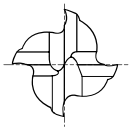
# HSS-PM, 4 FLUTE LONG LENGTH

## HSS-PM, 4 SCHNEIDEN LANG
## FRAISES HSS-PM, 4 DENTS, SÉRIE LONGUE
## 4 TAGLIENTI, SERIE LUNGA, HSS-PM

- Designed to machine carbon steels, alloyed steels, stainless steels.
- Recommended for pocketing, cam milling, die sinking and slotting.
- Designed for high speed cutting of difficult-to-cut materials.
- YG-1's new developed TANK-POWER Coating suitable for high speed cutting.

- Geeignet zum Fräsen von Stahl, legiertem Stahl und rostfreier Stahl.
- Empfohlen für Taschenfräsen, Nockenfräsen, Gussformen und Nutenfräsen.
- Geeignet für Hochgeschwindigkeitsfräsen von schwer zu zerspanenden Materialien.
- Neuentwickelte Beschichtung für Hochgeschwindigkeitsfräsen.



HSS PM | DIN 844 | 4 | 30° | DIN 1835B

P.662~663

Unit : mm

| EDP No. | | Mill Diameter | Shank Diameter | Length of Cut | Overall Length |
|---|---|---|---|---|---|
| UNCOATED | TiAlN based | | | | |
| E9A31020 | GAA31020 | 2.0 | 6 | 10 | 54 |
| E9A31030 | GAA31030 | 3.0 | 6 | 12 | 56 |
| E9A31040 | GAA31040 | 4.0 | 6 | 19 | 63 |
| E9A31050 | GAA31050 | 5.0 | 6 | 24 | 68 |
| E9A31060 | GAA31060 | 6.0 | 6 | 24 | 68 |
| E9A31070 | GAA31070 | 7.0 | 10 | 30 | 80 |
| E9A31080 | GAA31080 | 8.0 | 10 | 38 | 88 |
| E9A31090 | GAA31090 | 9.0 | 10 | 38 | 88 |
| E9A31100 | GAA31100 | 10.0 | 10 | 45 | 95 |
| E9A31120 | GAA31120 | 12.0 | 12 | 53 | 110 |
| E9A31140 | GAA31140 | 14.0 | 12 | 53 | 110 |
| E9A31160 | GAA31160 | 16.0 | 16 | 63 | 123 |
| E9A31180 | GAA31180 | 18.0 | 16 | 63 | 123 |
| E9A31200 | GAA31200 | 20.0 | 20 | 75 | 141 |
| E9A31220 | GAA31220 | 22.0 | 20 | 75 | 141 |
| E9A31250 | GAA31250 | 25.0 | 25 | 90 | 166 |

| Mill Dia. Tolerance (mm) | Shank Dia. Tolerance |
|---|---|
| 0 ~ −0.03 | h6 |

◎ : Excellent ○ : Good

| ISO | P | | | | | | | | | | | M | | | K | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Material Description | Non-alloy steel | | | | | Low alloy steel | | | | High alloyed steel, and tool steel | | Stainless steel | | | Grey cast iron | | Nodular cast iron | | Malleable cast iron | |
| VDI 3323 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| HRc | | 13 | 25 | 28 | 32 | 10 | 29 | 32 | 38 | 15 | 35 | 15 | 23 | 10 | 10 | 26 | 3 | 25 | | 21 |
| HB | 125 | 190 | 250 | 270 | 300 | 180 | 275 | 300 | 350 | 200 | 325 | 200 | 240 | 180 | 180 | 260 | 160 | 250 | 130 | 230 |
| Recommend | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ○ | ◎ | ○ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ | ◎ |

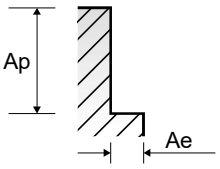
| ISO | N | | | | | | | | | | S | | | | | | | H | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Material Description | Aluminum-wrought alloy | | Aluminum-cast, alloyed | | | Copper and Copper Alloys (Bronze / Brass) | | | Non Metallic Materials | | Heat Resistant Super Alloys | | | | | Titanium Alloys | | Hardened steel | | Chilled Cast Iron | Hardened Cast Iron |
| VDI 3323 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 |
| HRc | | | | | | | | | | | 15 | 30 | 25 | 38 | 34 | | | 55 | 60 | 42 | 55 |
| HB | 60 | 100 | 75 | 90 | 130 | 110 | 90 | 100 | | | 200 | 280 | 250 | 350 | 320 | 400 Rm | 1050 Rm | 550 | 630 | 400 | 550 |
| Recommend | | | | | | ○ | ○ | ○ | | | | | | | | | | | | | |

# TANK-POWER HSS-PM END MILLS

## RECOMMENDED CUTTING CONDITIONS
## EMPFOHLENE SCHNEIDPARAMETER

## GA938 , GAA31 SERIES — 4 FLUTE - SIDE CUTTING

Vc = m/min.
fz = mm/tooth
RPM = rev./min.
FEED = mm/min.

| ISO | VDI 3323 | Material Description | Ae | Ap | Parameter | Diameter (Ø) 2.0 | 3.0 | 4.0 | 5.0 | 6.0 | 8.0 | 10.0 | 12.0 | 14.0 | 16.0 | 18.0 | 20.0 | 22.0 | 25.0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P | 1 | Non-alloy steel | 0.1D | 1.5D | Vc | 60 | 60 | 65 | 70 | 75 | 80 | 70 | 75 | 80 | 80 | 85 | 80 | 75 | 80 |
| | | | | | fz | 0.008 | 0.016 | 0.023 | 0.029 | 0.035 | 0.046 | 0.068 | 0.071 | 0.076 | 0.08 | 0.077 | 0.088 | 0.098 | 0.093 |
| | | | | | RPM | 9549 | 6366 | 5173 | 4456 | 3979 | 3183 | 2228 | 1989 | 1819 | 1592 | 1503 | 1273 | 1085 | 1019 |
| | | | | | FEED | 306 | 407 | 476 | 517 | 557 | 586 | 606 | 565 | 553 | 509 | 463 | 448 | 425 | 379 |
| | 2 | | 0.1D | 1.5D | Vc | 55 | 55 | 60 | 65 | 70 | 65 | 65 | 70 | 70 | 70 | 70 | 65 | 65 | 65 |
| | | | | | fz | 0.007 | 0.015 | 0.021 | 0.026 | 0.031 | 0.046 | 0.063 | 0.067 | 0.072 | 0.077 | 0.08 | 0.088 | 0.084 | 0.091 |
| | | | | | RPM | 8754 | 5836 | 4775 | 4138 | 3714 | 2586 | 2069 | 1857 | 1592 | 1393 | 1238 | 1035 | 940 | 828 |
| | | | | | FEED | 245 | 350 | 401 | 430 | 460 | 476 | 521 | 498 | 458 | 429 | 396 | 364 | 316 | 301 |
| | 3-4 | | 0.1D | 1.5D | Vc | 40 | 40 | 45 | 45 | 50 | 50 | 50 | 55 | 50 | 50 | 50 | 50 | 45 | 50 |
| | | | | | fz | 0.007 | 0.014 | 0.021 | 0.028 | 0.032 | 0.046 | 0.059 | 0.066 | 0.08 | 0.085 | 0.087 | 0.088 | 0.094 | 0.091 |
| | | | | | RPM | 6366 | 4244 | 3581 | 2865 | 2653 | 1989 | 1592 | 1459 | 1137 | 995 | 884 | 796 | 651 | 637 |
| | | | | | FEED | 178 | 238 | 301 | 321 | 340 | 366 | 376 | 385 | 364 | 338 | 308 | 280 | 245 | 232 |
| | 5 | | 0.1D | 1.5D | Vc | 25 | 25 | 30 | 30 | 35 | 35 | 30 | 35 | 35 | 35 | 35 | 35 | 30 | 35 |
| | | | | | fz | 0.008 | 0.017 | 0.022 | 0.028 | 0.032 | 0.043 | 0.066 | 0.067 | 0.073 | 0.081 | 0.077 | 0.083 | 0.085 | 0.089 |
| | | | | | RPM | 3979 | 2653 | 2387 | 1910 | 1857 | 1393 | 955 | 928 | 796 | 696 | 619 | 557 | 434 | 446 |
| | | | | | FEED | 127 | 180 | 210 | 214 | 238 | 240 | 252 | 249 | 232 | 226 | 191 | 185 | 148 | 159 |
| | 6 | Low alloy steel | 0.1D | 1.5D | Vc | 55 | 55 | 60 | 65 | 70 | 65 | 65 | 70 | 70 | 70 | 70 | 65 | 65 | 65 |
| | | | | | fz | 0.007 | 0.015 | 0.021 | 0.026 | 0.031 | 0.046 | 0.063 | 0.067 | 0.072 | 0.077 | 0.08 | 0.088 | 0.084 | 0.091 |
| | | | | | RPM | 8754 | 5836 | 4775 | 4138 | 3714 | 2586 | 2069 | 1857 | 1592 | 1393 | 1238 | 1035 | 940 | 828 |
| | | | | | FEED | 245 | 350 | 401 | 430 | 460 | 476 | 521 | 498 | 458 | 429 | 396 | 364 | 316 | 301 |
| | 7 | | 0.1D | 1.5D | Vc | 40 | 40 | 45 | 45 | 50 | 50 | 50 | 55 | 50 | 50 | 50 | 50 | 45 | 50 |
| | | | | | fz | 0.007 | 0.014 | 0.021 | 0.028 | 0.032 | 0.046 | 0.059 | 0.066 | 0.08 | 0.085 | 0.087 | 0.088 | 0.094 | 0.091 |
| | | | | | RPM | 6366 | 4244 | 3581 | 2865 | 2653 | 1989 | 1592 | 1459 | 1137 | 995 | 884 | 796 | 651 | 637 |
| | | | | | FEED | 178 | 238 | 301 | 321 | 340 | 366 | 376 | 385 | 364 | 338 | 308 | 280 | 245 | 232 |
| | 8 | | 0.1D | 1.5D | Vc | 25 | 25 | 30 | 30 | 35 | 35 | 30 | 35 | 35 | 35 | 35 | 35 | 30 | 35 |
| | | | | | fz | 0.008 | 0.017 | 0.022 | 0.028 | 0.032 | 0.043 | 0.066 | 0.067 | 0.073 | 0.081 | 0.077 | 0.083 | 0.085 | 0.089 |
| | | | | | RPM | 3979 | 2653 | 2387 | 1910 | 1857 | 1393 | 955 | 928 | 796 | 696 | 619 | 557 | 434 | 446 |
| | | | | | FEED | 127 | 180 | 210 | 214 | 238 | 240 | 252 | 249 | 232 | 226 | 191 | 185 | 148 | 159 |
| | 9 | | 0.1D | 1.5D | Vc | 20 | 25 | 25 | 25 | 25 | 30 | 30 | 25 | 30 | 30 | 30 | 30 | 30 | 30 |
| | | | | | fz | 0.006 | 0.013 | 0.019 | 0.024 | 0.031 | 0.04 | 0.056 | 0.064 | 0.067 | 0.075 | 0.075 | 0.08 | 0.081 | 0.087 |
| | | | | | RPM | 3183 | 2653 | 1989 | 1592 | 1326 | 1194 | 955 | 663 | 682 | 597 | 531 | 477 | 434 | 382 |
| | | | | | FEED | 76 | 138 | 151 | 153 | 164 | 191 | 214 | 170 | 183 | 179 | 159 | 153 | 141 | 133 |
| | 10 | High alloyed steel, and tool steel | 0.1D | 1.5D | Vc | 55 | 55 | 60 | 65 | 70 | 65 | 65 | 70 | 70 | 70 | 70 | 65 | 65 | 65 |
| | | | | | fz | 0.007 | 0.015 | 0.021 | 0.026 | 0.031 | 0.046 | 0.063 | 0.067 | 0.072 | 0.077 | 0.08 | 0.088 | 0.084 | 0.091 |
| | | | | | RPM | 8754 | 5836 | 4775 | 4138 | 3714 | 2586 | 2069 | 1857 | 1592 | 1393 | 1238 | 1035 | 940 | 828 |
| | | | | | FEED | 245 | 350 | 401 | 430 | 460 | 476 | 521 | 498 | 458 | 429 | 396 | 364 | 316 | 301 |
| | 11.1 | | 0.1D | 1.5D | Vc | 25 | 25 | 30 | 30 | 35 | 35 | 30 | 35 | 35 | 35 | 35 | 35 | 30 | 35 |
| | | | | | fz | 0.008 | 0.017 | 0.022 | 0.028 | 0.032 | 0.043 | 0.066 | 0.067 | 0.073 | 0.081 | 0.077 | 0.083 | 0.085 | 0.089 |
| | | | | | RPM | 3979 | 2653 | 2387 | 1910 | 1857 | 1393 | 955 | 928 | 796 | 696 | 619 | 557 | 434 | 446 |
| | | | | | FEED | 127 | 180 | 210 | 214 | 238 | 240 | 252 | 249 | 232 | 226 | 191 | 185 | 148 | 159 |
| K | 15-20 | Grey cast iron Nodular cast iron Malleable cast iron | 0.1D | 1.5D | Vc | 55 | 55 | 60 | 65 | 70 | 65 | 65 | 70 | 70 | 70 | 70 | 65 | 65 | 65 |
| | | | | | fz | 0.007 | 0.015 | 0.021 | 0.026 | 0.031 | 0.046 | 0.063 | 0.067 | 0.072 | 0.077 | 0.08 | 0.088 | 0.084 | 0.091 |
| | | | | | RPM | 8754 | 5836 | 4775 | 4138 | 3714 | 2586 | 2069 | 1857 | 1592 | 1393 | 1238 | 1035 | 940 | 828 |
| | | | | | FEED | 245 | 350 | 401 | 430 | 460 | 476 | 521 | 498 | 458 | 429 | 396 | 364 | 316 | 301 |

※ The FEED, in long & extra long types, should be reduced by around 50%