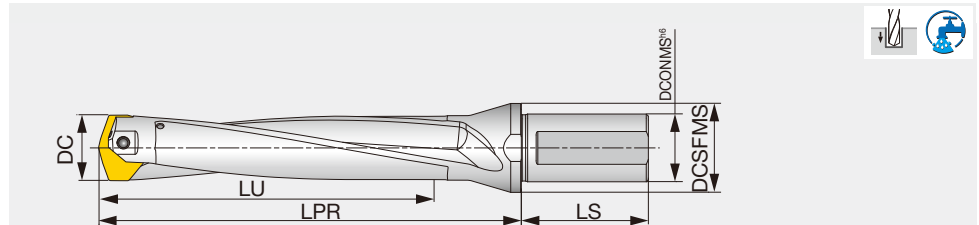
| Tool diameter | Hole diameter tolerance* |
|---------------|--------------------------|
| ø26 - ø29.9 | +0.05 / 0 |
| ø30 - ø41 | +0.06 / 0 |

SPARE PARTS



| Designation | Clamping screw | Wrench | |
|-------------|----------------|-----------|--------|
| | | Torx Bit | Grip |
| TIS260F32-* | TS50230D3 | BLDT20/S7 | H-TB2W |
| TIS270F32-* | TS50230D3 | BLDT20/S7 | H-TB2W |
| TIS280F32-* | TS50250D35 | BLDT25/S7 | H-TB2W |
| TIS290F32-* | TS50250D35 | BLDT25/S7 | H-TB2W |
| TIS300F32-* | TS60265D4 | BLDT25/S7 | H-TB2W |
| TIS310F32-* | TS60265D4 | BLDT25/S7 | H-TB2W |
| TIS320F40-* | TS60285D42 | BLDT25/S7 | H-TB2W |
| TIS330F40-* | TS60285D42 | BLDT25/S7 | H-TB2W |
| TIS340F40-* | TS60285D42 | BLDT25/S7 | H-TB2W |
| TIS350F40-* | TS60320D5 | BLDT25/S7 | H-TB2W |
| TIS360F40-* | TS60320D5 | BLDT25/S7 | H-TB2W |
| TIS370F40-* | TS60320D5 | BLDT25/S7 | H-TB2W |
| TIS380F40-* | TS80340D6 | BLDT25/S7 | H-TB2W |
| TIS390F40-* | TS80340D6 | BLDT25/S7 | H-TB2W |
| TIS400F40-* | TS80340D6 | BLDT25/S7 | H-TB2W |

TIS L/D=5



| Designation | DC | DCONMS | DCSFMS | LU | LPR | LS | Pocket size | Head |
|-------------|-----------|--------|--------|-------|-------|----|-------------|--------|
| TIS260F32-5 | 26 - 26.9 | 32 | 40 | 134.7 | 169 | 60 | 26 | SMP26* |
| TIS270F32-5 | 27 - 27.9 | 32 | 40 | 139.9 | 174 | 60 | 27 | SMP27* |
| TIS280F32-5 | 28 - 28.9 | 32 | 40 | 145.1 | 184.4 | 60 | 28 | SMP28* |
| TIS290F32-5 | 29 - 29.9 | 32 | 40 | 150.3 | 189.4 | 60 | 29 | SMP29* |
| TIS300F32-5 | 30 - 30.9 | 32 | 42 | 155.5 | 194.7 | 60 | 30 | SMP30* |
| TIS310F32-5 | 31 - 31.9 | 32 | 42 | 160.6 | 199.7 | 60 | 31 | SMP31* |
| TIS320F40-5 | 32 - 32.9 | 40 | 48 | 165.8 | 207 | 68 | 32 | SMP32* |
| TIS330F40-5 | 33 - 33.9 | 40 | 48 | 171 | 212 | 68 | 33 | SMP33* |
| TIS340F40-5 | 34 - 34.9 | 40 | 48 | 176.2 | 217 | 68 | 34 | SMP34* |
| TIS350F40-5 | 35 - 35.9 | 40 | 48 | 181.4 | 222.4 | 68 | 35 | SMP35* |
| TIS360F40-5 | 36 - 36.9 | 40 | 48 | 186.6 | 227.4 | 68 | 36 | SMP36* |
| TIS370F40-5 | 37 - 37.9 | 40 | 48 | 191.7 | 232.4 | 68 | 37 | SMP37* |
| TIS380F40-5 | 38 - 38.9 | 40 | 50 | 196.9 | 242.9 | 68 | 38 | SMP38* |
| TIS390F40-5 | 39 - 39.9 | 40 | 50 | 202.1 | 247.9 | 68 | 39 | SMP39* |
| TIS400F40-5 | 40 - 41 | 40 | 50 | 207.3 | 252.9 | 68 | 40 | SMP40* |

| Tool diameter | Hole diameter tolerance* |
|---------------|--------------------------|
| ø26 - ø29.9 | +0.08 / 0 |
| ø30 - ø41 | +0.09 / 0 |

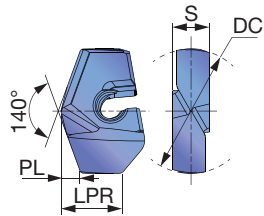
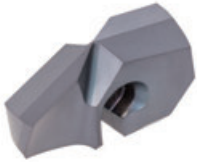
SPARE PARTS



| Designation | Clamping screw | Wrench | |
|-------------|----------------|-----------|--------|
| | | Torx Bit | Grip |
| TIS260F32-* | TS50230D3 | BLDT20/S7 | H-TB2W |
| TIS270F32-* | TS50230D3 | BLDT20/S7 | H-TB2W |
| TIS280F32-* | TS50250D35 | BLDT25/S7 | H-TB2W |
| TIS290F32-* | TS50250D35 | BLDT25/S7 | H-TB2W |
| TIS300F32-* | TS60265D4 | BLDT25/S7 | H-TB2W |
| TIS310F32-* | TS60265D4 | BLDT25/S7 | H-TB2W |
| TIS320F40-* | TS60285D42 | BLDT25/S7 | H-TB2W |
| TIS330F40-* | TS60285D42 | BLDT25/S7 | H-TB2W |
| TIS340F40-* | TS60285D42 | BLDT25/S7 | H-TB2W |
| TIS350F40-* | TS60320D5 | BLDT25/S7 | H-TB2W |
| TIS360F40-* | TS60320D5 | BLDT25/S7 | H-TB2W |
| TIS370F40-* | TS60320D5 | BLDT25/S7 | H-TB2W |
| TIS380F40-* | TS80340D6 | BLDT25/S7 | H-TB2W |
| TIS390F40-* | TS80340D6 | BLDT25/S7 | H-TB2W |
| TIS400F40-* | TS80340D6 | BLDT25/S7 | H-TB2W |

DRILL HEAD

SMP



| Designation | DC | AH725 | S | LPR | PL | Pocket size | Body | Designation | DC | AH725 | S | LPR | PL | Pocket size | Body |
|-------------|------|-------|-----|------|------|-------------|-------------|-------------|------|-------|------|------|------|-------------|-------------|
| SMP260 | 26 | ● | 7.5 | 11.6 | 4.73 | 26 | TIS260F32-* | SMP361 | 36.1 | ● | 10 | 16.1 | 6.57 | 36 | TIS360F40-* |
| SMP261 | 26.1 | ● | 7.5 | 11.6 | 4.75 | 26 | TIS260F32-* | SMP365 | 36.5 | ● | 10 | 16.1 | 6.64 | 36 | TIS360F40-* |
| SMP265 | 26.5 | ● | 7.5 | 11.6 | 4.82 | 26 | TIS260F32-* | SMP366 | 36.6 | ● | 10 | 16.1 | 6.66 | 36 | TIS360F40-* |
| SMP267 | 26.7 | ● | 7.5 | 11.6 | 4.86 | 26 | TIS260F32-* | SMP370 | 37 | ● | 10 | 15.7 | 6.73 | 37 | TIS370F40-* |
| SMP270 | 27 | ● | 7.5 | 11.1 | 4.91 | 27 | TIS270F32-* | SMP371 | 37.1 | ● | 10 | 15.7 | 6.75 | 37 | TIS370F40-* |
| SMP271 | 27.1 | ● | 7.5 | 11.1 | 4.93 | 27 | TIS270F32-* | SMP375 | 37.5 | ● | 10 | 15.7 | 6.82 | 37 | TIS370F40-* |
| SMP272 | 27.2 | ● | 7.5 | 11.1 | 4.95 | 27 | TIS270F32-* | SMP380 | 38 | ● | 10.5 | 17 | 6.92 | 38 | TIS380F40-* |
| SMP275 | 27.5 | ● | 7.5 | 11.1 | 5 | 27 | TIS270F32-* | SMP381 | 38.1 | ● | 10.5 | 17 | 6.93 | 38 | TIS380F40-* |
| SMP280 | 28 | ● | 8 | 11.7 | 5.1 | 28 | TIS280F32-* | SMP385 | 38.5 | ● | 10.5 | 17 | 7.01 | 38 | TIS380F40-* |
| SMP281 | 28.1 | ● | 8 | 11.7 | 5.11 | 28 | TIS280F32-* | SMP388 | 38.8 | ● | 10.5 | 17 | 7.06 | 38 | TIS380F40-* |
| SMP285 | 28.5 | ● | 8 | 11.7 | 5.19 | 28 | TIS280F32-* | SMP390 | 39 | ● | 10.5 | 16.6 | 7.1 | 39 | TIS390F40-* |
| SMP286 | 28.6 | ● | 8 | 11.7 | 5.2 | 28 | TIS280F32-* | SMP391 | 39.1 | ● | 10.5 | 16.6 | 7.12 | 39 | TIS390F40-* |
| SMP290 | 29 | ● | 8 | 11.3 | 5.28 | 29 | TIS290F32-* | SMP395 | 39.5 | ● | 10.5 | 16.6 | 7.19 | 39 | TIS390F40-* |
| SMP291 | 29.1 | ● | 8 | 11.3 | 5.3 | 29 | TIS290F32-* | SMP397 | 39.7 | ● | 10.5 | 16.6 | 7.22 | 39 | TIS390F40-* |
| SMP295 | 29.5 | ● | 8 | 11.3 | 5.37 | 29 | TIS290F32-* | SMP398 | 39.8 | ● | 10.5 | 16.6 | 7.24 | 39 | TIS390F40-* |
| SMP296 | 29.6 | ● | 8 | 11.3 | 5.39 | 29 | TIS290F32-* | SMP400 | 40 | ● | 10.5 | 16.2 | 7.28 | 40 | TIS400F40-* |
| SMP300 | 30 | ● | 8.5 | 14.1 | 5.46 | 30 | TIS300F32-* | SMP401 | 40.1 | ● | 10.5 | 16.2 | 7.3 | 40 | TIS400F40-* |
| SMP301 | 30.1 | ● | 8.5 | 14.1 | 5.48 | 30 | TIS300F32-* | SMP405 | 40.5 | ● | 10.5 | 16.2 | 7.37 | 40 | TIS400F40-* |
| SMP302 | 30.2 | ● | 8.5 | 14.1 | 5.5 | 30 | TIS300F32-* | SMP410 | 41 | ● | 10.5 | 16.2 | 7.46 | 40 | TIS400F40-* |
| SMP303 | 30.3 | ● | 8.5 | 14.1 | 5.51 | 30 | TIS300F32-* | | | | | | | | |
| SMP305 | 30.5 | ● | 8.5 | 14.1 | 5.55 | 30 | TIS300F32-* | | | | | | | | |
| SMP308 | 30.8 | ● | 8.5 | 14.1 | 5.61 | 30 | TIS300F32-* | | | | | | | | |
| SMP310 | 31 | ● | 8.5 | 13.7 | 5.64 | 31 | TIS310F32-* | | | | | | | | |
| SMP311 | 31.1 | ● | 8.5 | 13.7 | 5.66 | 31 | TIS310F32-* | | | | | | | | |
| SMP315 | 31.5 | ● | 8.5 | 13.7 | 5.73 | 31 | TIS310F32-* | | | | | | | | |
| SMP318 | 31.8 | ● | 8.5 | 13.7 | 5.79 | 31 | TIS310F32-* | | | | | | | | |
| SMP320 | 32 | ● | 9 | 14.5 | 5.82 | 32 | TIS320F40-* | | | | | | | | |
| SMP321 | 32.1 | ● | 9 | 14.5 | 5.84 | 32 | TIS320F40-* | | | | | | | | |
| SMP325 | 32.5 | ● | 9 | 14.5 | 5.91 | 32 | TIS320F40-* | | | | | | | | |
| SMP328 | 32.8 | ● | 9 | 14.5 | 5.97 | 32 | TIS320F40-* | | | | | | | | |
| SMP330 | 33 | ● | 9 | 14.1 | 6.01 | 33 | TIS330F40-* | | | | | | | | |
| SMP331 | 33.1 | ● | 9 | 14.1 | 6.02 | 33 | TIS330F40-* | | | | | | | | |
| SMP333 | 33.3 | ● | 9 | 14.1 | 6.06 | 33 | TIS330F40-* | | | | | | | | |
| SMP335 | 33.5 | ● | 9 | 14.1 | 6.1 | 33 | TIS330F40-* | | | | | | | | |
| SMP340 | 34 | ● | 9 | 13.7 | 6.19 | 34 | TIS340F40-* | | | | | | | | |
| SMP341 | 34.1 | ● | 9 | 13.7 | 6.21 | 34 | TIS340F40-* | | | | | | | | |
| SMP345 | 34.5 | ● | 9 | 13.7 | 6.28 | 34 | TIS340F40-* | | | | | | | | |
| SMP349 | 34.9 | ● | 9 | 13.7 | 6.35 | 34 | TIS340F40-* | | | | | | | | |
| SMP350 | 35 | ● | 10 | 16.6 | 6.37 | 35 | TIS350F40-* | | | | | | | | |
| SMP351 | 35.1 | ● | 10 | 16.6 | 6.39 | 35 | TIS350F40-* | | | | | | | | |
| SMP355 | 35.5 | ● | 10 | 16.6 | 6.46 | 35 | TIS350F40-* | | | | | | | | |
| SMP360 | 36 | ● | 10 | 16.1 | 6.55 | 36 | TIS360F40-* | | | | | | | | |

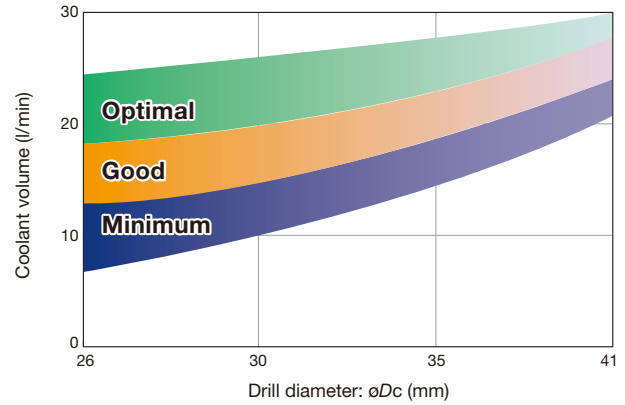
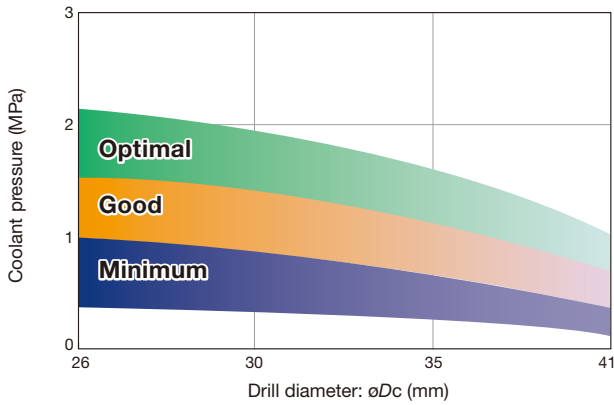
| Tool diameter | Head diameter tolerance |
|---------------|-------------------------|
| ø26 - ø29.9 | +0.014 / -0.015 |
| ø30 - ø41 | +0.014 / -0.02 |

Package quantity = 1 pc
●: Line-up

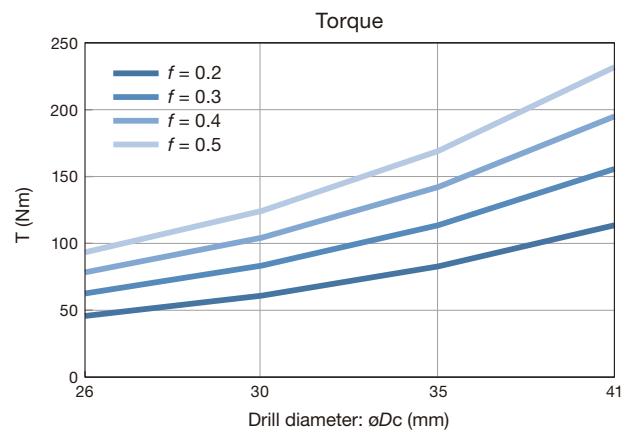
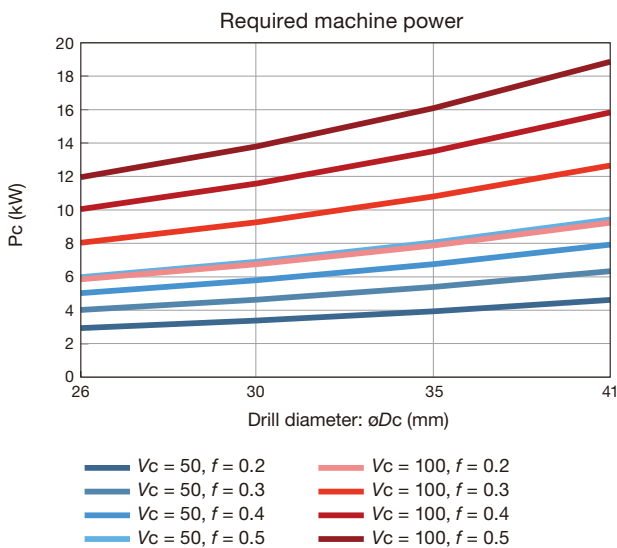
STANDARD CUTTING CONDITIONS

| ISO | Workpiece materials | Cutting speed Vc (m/min) | Feed: f (mm/rev) | | |
|----------|---|-----------------------------|------------------|-------------|-------------|
| | | | øDc (mm) | | |
| | | | 26 - 29.9 | 30.0 - 35.9 | 36.0 - 41.0 |
| P | Low carbon steel (C15, C20, etc.) | 80 - 140 | 0.2 - 0.5 | 0.2 - 0.5 | 0.2 - 0.55 |
| | Carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4, etc.) | 80 - 130 | 0.2 - 0.5 | 0.2 - 0.5 | 0.2 - 0.55 |
| | Prehardend steel (NAK80, PX5, etc.) | 50 - 100 | 0.2 - 0.5 | 0.2 - 0.5 | 0.2 - 0.55 |
| M | Stainless steel (SUS304 / X5CrNi18-9, SUS316 / X5CrNiMo17-12-3, etc.) | 40 - 80 | 0.15 - 0.3 | 0.15 - 0.3 | 0.2 - 0.35 |
| K | Grey cast iron (FC250 / 250, FC300 / 300, etc.) | 80 - 180 | 0.25 - 0.55 | 0.25 - 0.55 | 0.3 - 0.6 |
| | Ductile cast iron (400-15, 600-3, etc.) | 80 - 140 | 0.25 - 0.55 | 0.25 - 0.55 | 0.3 - 0.6 |
| N | Non ferrous materials | 100 - 200 | 0.4 - 0.6 | 0.4 - 0.6 | 0.5 - 0.7 |
| S | Heat-resistant alloys (Inconel718, etc.) | 20 - 50 | 0.1 - 0.2 | 0.1 - 0.2 | 0.1 - 0.25 |
| | Titanium alloys (Ti-6Al-4V, etc.) | 20 - 50 | 0.1 - 0.2 | 0.1 - 0.2 | 0.1 - 0.25 |
| H | Hardened materials | 20 - 60 | 0.1 - 0.2 | 0.1 - 0.2 | 0.1 - 0.25 |

RECOMMENDED COOLANT PRESSURE AND VOLUME



REQUIRED MACHINE POWER AND TORQUE

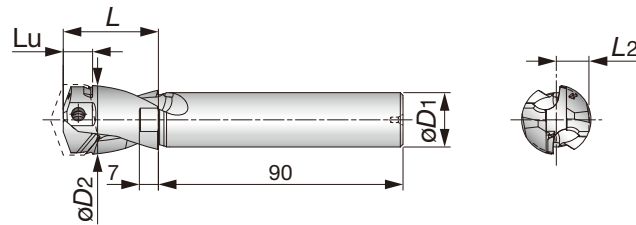


- Please access to "Tungaloy machining power" to calculate more detailed cutting forces.

<http://mpwr.imc-companies.com/machiningpwr/machiningpower.wgx?vwg-instance=3d4bfb46110a456b8d375e68942cd0a3&Home=tungaloy>



REGRINDING HOLDER



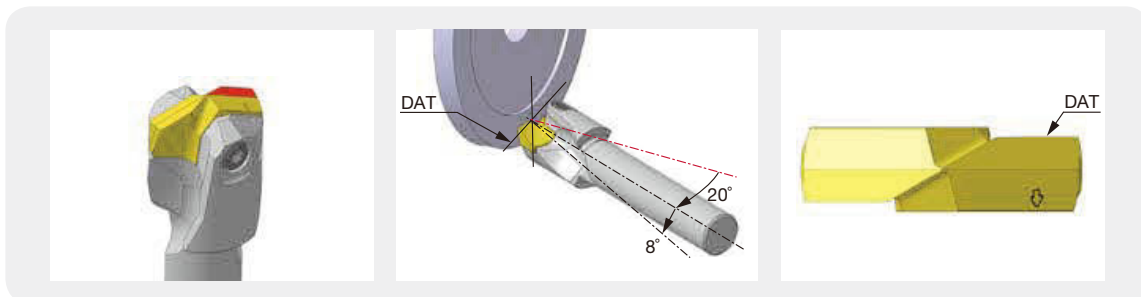
| Designation | øD1 | øD2 | L | Lu | L2 | Head |
|---------------|-----|------|----|------|------|---------------|
| SMP260-279-GH | 20 | 25.5 | 35 | 10.8 | 12 | SMP260-SMP279 |
| SMP280-299-GH | 20 | 27.5 | 35 | 10.8 | 13 | SMP280-SMP299 |
| SMP300-319-GH | 20 | 29.5 | 35 | 13 | 14 | SMP300-SMP319 |
| SMP320-349-GH | 20 | 31.5 | 35 | 13 | 15 | SMP320-SMP349 |
| SMP350-379-GH | 20 | 34.5 | 40 | 14.7 | 16.5 | SMP350-SMP379 |
| SMP380-410-GH | 20 | 37.5 | 40 | 15.1 | 18 | SMP380-SMP410 |

① Clamping

- Assemble the drill head on the regrinding holder or shortest standard holder (3xD)
- Set-up the drill head in the machine : Total run-out must be less than 0.02 mm

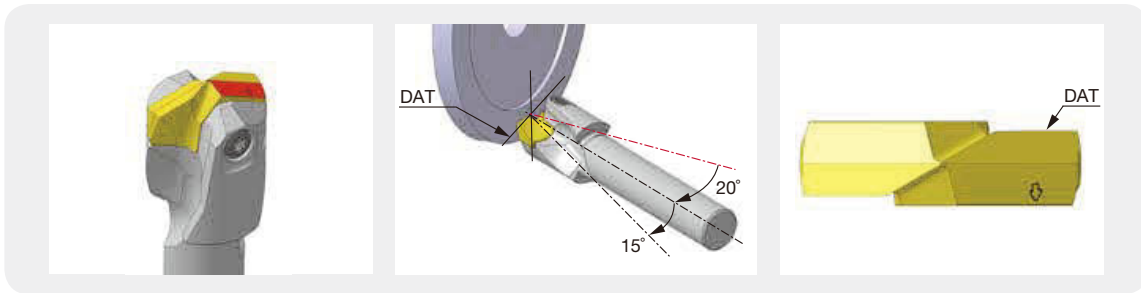
② Grinding the 1st clearance angle

- Set the drill for point angle (140°) and 1st clearance angle (8°)
- Keep the cutting edge in the horizontal plane



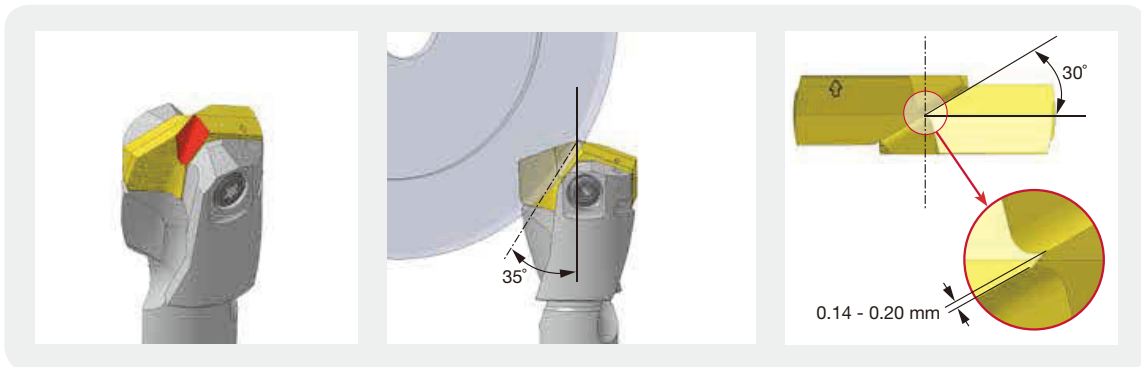
③ Grinding the 2nd clearance angle

- Set the drill for 2nd clearance angle (15°)



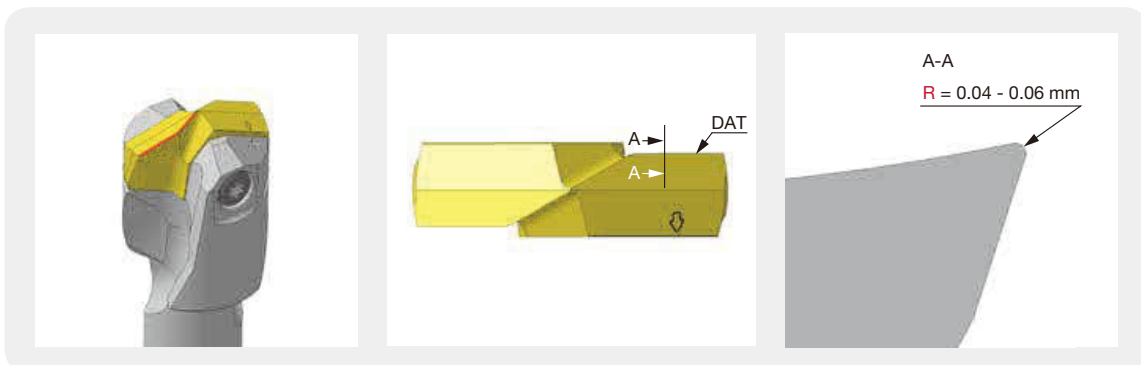
④ Grinding the chisel (Thinning)

- Set the drill for thinning angle (35°) with reference to drill axis and angle (30°) with reference to radial axis
- Keep the chisel thickness (0.14 - 0.20) and the thinning point must be over the center line



⑤ Edge preparation (Honing)

- Cutting edges should have honing by sand or brush (0.04 - 0.06 mm)
- Nega-land by diamond hand lapper is also available
- The width of honing must be uniform with good surface finish



HOW TO CHANGE DRILL HEAD



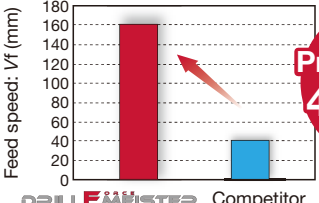
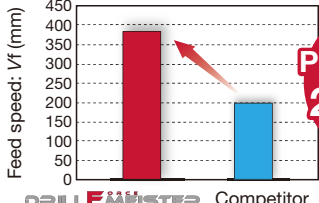
To unclamp rotate the screw 3-5 times counter-clockwise.

No need to remove the screw from the body.



- Please change the screw to new one when the screw does not rotate smoothly

PRACTICAL EXAMPLES

| Workpiece type | Gate valve | Slewing ring | |
|--------------------|---|--|--------------|
| Drill | TIS300F40-5 | TIS330F40-5 | |
| Head | SMP300 | SMP331 | |
| Grade | AH725 | AH725 | |
| Workpiece material | SUS304 / X5CrNi18-9 | SCM440 / 42CrMo4 | |
| |  M |  P | |
| Cutting conditions | Cutting speed: V_c (m/min) | 60 | 100 |
| | Feed : f (mm/rev) | 0.25 | 0.4 |
| | Feed speed : V_f (mm) | 160 | 380 |
| | Drilling depth : H (mm) | 120 | 150 |
| | Machine | Horizontal M/C | Vertical M/C |
| Results |  <p>Productivity 4 times!</p> <p>DrillForce-Meister provides 4 times productivity than HSS drill.</p> |  <p>Productivity 2 times!</p> <p>DrillForce-Meister provides 2 times productivity and more stable hole diameter compare with indexable drill.</p> | |

Tungaloy Corporation (Head office)

11-1 Yoshima-Kogyodanchi
Iwaki-city, Fukushima, 970-1144 Japan
Phone: +81-246-36-8501
Fax: +81-246-36-8542
www.tungaloy.co.jp

Tungaloy America, Inc.

3726 N Ventura Drive
Arlington Heights, IL 60004, U.S.A.
Phone: +1-888-554-8394
Fax: +1-888-554-8392
www.tungaloyamerica.com

Tungaloy Canada

432 Elgin St. Unit 3
Brantford, Ontario N3S 7P7, Canada
Phone: +1-519-758-5779
Fax: +1-519-758-5791
www.tungaloy.co.jp/ca

Tungaloy de Mexico S.A.

C Los Arellano 113,
Parque Industrial Siglo XXI
Aguascalientes, AGS, Mexico 20290
Phone: +52-449-929-5410
Fax: +52-449-929-5411
www.tungaloy.co.jp/mx

Tungaloy do Brasil Ltda.

Avd. Independencia N4158 Residencial Flora
13280-000 Vinhedo, São Paulo, Brasil
Phone: +55-19-38262757
Fax: +55-19-38262757
www.tungaloy.com.br

Tungaloy Germany GmbH

An der Alten Ziegelei 1
D-40789 Monheim, Germany
Phone: +49-2173-90420-0
Fax: +49-2173-90420-19
www.tungaloy.de

Tungaloy France S.A.S.

ZA Courtaboef - Le Rio
1 rue de la Terre de feu
F-91952 Courtaboef Cedex, France
Phone: +33-1-6486-4300
Fax: +33-1-6907-7817
www.tungaloy.fr

Tungaloy Italia S.r.l.

Via E. Andolfato 10
I-20126 Milano, Italy
Phone: +39-02-252012-1
Fax: +39-02-252012-65
www.tungaloy.it

Tungaloy Czech s.r.o.

Turanka 115
CZ-627 00 Brno, Czech Republic
Phone: +420-532 123 391
Fax: +420-532 123 392
www.tungaloy.cz

Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7
Pol. Ind. Bufalvent
ES-08243 Manresa (BCN), Spain
Phone: +34 93 113 1360
Fax: +34 93 876 2798
www.tungaloy.es

Tungaloy Scandinavia AB

Bultgatan 38
442 40 Kungälv, Sweden
Phone: +46-462119200
www.tungaloy.se

Tungaloy Rus, LLC

36-D Harkovsky Lane
308009 Belgorod, Russia
Phone: +7 4722 24 00 07
Fax: +7 4722 24 00 08
www.tungaloy.co.jp/ru

Tungaloy East LLC

Stachek str., h.4, office 2, Ekaterinburg,
620017, Russia
Phone: +7-343-389-13-22
Fax: +7-343-278-94-35
www.tungaloy.co.jp/ru

Tungaloy Polska Sp. z o.o.

ul. Genewska 24
03-963 Warszawa, Poland
Phone: +48-22-617-0890
Fax: +48-22-617-0890
www.tungaloy.co.jp/pl

Tungaloy U.K. Ltd

The Technology Centre,
Wolverhampton Science Park
Glaisher Drive, Wolverhampton
West Midlands WV10 9RU, UK
Phone: +44 121 4000 231
Fax: +44 121 270 9694
www.tungaloy.co.jp/uk
salesinfo@tungaloyuk.co.uk

Tungaloy Hungary Kft

Erzsébet királyné útja 125
H-1142 Budapest, Hungary
Phone: +36 1 781-6846
Fax: +36 1 781-6866
www.tungaloy.co.jp/hu
info@tungaloytools.hu

Tungaloy Turkey

Dudullu.OSB 4. Cad No:4
34776 Umranıye Istanbul, TURKEY
Phone: +90 216 540 04 67
Fax: +90 216 540 04 87
www.tungaloy.com.tr
info@tungaloy.com.tr

Tungaloy Benelux b.v.

Tjalk 70
NL-2411 NZ Bodegraven, Netherlands
Phone: +31 172 630 420
Fax: +31 172 630 429
www.tungaloy-benelux.com

Tungaloy Croatia

Josipa Kozarca 4
10432 Bregana, Croatia
Phone: +385 1 3326 604
Fax: +385 1 3327 683
www.tungaloy.hr

Tungaloy Cutting Tool (Shanghai) Co.,Ltd.

Rm No 401 No.88 Zhabei
Jiangchang No.3 Rd
Shanghai 200436, China
Phone: +86-21-3632-1880
Fax: +86-21-3621-1918
www.tungaloy.co.jp/tcts

Tungaloy Cutting Tool (Thailand) Co.,Ltd.

Interlink tower 4th Fl.
1858/5-7 Bangna-Trad Road
km.5 Bangna, Bangna, Bangkok 10260
Thailand
Phone: +66-2-751-5711
Fax: +66-2-751-5715
www.tungaloy.co.th

Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #06-11 Oxley BizHub 2
Singapore 408734
Phone: +65-6391-1833
Fax: +65-6299-4557
www.tungaloy.co.jp/tspl

Tungaloy Vietnam

Unit 18, 4th Fl. Saigon Centre Building
65 Le Loi Blvd.
Dist 1, Ho Chi Minh City, Vietnam
Phone: +84-8-3827-0201
Fax: +84-8-3827-0203
www.tungaloy.co.jp/tspl

Tungaloy India Pvt. Ltd.

Indiabulls Finance Centre,
Unit # 902-A, 9th Floor,
Tower 1, Senapati Bapat Marg,
Elphinstone Road (West),
Mumbai -400013, India
Phone: +91-22-6124-8804
Fax: +91-22-6124-8899
www.tungaloy.co.jp/in

Tungaloy Korea Co., Ltd

#1312, Byucksan Digital Valley 5-cha
Beotkkot-ro 244, Geumcheon-gu
153-788 Seoul, Korea
Phone: +82-2-2621-6161
Fax: +82-2-6393-8952
www.tungaloy.co.jp/kr

Tungaloy Malaysia Sdn Bhd

50 K-2, Kelana Mall, Jalan SS6/14
Kelana Jaya, 47301
Petaling Jaya, Selangor Darul Ehsan
Malaysia
Phone: +603-7805-3222
Fax: +603-7804-8563
www.tungaloy.com.my

Tungaloy Australia Pty Ltd

PO Box 2232, Rowville,
Victoria 3178, Australia
Phone: +61-3-9755-8147
Fax: +61-3-9755-6070
www.tungaloy.com.au

PT. Tungaloy Indonesia

Kompleks Grand Wisata Block AA-10 No.3-5
Cibitung
Bekasi 17510, Indonesia
Phone: +62-21-8261-5808
Fax: +62-21-8261-5809
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DRILLFORCE MEISTER

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Tungaloy Report No. 509S1-G

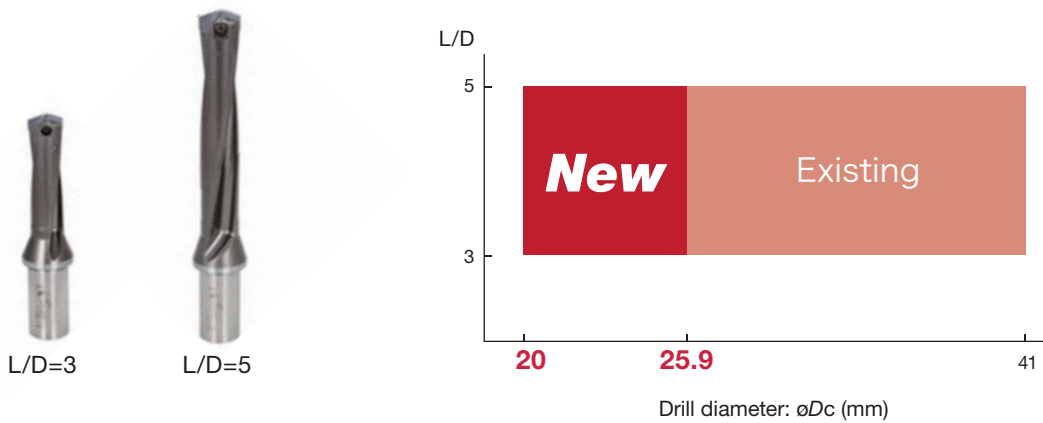
Expansion of the DrillForceMeister line with a wider range of diameters - **ø20 - 25.9 mm**



INDUSTRY 4.0
FEED the SPEED!

Line-up expansion of $\varnothing 20 - \varnothing 25.9$ mm

Based on the big success of the existing range of DrillForceMeister and following market demand, Tungaloy has expanded the range of diameters. All heads are coated with our excellent wear resistant PVD coating, AH725.



Unique clamping system

Easy and quick yet rigid and reliable clamping method for excellent hole quality and long tool life

DrillForceMeister has a large contact area, thus it strongly withstands radical forces and low rigidity workpiece clamping.



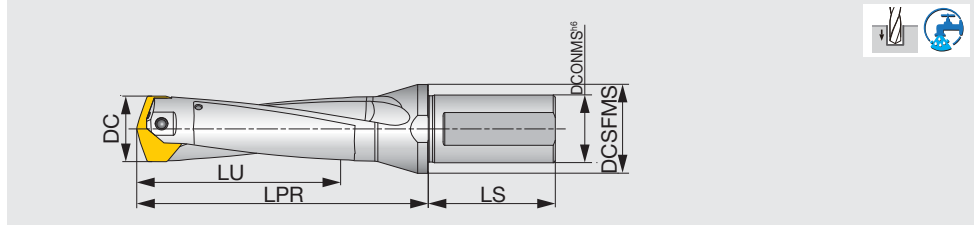
Typical examples of unbalanced machining

| Inclined exit | Inclined surface | Thin metal machining | Jump hole machining |
|---------------|------------------|----------------------|---------------------|
| | | | |

TIS L/D=3

Head indexable drill

New



| Designation | DC | DCONMS | DCSFMS | LU | LPR | LS | Pocket size | Head |
|-------------|-----------|--------|--------|------|-------|----|-------------|--------|
| TIS200F25-3 | 20 - 20.9 | 25 | 32 | 63.1 | 92.1 | 56 | 20 | SMP20* |
| TIS210F25-3 | 21 - 21.9 | 25 | 32 | 66.3 | 95.1 | 56 | 21 | SMP21* |
| TIS220F25-3 | 22 - 22.9 | 25 | 32 | 69.4 | 98.4 | 56 | 22 | SMP22* |
| TIS230F25-3 | 23 - 23.9 | 25 | 32 | 72.6 | 101.4 | 56 | 23 | SMP23* |
| TIS240F32-3 | 24 - 24.9 | 32 | 40 | 75.7 | 110.7 | 60 | 24 | SMP24* |
| TIS250F32-3 | 25 - 25.9 | 32 | 40 | 78.9 | 113.7 | 60 | 25 | SMP25* |

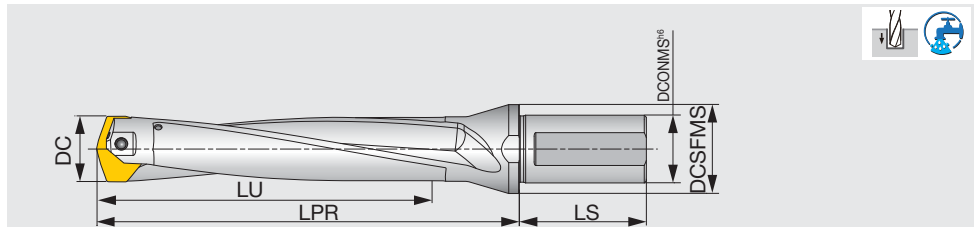
| Tool diameter | Hole diameter tolerance* |
|---------------|--------------------------|
| ø20 - ø25.9 | +0.05 / 0 |

* Just for reference.

TIS L/D=5

Head indexable drill

New



| Designation | DC | DCONMS | DCSFMS | LU | LPR | LS | Pocket size | Head |
|-------------|-----------|--------|--------|-------|-------|----|-------------|--------|
| TIS200F25-5 | 20 - 20.9 | 25 | 32 | 103.1 | 132.1 | 56 | 20 | SMP20* |
| TIS210F25-5 | 21 - 21.9 | 25 | 32 | 108.3 | 137.1 | 56 | 21 | SMP21* |
| TIS220F25-5 | 22 - 22.9 | 25 | 32 | 113.4 | 142.4 | 56 | 22 | SMP22* |
| TIS230F25-5 | 23 - 23.9 | 25 | 32 | 118.6 | 147.4 | 56 | 23 | SMP23* |
| TIS240F32-5 | 24 - 24.9 | 32 | 40 | 123.7 | 158.7 | 60 | 24 | SMP24* |
| TIS250F32-5 | 25 - 25.9 | 32 | 40 | 128.9 | 163.7 | 60 | 25 | SMP25* |

| Tool diameter | Hole diameter tolerance* |
|---------------|--------------------------|
| ø20 - ø25.9 | +0.08 / 0 |

* Just for reference.

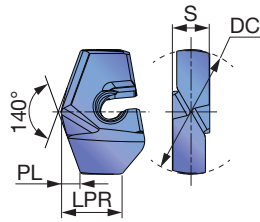
SPARE PARTS



| Designation | Clamping screw | Wrench | |
|-------------|----------------|-----------|--------|
| | | Torx Bit | Grip |
| TIS200F25-* | TS40178D25 | BLDT20/S7 | H-TB2W |
| TIS210F25-* | TS40178D25 | BLDT20/S7 | H-TB2W |
| TIS220F25-* | TS40198D28 | BLDT20/S7 | H-TB2W |
| TIS230F25-* | TS40198D28 | BLDT20/S7 | H-TB2W |
| TIS240F32-* | TS40210D3 | BLDT20/S7 | H-TB2W |
| TIS250F32-* | TS40210D3 | BLDT20/S7 | H-TB2W |

SMP

New



| | |
|----------------------|--------------------------------|
| Tool diameter | Head diameter tolerance |
| ø20 - ø25.9 | +0.014 / -0.015 |

| | |
|-------------------------|---|
| P Steel | ★ |
| M Stainless | ★ |
| K Cast iron | ★ |
| N Non-ferrous | ☆ |
| S Superalloys | ★ |
| H Hard materials | ★ |

★ : First choice
☆ : Second choice

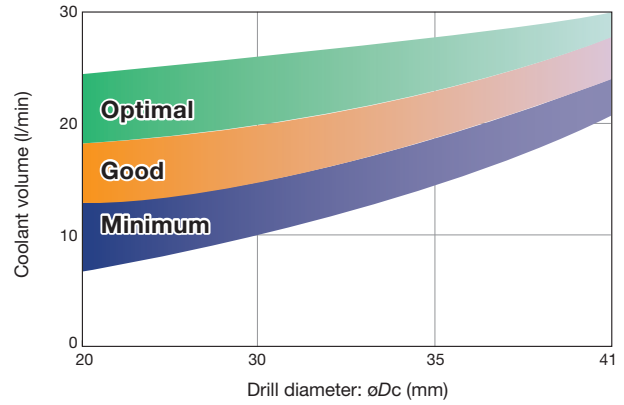
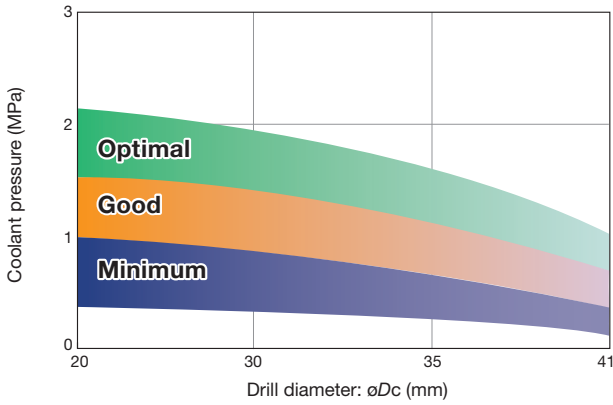
| Designation | DC | S | Coated | | | | | | | | LPR | PL | Pocket Size | Body |
|-------------|------|-----|--------|--|--|--|--|--|--|--|------|------|-------------|-------------|
| | | | AH725 | | | | | | | | | | | |
| SMP200 | 20 | 5.7 | ● | | | | | | | | 9.7 | 3.11 | 20 | TIS200F25-* |
| SMP205 | 20.5 | 5.7 | ● | | | | | | | | 9.7 | 3.2 | 20 | TIS200F25-* |
| SMP210 | 21 | 5.7 | ● | | | | | | | | 9.7 | 3.29 | 21 | TIS210F25-* |
| SMP215 | 21.5 | 5.7 | ● | | | | | | | | 9.7 | 3.38 | 21 | TIS210F25-* |
| SMP220 | 22 | 6.2 | ● | | | | | | | | 10.5 | 3.42 | 22 | TIS220F25-* |
| SMP223 | 22.3 | 6.2 | ● | | | | | | | | 10.5 | 3.47 | 22 | TIS220F25-* |
| SMP225 | 22.5 | 6.2 | ● | | | | | | | | 10.5 | 3.51 | 22 | TIS220F25-* |
| SMP230 | 23 | 6.2 | ● | | | | | | | | 10.5 | 3.6 | 23 | TIS230F25-* |
| SMP235 | 23.5 | 6.2 | ● | | | | | | | | 10.5 | 3.69 | 23 | TIS230F25-* |
| SMP240 | 24 | 6.7 | ● | | | | | | | | 10.8 | 3.73 | 24 | TIS240F32-* |
| SMP245 | 24.5 | 6.7 | ● | | | | | | | | 10.8 | 3.82 | 24 | TIS240F32-* |
| SMP247 | 24.7 | 6.7 | ● | | | | | | | | 10.8 | 3.86 | 24 | TIS240F32-* |
| SMP250 | 25 | 6.7 | ● | | | | | | | | 10.8 | 3.91 | 25 | TIS250F32-* |
| SMP255 | 25.5 | 6.7 | ● | | | | | | | | 10.8 | 4 | 25 | TIS250F32-* |

● : Line up

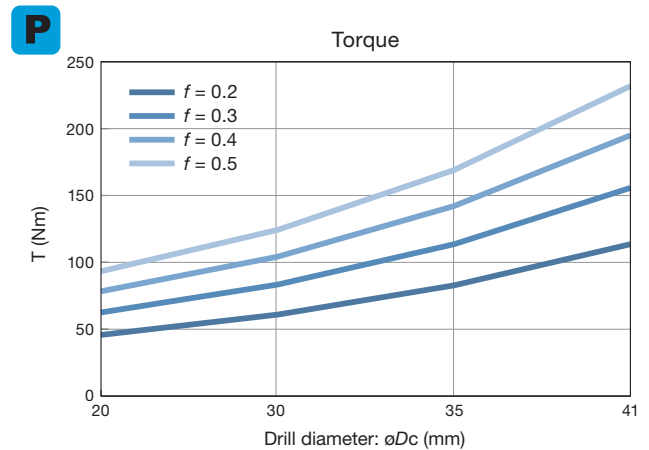
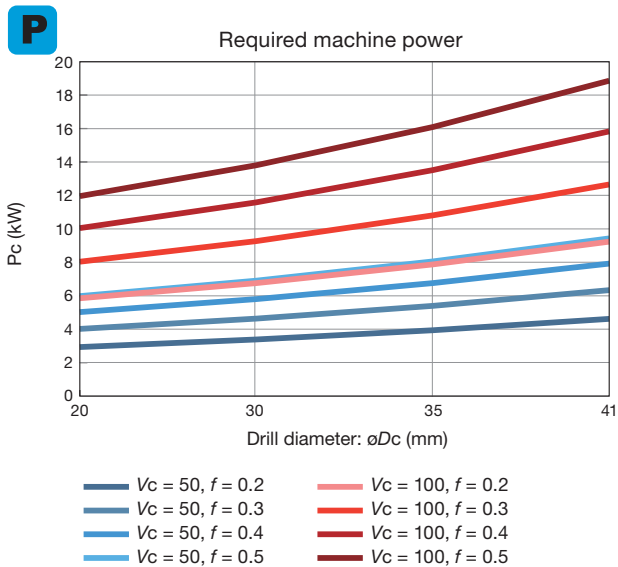
STANDARD CUTTING CONDITIONS

| ISO | Workpiece materials | Cutting speed Vc (m/min) | Feed: f (mm/rev) |
|----------|---|-----------------------------|-----------------------|
| | | | øDc (mm) 20 - 25.9 |
| P | Low carbon steel (C15, C20, etc.) | 80 - 140 | 0.2 - 0.5 |
| | Carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4, etc.) | 80 - 130 | 0.2 - 0.5 |
| | Prehardend steel (NAK80, PX5, etc.) | 50 - 100 | 0.2 - 0.5 |
| M | Stainless steel (SUS304 / X5CrNi18-9, SUS316 / X5CrNiMo17-12-3, etc.) | 40 - 80 | 0.15 - 0.3 |
| K | Grey cast iron (FC250 / 250, FC300 / 300, etc.) | 80 - 180 | 0.25 - 0.55 |
| | Ductile cast iron (400-15, 600-3, etc.) | 80 - 140 | 0.25 - 0.55 |
| N | Non ferrous materials | 100 - 200 | 0.4 - 0.6 |
| S | Heat-resistant alloys (Inconel718, etc.) | 20 - 50 | 0.1 - 0.2 |
| | Titanium alloys (Ti-6Al-4V, etc.) | 20 - 50 | 0.1 - 0.2 |
| H | Hardened materials | 20 - 60 | 0.1 - 0.2 |

RECOMMENDED COOLANT PRESSURE AND VOLUME



REQUIRED MACHINE POWER AND TORQUE



- Please access to "Tungaloy machining power" to calculate more detailed cutting forces.

<https://www.imc-i.com/mpwr/MachiningPower>



HOW TO CHANGE DRILL HEAD


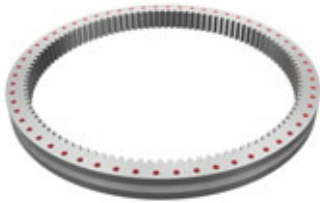
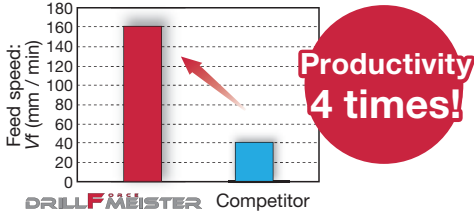

To unclamp rotate the screw 3-5 times counter-clockwise.



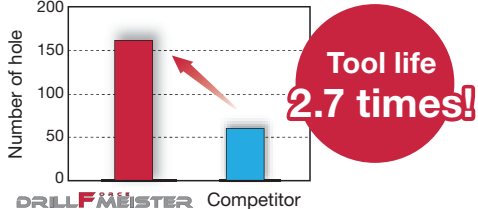
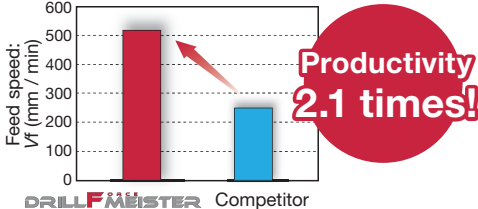
No need to remove the screw from the body.



- Please change the screw to new one when the screw does not rotate smoothly

PRACTICAL EXAMPLES

| Workpiece type | Gate valve | Slewing ring | |
|--------------------|--|---|-----|
| Drill | TIS300F40-5 | TIS330F40-5 | |
| Head | SMP300 | SMP331 | |
| Grade | AH725 | AH725 | |
| Workpiece material | SUS304 / X5CrNi18-9 | SCM440 / 42CrMo4 | |
| |  M |  P | |
| Cutting conditions | Cutting speed: V_c (m/min) | 60 | 100 |
| | Feed : f (mm/rev) | 0.25 | 0.4 |
| | Feed speed : V_f (mm) | 160 | 380 |
| | Drilling depth : H (mm) | 120 | 150 |
| Machine | Horizontal M/C | Vertical M/C | |
| Results |  <p>Productivity 4 times!</p> <p>DrillForceMeister provides 4 times productivity than HSS drill.</p> |  <p>Productivity 2 times!</p> <p>DrillForceMeister provides 2 times productivity and more stable hole diameter compare with indexable drill.</p> | |

| Workpiece type | | Link | Plate | |
|--------------------|---|--|--|--|
| Drill | | TIS320F40-5 | TIS260F32-3 | |
| Head | | SMP321 | SMP260 | |
| Grade | | AH725 | AH725 | |
| Workpiece material | | SCM440 / 42CrMo4  M | SN490B  P | |
| Cutting conditions | Cutting speed: V_c (m/min) | 60 | 120 | |
| | Feed : f (mm/rev) | 0.15 | 0.35 | |
| | Feed speed : V_f (mm) | 90 | 514 | |
| | Drilling depth : H (mm) | 43 | 22 | |
| | Machine | Horizontal M/C | Vertical M/C | |
| Results |  <p>Tool life 2.7 times!</p> <p>DrillForceMeister provides 2.7 times tool life than head changeable drill.</p> | |  <p>Productivity 2.1 times!</p> <p>DrillForceMeister provides 2.1 times productivity than indexable drill.</p> | |

Tungaloy Corporation (Head office)

11-1 Yoshima-Kogyodanchi
Iwaki-city, Fukushima 970-1144 Japan
Phone: +81-246-36-8501
Fax: +81-246-36-8542
www.tungaloy.co.jp

Tungaloy America, Inc.

3726 N Ventura Drive
Arlington Heights, IL 60004, U.S.A.
Phone: +1-888-554-8394
Fax: +1-888-554-8392
www.tungaloy.com/us

Tungaloy Canada

432 Elgin St. Unit 3
Brantford, Ontario N3S 7P7, Canada
Phone: +1-519-758-5779
Fax: +1-519-758-5791
www.tungaloy.com/ca

Tungaloy de Mexico S.A.

C Los Arellano 113,
Parque Industrial Siglo XXI
Aguascalientes, AGS, Mexico 20290
Phone: +52-449-929-5410
Fax: +52-449-929-5411
www.tungaloy.com/mx

Tungaloy do Brasil Ltda.

Avd. Independencia N4158 Residencial Flora
13280-000 Vinhedo, São Paulo, Brasil
Phone: +55-19-38262757
Fax: +55-19-38262757
www.tungaloy.com/br

Tungaloy Germany GmbH

An der Alten Ziegelei 1
D-40789 Monheim, Germany
Phone: +49-2173-90420-0
Fax: +49-2173-90420-19
www.tungaloy.com/de

Tungaloy France S.A.S.

ZA Courtaboef - Le Rio
1 rue de la Terre de feu
F-91952 Courtaboef Cedex, France
Phone: +33-1-6486-4300
Fax: +33-1-6907-7817
www.tungaloy.com/fr

Tungaloy Italia S.r.l.

Via E. Andolfato 10
I-20126 Milano, Italy
Phone: +39-02-252012-1
Fax: +39-02-252012-65
www.tungaloy.com/it

Tungaloy Czech s.r.o.

Turanka 115
CZ-627 00 Brno, Czech Republic
Phone: +420-532 123 391
Fax: +420-532 123 392
www.tungaloy.com/cz

Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7
Pol. Ind. Bufalvent
ES-08243 Manresa (BCN), Spain
Phone: +34 93 113 1360
Fax: +34 93 876 2798
www.tungaloy.com/es

Tungaloy Scandinavia AB

Bultgatan 38
442 40 Kungälv, Sweden
Phone: +46-462119200
Fax: +46-462119207
www.tungaloy.com/se

Tungaloy Rus, LLC

Andropova avenue, h.18/7,
11 floor, office 3, 115432,
Moscow, Russia
Phone: +7-499-683-01-80
Fax: +7-499-683-01-81
www.tungaloy.com/ru

Tungaloy Polska Sp. z o.o.

Ul. Irysowa 1, 55-040 Bielany
Wroclawskie, Poland
Phone: +48 607 907 237
www.tungaloy.com/pl

Tungaloy U.K. Ltd

Gallan Park, Watling Street,
Cannock, WS110XG, UK
Phone: +44 121 4000 231
Fax: +44 121 270 9694
www.tungaloy.com/uk

Tungaloy Hungary Kft

Erzsébet királyné útja 125
H-1142 Budapest, Hungary
Phone: +36 1 781-6846
Fax: +36 1 781-6866
www.tungaloy.com/hu

Tungaloy Turkey

Serifali Mah.bayraktar Bulvari Kule Sk. No:26
34775 Umraniye / Istanbul / Turkey
Phone: +90 216 540 04 67
Fax: +90 216 540 04 87
www.tungaloy.com/tr

Tungaloy Benelux b.v.

Tjalk 70
NL-2411 NZ Bodegraven, Netherlands
Phone: +31 172 630 420
Fax: +31 172 630 429
www.tungaloy.com/nl

Tungaloy Croatia

Ulica bana Josipa Jelačića 87,
10430, Samobor, Croatia
Phone: +385 1 3326 604
Fax: +385 1 3327 683
www.tungaloy.com/hr

Tungaloy Cutting Tool (Shanghai) Co.,Ltd.

Rm No 401 No.88 Zhabei
Jiangchang No.3 Rd
Shanghai 200436, China
Phone: +86-21-3632-1880
Fax: +86-21-3621-1918
www.tungaloy.com/cn

Tungaloy Cutting Tools (Taiwan) Co.,Ltd.

9F, No.293, Zhongyang Rd,
Xinzhuang Dist, New Taipei City,
24251 Taiwan
Phone: +886-2-8521-9986
Fax: +886-2-8521-8935
www.tungaloy.com/tw

Tungaloy Cutting Tools (Thailand) Co.,Ltd.

Interlink tower 4th Fl.
1858/5-7 Bangna-Trad Road
km.5 Bangna, Bangna, Bangkok 10260
Thailand
Phone: +66-2-751-5711
Fax: +66-2-751-5715
www.tungaloy.com/th

Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #06-11 Oxley BizHub 2
Singapore 408734
Phone: +65-6391-1833
Fax: +65-6299-4557
www.tungaloy.com/sg

Tungaloy Vietnam

LE04.38, Lexington Residence
67 Mai Chi Tho St., Dist. 2,
Ho Chi Minh City, Vietnam
Phone: +84-2837406660
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Tungaloy India Pvt. Ltd.

Indiabulls Finance Centre,
Unit # 902-A, 9th Floor,
Tower 1, Senapati Bapat Marg,
Elphinstone Road (West),
Mumbai-400013, India
Phone: +91-22-6124-8804
Fax: +91-22-6124-8899
www.tungaloy.com/in

Tungaloy Korea Co., Ltd

#1312, Byucksan Digital Valley 5-cha
Beotkkot-ro 244, Geumcheon-gu
153-788 Seoul, Korea
Phone: +82-2-2621-6161
Fax: +82-2-6393-8952
www.tungaloy.com/kr

Tungaloy Malaysia Sdn Bhd

50 K-2, Kelana Mall, Jalan SS6/14
Kelana Jaya, 47301
Petaling Jaya, Selangor Darul Ehsan
Malaysia
Phone: +603-7805-3222
Fax: +603-7804-8563
www.tungaloy.com/my

Tungaloy Australia Pty Ltd

Unit 68 1470 Ferntree Gully Road
Knoxfield 3180 Victoria, Australia
Phone: +61-3-9755-8147
Fax: +61-3-9755-6070
www.tungaloy.com/au

PT. Tungaloy Indonesia

Kompleks Grand Wisata Block AA-10 No.3-5
Cibitung
Bekasi 17510, Indonesia
Phone: +62-21-8261-5808
Fax: +62-21-8261-5809
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DrillLine



DRILL FORCE MEISTER

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Tungaloy Report No. 509S2-G

Expanded lineup with new SMF flat-edged drill head: $\varnothing 20$ – $\varnothing 40$ mm



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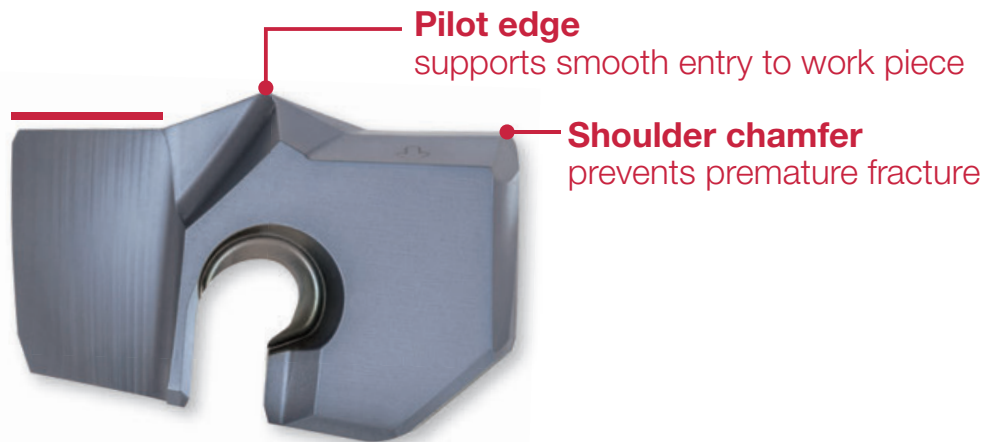
Optimized edge design for efficient drilling of flat-bottom holes

New SMF DrillForceMeister flat-edged drill head

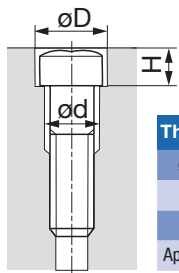
Tungaloy further expands the lineup of SMF flat-edged drill heads. All heads are coated with Tungaloy's top-notch wear resistant PVD grade, AH9130.

The flat-edge drill head is an ideal tool for counterboring bolt and screw heads.

180° flat cutting edges produces holes with flat bottom. Ideal for counterboring bolt heads.



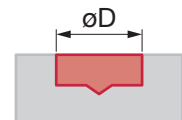
Counterbore dimensions for bolt holes



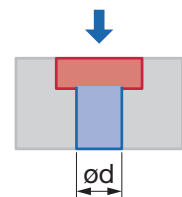
| Thread size | M16 | M20 | M22 | M24 |
|-----------------|--------|--------|--------|--------|
| øD (mm) | 26 | 32 | 35 | 39 |
| H (mm) | 17.5 | 21.5 | 23.5 | 25.5 |
| ød (mm) | 18 | 22 | 24 | 26 |
| Applicable tool | SMF260 | SMF320 | SMF350 | SMF390 |

Recommended counterboring method

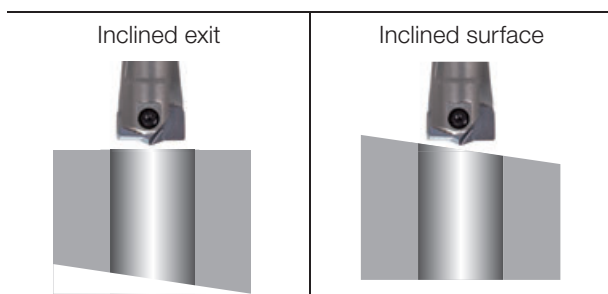
1 Use SMF to make a counterbore for the bolt head.



2 Drill a smaller diameter hole for threads.



Typical applications for irregular surfaces



Compared with a 140° drill tip, the SMF head provides greater resistance to radial forces, improving machining stability during the drilling of irregular surfaces or workpieces with low rigidity. In addition, the drill head and holder interface is designed to provide tool reliability during demanding operations.

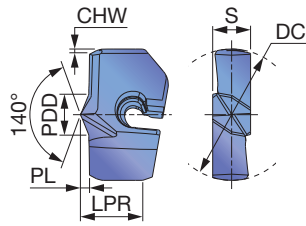
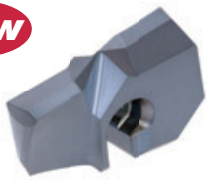


Wide contact area

* Standard DrillForceMeister body can be used

SMF

New



| Tool diameter | Head diameter tolerance |
|---------------|-------------------------|
| ø20 - ø29.9 | +0.014 / -0.015 |
| ø30 - ø40 | +0.014 / -0.02 |

| | | | | | |
|---|----------------|---|--|--|--|
| P | Steel | ★ | | | |
| M | Stainless | ★ | | | |
| K | Cast iron | ★ | | | |
| N | Non-ferrous | ☆ | | | |
| S | Superalloys | ★ | | | |
| H | Hard materials | ★ | | | |

★ : First choice
☆ : Second choice

| Designation | DC | S | Coated | | LPR | PL | CHW | PDD | Pocket size | Body |
|-------------|------|-------|--------|--|------|------|-----|------|-------------|-------------|
| | | | AH9130 | | | | | | | |
| SMF200 | 20 | 5.69 | ● | | 10.2 | 2.11 | 0.3 | 6 | 20 | TIS200F25-* |
| SMF205 | 20.5 | 5.69 | ● | | 10 | 2.11 | 0.3 | 6 | 20 | TIS200F25-* |
| SMF210 | 21 | 5.69 | ● | | 9.8 | 2.11 | 0.3 | 6 | 21 | TIS210F25-* |
| SMF215 | 21.5 | 5.69 | ● | | 9.6 | 2.11 | 0.3 | 6 | 21 | TIS210F25-* |
| SMF220 | 22 | 6.19 | ● | | 10.9 | 2.27 | 0.3 | 6.6 | 22 | TIS220F25-* |
| SMF225 | 22.5 | 6.19 | ● | | 10.7 | 2.27 | 0.3 | 6.6 | 22 | TIS220F25-* |
| SMF230 | 23 | 6.19 | ● | | 10.5 | 2.27 | 0.3 | 6.6 | 23 | TIS230F25-* |
| SMF235 | 23.5 | 6.19 | ● | | 10.3 | 2.27 | 0.3 | 6.6 | 23 | TIS230F25-* |
| SMF240 | 24 | 6.69 | ● | | 11 | 2.43 | 0.3 | 7.2 | 24 | TIS240F32-* |
| SMF245 | 24.5 | 6.69 | ● | | 10.8 | 2.43 | 0.3 | 7.2 | 24 | TIS240F32-* |
| SMF250 | 25 | 6.69 | ● | | 10.6 | 2.43 | 0.3 | 7.2 | 25 | TIS250F32-* |
| SMF255 | 25.5 | 6.69 | ● | | 10.4 | 2.43 | 0.3 | 7.2 | 25 | TIS250F32-* |
| SMF260 | 26 | 7.49 | ● | | 12.7 | 2.5 | 0.3 | 7.8 | 26 | TIS260F32-* |
| SMF265 | 26.5 | 7.49 | ● | | 12.5 | 2.5 | 0.3 | 7.8 | 26 | TIS260F32-* |
| SMF270 | 27 | 7.49 | ● | | 12.3 | 2.5 | 0.3 | 7.8 | 27 | TIS270F32-* |
| SMF275 | 27.5 | 7.49 | ● | | 12.1 | 2.5 | 0.3 | 7.8 | 27 | TIS270F32-* |
| SMF280 | 28 | 7.99 | ● | | 12.9 | 2.66 | 0.3 | 8.4 | 28 | TIS280F32-* |
| SMF300 | 30 | 8.49 | ● | | 15.1 | 2.82 | 0.3 | 9 | 30 | TIS300F32-* |
| SMF315 | 31.5 | 8.49 | ● | | 14.4 | 2.82 | 0.3 | 9 | 31 | TIS310F32-* |
| SMF320 | 32 | 8.99 | ● | | 15.3 | 2.98 | 0.3 | 9.6 | 32 | TIS320F40-* |
| SMF325 | 32.5 | 8.99 | ● | | 15.1 | 2.98 | 0.3 | 9.6 | 32 | TIS320F40-* |
| SMF330 | 33 | 8.99 | ● | | 14.9 | 2.98 | 0.3 | 9.6 | 33 | TIS330F40-* |
| SMF340 | 34 | 8.99 | ● | | 14.5 | 2.98 | 0.3 | 9.6 | 34 | TIS340F40-* |
| SMF345 | 34.5 | 8.99 | ● | | 14.3 | 2.98 | 0.3 | 9.6 | 34 | TIS340F40-* |
| SMF350 | 35 | 9.99 | ● | | 17.1 | 3.21 | 0.3 | 10.5 | 35 | TIS350F40-* |
| SMF360 | 36 | 9.99 | ● | | 16.7 | 3.21 | 0.3 | 10.5 | 36 | TIS360F40-* |
| SMF390 | 39 | 10.49 | ● | | 17 | 3.44 | 0.3 | 11.4 | 39 | TIS390F40-* |
| SMF400 | 40 | 10.49 | ● | | 16.6 | 3.44 | 0.3 | 11.4 | 40 | TIS400F40-* |

● : New product

STANDARD CUTTING CONDITIONS

| ISO | Workpiece materials | Cutting speed Vc (m/min) | Feed: f (mm/rev) | | |
|-----|---|-----------------------------|------------------|-------------|------------|
| | | | ø20 - ø29.9 | ø30 - ø35.9 | ø36 - ø40 |
| P | Low carbon steel (C15, C20, etc.) | 80 - 140 | 0.2 - 0.5 | 0.2 - 0.5 | 0.2 - 0.55 |
| | Carbon steel and alloy steel (S55C / C55, SCM440 / 42CrMo4, etc.) | 80 - 130 | 0.2 - 0.5 | 0.2 - 0.5 | 0.2 - 0.55 |
| | Prehardend steel (NAK80, PX5, etc.) | 50 - 100 | 0.2 - 0.5 | 0.2 - 0.5 | 0.2 - 0.55 |
| M | Stainless steel (SUS304 / X5CrNi18-9, SUS316 / X5CrNiMo17-12-3, etc.) | 40 - 70 | 0.15 - 0.25 | 0.2 - 0.3 | 0.2 - 0.35 |
| K | Grey cast iron (FC250 / 250, FC300 / 300, etc.) | 80 - 180 | 0.25 - 0.55 | 0.25 - 0.55 | 0.3 - 0.6 |
| | Ductile cast iron (400-15, 600-3, etc.) | 80 - 140 | 0.25 - 0.55 | 0.25 - 0.55 | 0.3 - 0.6 |
| N | Non ferrous materials | 100 - 200 | 0.4 - 0.6 | 0.4 - 0.6 | 0.5 - 0.7 |
| S | Heat-resistant alloys (Inconel718, etc.) | 20 - 50 | 0.1 - 0.2 | 0.1 - 0.2 | 0.1 - 0.25 |
| | Titanium alloys (Ti-6Al-4V, etc.) | 20 - 50 | 0.1 - 0.2 | 0.1 - 0.2 | 0.1 - 0.25 |
| H | Hardened materials | 20 - 60 | 0.1 - 0.2 | 0.1 - 0.2 | 0.1 - 0.25 |

Tungaloy Corporation (Head office)

11-1 Yoshima-Kogyodanchi
Iwaki-city, Fukushima 970-1144 Japan
Phone: +81-246-36-8501
Fax: +81-246-36-8542
www.tungaloy.co.jp

Tungaloy America, Inc.

3726 N Ventura Drive
Arlington Heights, IL 60004, U.S.A.
Phone: +1-888-554-8394
Fax: +1-888-554-8392
www.tungaloy.com/us

Tungaloy Canada

432 Elgin St. Unit 3
Brantford, Ontario N3S 7P7, Canada
Phone: +1-519-758-5779
Fax: +1-519-758-5791
www.tungaloy.com/ca

Tungaloy de Mexico S.A.

C Los Arellano 113,
Parque Industrial Siglo XXI
Aguascalientes, AGS, Mexico 20290
Phone: +52-449-929-5410
Fax: +52-449-929-5411
www.tungaloy.com/mx

Tungaloy do Brasil Ltda.

Avd. Independencia N4158 Residencial Flora
13280-000 Vinhedo, São Paulo, Brasil
Phone: +55-19-38262757
Fax: +55-19-38262757
www.tungaloy.com/br

Tungaloy Germany GmbH

An der Alten Ziegelei 1
D-40789 Monheim, Germany
Phone: +49-2173-90420-0
Fax: +49-2173-90420-19
www.tungaloy.com/de

Tungaloy France S.A.S.

ZA Courtaboef - Le Rio
1 rue de la Terre de feu
F-91952 Courtaboef Cedex, France
Phone: +33-1-6486-4300
Fax: +33-1-6907-7817
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Via E. Andolfato 10
I-20126 Milano, Italy
Phone: +39-02-252012-1
Fax: +39-02-252012-65
www.tungaloy.com/it

Tungaloy Czech s.r.o.

Turanka 115
CZ-627 00 Brno, Czech Republic
Phone: +420-532 123 391
Fax: +420-532 123 392
www.tungaloy.com/cz

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ES-08243 Manresa (BCN), Spain
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Phone: +46-462119200
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Ul. Irysowa 1, 55-040 Bielany
Wroclawskie, Poland
Phone: +48 607 907 237
www.tungaloy.com/pl

Tungaloy U.K. Ltd

Gallan Park, Watling Street,
Cannock, WS110XG, UK
Phone: +44 121 4000 231
Fax: +44 121 270 9694
www.tungaloy.com/uk

Tungaloy Hungary Kft

Erzsébet királyné útja 125
H-1142 Budapest, Hungary
Phone: +36 1 781-6846
Fax: +36 1 781-6866
www.tungaloy.com/hu

Tungaloy Turkey

Serifali Mah.bayraktar Bulvari Kule Sk. No:26
34775 Umraniye / Istanbul / Turkey
Phone: +90 216 540 04 67
Fax: +90 216 540 04 87
www.tungaloy.com/tr

Tungaloy Benelux b.v.

Tjalk 70
NL-2411 NZ Bodegraven, Netherlands
Phone: +31 172 630 420
Fax: +31 172 630 429
www.tungaloy.com/nl

Tungaloy Croatia

Ulica bana Josipa Jelačića 87,
10430, Samobor, Croatia
Phone: +385 1 3326 604
Fax: +385 1 3327 683
www.tungaloy.com/hr

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Jiangchang No.3 Rd
Shanghai 200436, China
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62 Ubi Road 1, #06-11 Oxley BizHub 2
Singapore 408734
Phone: +65-6391-1833
Fax: +65-6299-4557
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LE04.38, Lexington Residence
67 Mai Chi Tho St., Dist. 2,
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Phone: +84-2837406660
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#1312, Byucksan Digital Valley 5-cha
Beotkkot-ro 244, Geumcheon-gu
153-788 Seoul, Korea
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Fax: +82-2-6393-8952
www.tungaloy.com/kr

Tungaloy Malaysia Sdn Bhd

50 K-2, Kelana Mall, Jalan SS6/14
Kelana Jaya, 47301
Petaling Jaya, Selangor Darul Ehsan
Malaysia
Phone: +603-7805-3222
Fax: +603-7804-8563
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Kompleks Grand Wisata Block AA-10 No.3-5
Cibitung
Bekasi 17510, Indonesia
Phone: +62-21-8261-5808
Fax: +62-21-8261-5809
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Tungaloy Report No. 509S3-G

SMP drill head expansion with grade **AH9130**



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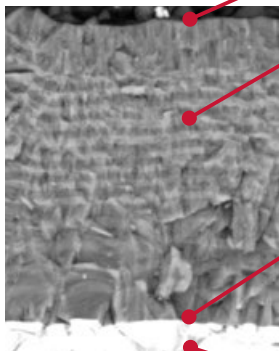
For more information

DrillForce-Meister **SMP** drill heads are now offered in **AH9130** insert grade

For increased productivity, extended tool life, and reduced machining costs

New

AH9130



Resistance to built up-edge
Coating layer to resist built up-edge

Resistance to wear, oxidation, and fracture

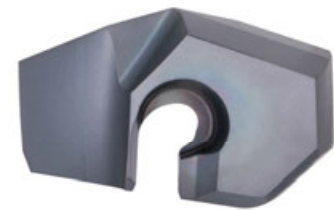
- 2 coating layers for wear and oxidation resistance
- Layered alternatively to prevent crack from propagating to fracture

Strong coating-substrate adhesion

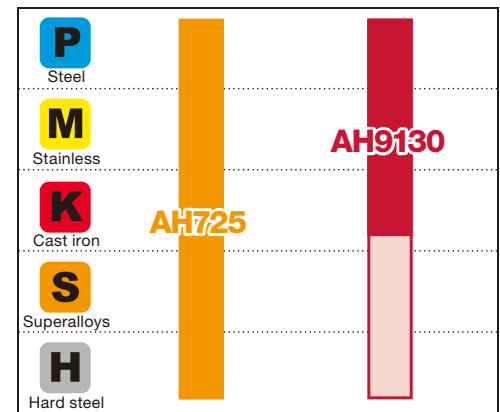
- Coating is provided with strong adhesion between the coating layer and carbide substrate to prevent coating delamination

Substrate

Carbide substrate features wear and fracture resistance



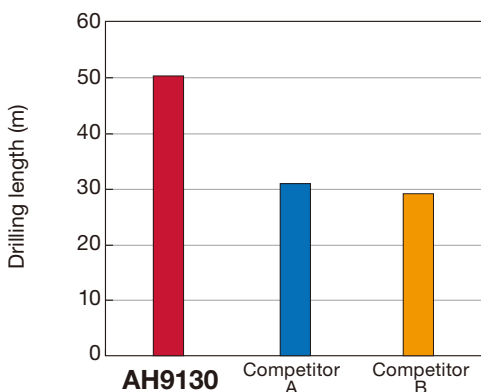
Application range



General purpose

Wear resistance

Cutting performance

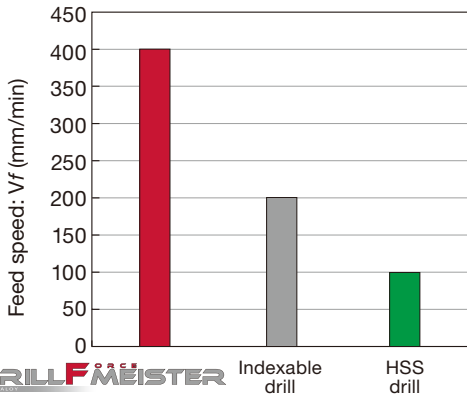


P

Drill : $\phi 26$ mm
Workpiece material : S55C / C55
Cutting speed : $V_c = 100$ m/min
Feed : $f = 0.35$ mm/rev

AH9130 provided superior wear resistance, significantly increasing tool life. In addition, secure drill tip clamping system provided tool life stability.

High productivity

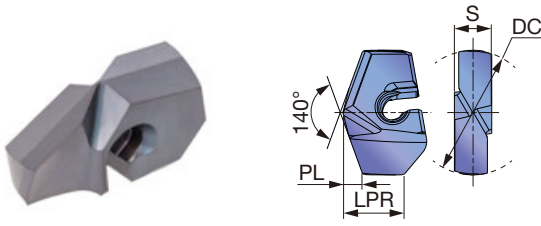


P Drill : $\phi 33$ mm, L/D = 5
Workpiece material : S55C / C55

| | Cutting speed Vc (m/min) | Feed f (mm/rev) | Feed speed Vf (mm/min) |
|----------------------|-----------------------------|--------------------|---------------------------|
| DRILLFMEISTER | 100 | 0.4 | 430 |
| Indexable drill | 150 | 0.15 | 240 |
| HSS drill | 20 | 0.4 | 85 |

Secure drill tip clamping and high-rigidity body provides remarkable increase in productivity.

SMP



| Tool diameter | Head diameter tolerance |
|-----------------------|-------------------------|
| $\phi 20 - \phi 29.9$ | -0.006 / -0.026 |
| $\phi 30 - \phi 35$ | -0.006 / -0.031 |

| | |
|-------------------------|-----|
| P Steel | ★ ★ |
| M Stainless | ★ ★ |
| K Cast iron | ★ ★ |
| N Non-ferrous | ☆ ☆ |
| S Superalloys | ★ ★ |
| H Hard materials | ☆ ★ |

★ : First choice
☆ : Second choice

| Designation | DC | S | Coated | | LPR | PL | Pocket Size | Body |
|-------------|------|-----|--------|-------|------|------|-------------|-------------|
| | | | AH9130 | AH725 | | | | |
| SMP200 | 20 | 5.7 | ● | ● | 9.7 | 3.11 | 20 | TIS200F25-* |
| SMP205 | 20.5 | 5.7 | ● | ● | 9.7 | 3.2 | 20 | TIS200F25-* |
| SMP210 | 21 | 5.7 | ● | ● | 9.7 | 3.29 | 21 | TIS210F25-* |
| SMP220 | 22 | 6.2 | ● | ● | 10.5 | 3.42 | 22 | TIS220F25-* |
| SMP230 | 23 | 6.2 | ● | ● | 10.5 | 3.6 | 23 | TIS230F25-* |
| SMP240 | 24 | 6.7 | ● | ● | 10.8 | 3.73 | 24 | TIS240F32-* |
| SMP250 | 25 | 6.7 | ● | ● | 10.8 | 3.91 | 25 | TIS250F32-* |
| SMP260 | 26 | 7.5 | ● | ● | 11.6 | 4.73 | 26 | TIS260F32-* |
| SMP265 | 26.5 | 7.5 | ● | ● | 11.6 | 4.82 | 26 | TIS260F32-* |
| SMP267 | 26.7 | 7.5 | ● | ● | 11.6 | 4.86 | 26 | TIS260F32-* |
| SMP270 | 27 | 7.5 | ● | ● | 11.1 | 4.91 | 27 | TIS270F32-* |
| SMP275 | 27.5 | 7.5 | ● | ● | 11.1 | 5 | 27 | TIS270F32-* |
| SMP280 | 28 | 8 | ● | ● | 11.7 | 5.1 | 28 | TIS280F32-* |
| SMP300 | 30 | 8.5 | ● | ● | 14.1 | 5.46 | 30 | TIS300F32-* |
| SMP320 | 32 | 9 | ● | ● | 14.5 | 5.82 | 32 | TIS320F40-* |
| SMP340 | 34 | 9 | ● | ● | 13.7 | 6.19 | 34 | TIS340F40-* |
| SMP350 | 35 | 10 | ● | ● | 16.6 | 6.37 | 35 | TIS350F40-* |

● : New
● : Line up

Tungaloy Corporation (Head office)

11-1 Yoshima-Kogyodanchi
Iwaki-city, Fukushima 970-1144 Japan
Phone: +81-246-36-8501
Fax: +81-246-36-8542
www.tungaloy.co.jp

Tungaloy America, Inc.

3726 N Ventura Drive
Arlington Heights, IL 60004, U.S.A.
Phone: +1-888-554-8394
Fax: +1-888-554-8392
www.tungaloy.com/us

Tungaloy Canada

432 Elgin St. Unit 3
Brantford, Ontario N3S 7P7, Canada
Phone: +1-519-758-5779
Fax: +1-519-758-5791
www.tungaloy.com/ca

Tungaloy de Mexico S.A.

C. Los Arellano 113,
Parque Industrial Siglo XXI
Aguascalientes, AGS, Mexico 20290
Phone: +52-449-929-5410
Fax: +52-449-929-5411
www.tungaloy.com/mx

Tungaloy do Brasil Ltda.

Avd. Independencia N4158 Residencial Flora
13280-000 Vinhedo, São Paulo, Brasil
Phone: +55-19-38262757
Fax: +55-19-38262757
www.tungaloy.com/br

Tungaloy Germany GmbH

An der Alten Ziegelei 1
D-40789 Monheim, Germany
Phone: +49-2173-90420-0
Fax: +49-2173-90420-19
www.tungaloy.com/de

Tungaloy France S.A.S.

ZA Courtaboeuf - Le Rio
1 rue de la Terre de feu
F-91952 Courtaboeuf Cedex, France
Phone: +33-1-6486-4300
Fax: +33-1-6907-7817
www.tungaloy.com/fr

Tungaloy Italia S.r.l.

Via E. Andolfato 10
I-20126 Milano, Italy
Phone: +39-02-252012-1
Fax: +39-02-252012-65
www.tungaloy.com/it

Tungaloy Czech s.r.o.

Turanka 115
CZ-627 00 Brno, Czech Republic
Phone: +420-532 123 391
Fax: +420-532 123 392
www.tungaloy.com/cz

Tungaloy Ibérica S.L.

C/Miquel Servet, 43B, Nau 7
Pol. Ind. Bufalvent
ES-08243 Manresa (BCN), Spain
Phone: +34 93 113 1360
Fax: +34 93 876 2798
www.tungaloy.com/es

Tungaloy Scandinavia AB

Bultgatan 38
442 40 Kungälv, Sweden
Phone: +46-462119200
Fax: +46-462119207
www.tungaloy.com/se

Tungaloy Rus, LLC

Andropova avenue, h.18/7,
11 floor, office 3, 115432,
Moscow, Russia
Phone: +7-499-683-01-80
Fax: +7-499-683-01-81
www.tungaloy.com/ru

Tungaloy Polska Sp. z o.o.

Ul. Irysowa 1, 55-040 Bielany
Wroclawskie, Poland
Phone: +48 607 907 237
www.tungaloy.com/pl

Tungaloy U.K. Ltd

Gallan Park, Watling Street,
Cannock, WS110XG, UK
Phone: +44 121 4000 231
Fax: +44 121 270 9694
www.tungaloy.com/uk

Tungaloy Hungary Kft

Erzsébet királyné útja 125
H-1142 Budapest, Hungary
Phone: +36 1 781-6846
Fax: +36 1 781-6866
www.tungaloy.com/hu

Tungaloy Turkey

Serifali Mah.bayraktar Bulvari Kule Sk. No:26
34775 Umraniye / Istanbul / Turkey
Phone: +90 216 540 04 67
Fax: +90 216 540 04 87
www.tungaloy.com/tr

Tungaloy Benelux b.v.

Tjalk 70
NL-2411 NZ Bodegraven, Netherlands
Phone: +31 172 630 420
Fax: +31 172 630 429
www.tungaloy.com/nl

Tungaloy Croatia

Ulica bana Josipa Jelačića 87,
10430, Samobor, Croatia
Phone: +385 1 3326 604
Fax: +385 1 3327 683
www.tungaloy.com/hr

Tungaloy Cutting Tool (Shanghai) Co.,Ltd.

Rm No 401 No.88 Zhabei
Jiangchang No.3 Rd
Shanghai 200436, China
Phone: +86-21-3632-1880
Fax: +86-21-3621-1918
www.tungaloy.com/cn

Tungaloy Cutting Tools (Taiwan) Co.,Ltd.

9F, No.293, Zhongyang Rd,
Xinzhuan Dist, New Taipei City,
24251 Taiwan
Phone: +886-2-8521-9986
Fax: +886-2-8521-8935
www.tungaloy.com/tw

Tungaloy Cutting Tools (Thailand) Co.,Ltd.

Interlink tower 4th Fl.
1858/5-7 Bangna-Trad Road
km.5 Bangna, Bangna, Bangkok 10260
Thailand
Phone: +66-2-751-5711
Fax: +66-2-751-5715
www.tungaloy.com/th

Tungaloy Singapore (Pte.), Ltd.

62 Ubi Road 1, #06-11 Oxley BizHub 2
Singapore 408734
Phone: +65-6391-1833
Fax: +65-6299-4557
www.tungaloy.com/sing

Tungaloy Vietnam

LE04.38, Lexington Residence
67 Mai Chi Tho St., Dist. 2,
Ho Chi Minh City, Vietnam
Phone: +84-2837406660
www.tungaloy.com/sing

Tungaloy India Pvt. Ltd.

Indiabulls Finance Centre,
Unit # 902-A, 9th Floor,
Tower 1, Senapati Bapat Marg,
Elphinstone Road (West),
Mumbai-400013, India
Phone: +91-22-6124-8804
Fax: +91-22-6124-8899
www.tungaloy.com/in

Tungaloy Korea Co., Ltd

#1312, Byucksan Digital Valley 5-cha
Beotkkot-ro 244, Geumcheon-gu
153-788 Seoul, Korea
Phone: +82-2-2621-6161
Fax: +82-2-6393-8952
www.tungaloy.com/kr

Tungaloy Malaysia Sdn Bhd

50 K-2, Kelana Mall, Jalan SS6/14
Kelana Jaya, 47301
Petaling Jaya, Selangor Darul Ehsan
Malaysia
Phone: +603-7805-3222
Fax: +603-7804-8563
www.tungaloy.com/my

Tungaloy Australia Pty Ltd

Unit 68 1470 Ferntree Gully Road
Knoxfield 3180 Victoria, Australia
Phone: +61-3-9755-8147
Fax: +61-3-9755-6070
www.tungaloy.com/au

PT. Tungaloy Indonesia

Kompleks Grand Wisata Block AA-10 No.3-5
Cibitung
Bekasi 17510, Indonesia
Phone: +62-21-8261-5808
Fax: +62-21-8261-5809
www.tungaloy.com/id



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