

# HSS SUPER HARDENED END MILLS

Designed to provide excellent toughness and wear resistance, outperforming standard HSS end mills in terms of performance

◎ : Excellent ○ : Good

| ISO      | VDI 3323 | Material Description                      | Composition / Structure / Heat Treatment       |                     | HB       | HRc |    |   |   |  |
|----------|----------|-------------------------------------------|------------------------------------------------|---------------------|----------|-----|----|---|---|--|
| <b>P</b> | 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  | ○  | ○ | ○ |  |
| <b>M</b> | 12       | Stainless steel                           | Ferritic / Martensitic                         | Annealed            | 200      | 15  |    |   |   |  |
|          | 13       |                                           | Martensitic                                    | Quenched & Tempered | 240      | 23  |    |   |   |  |
|          | 14       |                                           | Austenitic                                     |                     | 180      | 10  |    |   |   |  |
| <b>K</b> | 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  |    |   |   |  |
| <b>N</b> | 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       | Non Metallic Materials                    | CuSn, lead-free copper and electrolytic copper |                     | 100      |     |    |   |   |  |
|          | 29       |                                           | Duroplastic, Fiber Reinforced Plastic          |                     |          |     |    |   |   |  |
|          | 30       |                                           | Rubber, Wood, etc.                             |                     |          |     |    |   |   |  |
| <b>S</b> | 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  |     |    |   |   |  |
| <b>H</b> | 38       | Hardened steel                            |                                                |                     | Hardened | 550 | 55 |   |   |  |
|          | 39       |                                           |                                                |                     | Hardened | 630 | 60 |   |   |  |
|          | 40       | Chilled Cast Iron                         | Cast                                           |                     | 400      | 42  |    |   |   |  |
|          | 41       | Hardened Cast Iron                        | Hardened                                       |                     | 550      | 55  |    |   |   |  |

**SERIES**
**FLUTE**
**HELIX ANGLE**
**CUTTING EDGE SHAPE**
**SIZE MIN**
**SIZE MAX**
**PAGE**
**ESH570  
EHC570**
**ESH571  
EHC571**
**ESH573  
EHC573**
**2**
**2**
**3**
 $\approx 30^\circ$ 
 $\approx 30^\circ$ 
 $\approx 30^\circ$ 

SQUARE

SQUARE

SQUARE

D2.0

D2.0

D2.0

D32.0

D32.0

D32.0

**6**
**7**
**8**

SHORT LENGTH

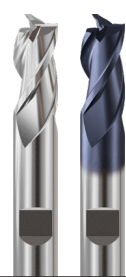
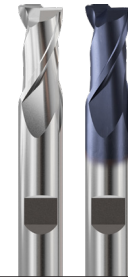
LONG LENGTH

SHORT LENGTH

Bright / TiAIN

Bright / TiAIN

Bright / TiAIN



Recommended cutting conditions : p.19~31

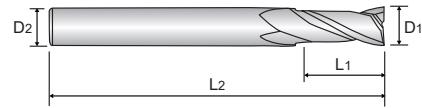
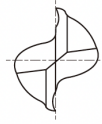


# SUPER HARDENED END MILLS



## HSS, 2 FLUTE HELIX SHORT LENGTH

► Designed to machine carbon steels, alloyed steels.



### Tolerances according to DIN 7160 & 7161

| Tolerance range in $\mu\text{m}$  |             |             |              |               |               |               |
|-----------------------------------|-------------|-------------|--------------|---------------|---------------|---------------|
| Nominal-Diameter in $\mu\text{m}$ |             |             |              |               |               |               |
|                                   | from 1 to 3 | over 3 to 6 | over 6 to 10 | over 10 to 18 | over 18 to 30 | over 30 to 50 |
| e8                                | -14<br>-28  | -20<br>-38  | -25<br>-47   | -32<br>-59    | -40<br>-73    | -50<br>-89    |
| h6                                | 0<br>-6     | 0<br>-8     | 0<br>-9      | 0<br>-11      | 0<br>-13      | 0<br>-16      |



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## ESH570 | EHC570 SERIES

Unit : mm

| EDP No.   |           | Mill Diameter | Shank Diameter | Length of Cut | Overall Length |
|-----------|-----------|---------------|----------------|---------------|----------------|
| Bright    | TiAlN     | D1            | D2             | L1            | L2             |
| ESH570020 | EHC570020 | 2.0           | 6              | 4             | 48             |
| ESH570030 | EHC570030 | 3.0           | 6              | 5             | 49             |
| ESH570040 | EHC570040 | 4.0           | 6              | 7             | 51             |
| ESH570050 | EHC570050 | 5.0           | 6              | 8             | 52             |
| ESH570060 | EHC570060 | 6.0           | 6              | 8             | 52             |
| ESH570070 | EHC570070 | 7.0           | 10             | 10            | 60             |
| ESH570080 | EHC570080 | 8.0           | 10             | 11            | 61             |
| ESH570090 | EHC570090 | 9.0           | 10             | 11            | 61             |
| ESH570100 | EHC570100 | 10.0          | 10             | 13            | 63             |
| ESH570110 | EHC570110 | 11.0          | 12             | 13            | 70             |
| ESH570120 | EHC570120 | 12.0          | 12             | 16            | 73             |
| ESH570130 | EHC570130 | 13.0          | 12             | 16            | 73             |
| ESH570140 | EHC570140 | 14.0          | 12             | 16            | 73             |
| ESH570150 | EHC570150 | 15.0          | 12             | 16            | 73             |
| ESH570160 | EHC570160 | 16.0          | 16             | 19            | 79             |
| ESH570170 | EHC570170 | 17.0          | 16             | 19            | 79             |
| ESH570180 | EHC570180 | 18.0          | 16             | 19            | 79             |
| ESH570190 | EHC570190 | 19.0          | 16             | 19            | 79             |
| ESH570200 | EHC570200 | 20.0          | 20             | 22            | 88             |
| ESH570210 | EHC570210 | 21.0          | 20             | 22            | 88             |
| ESH570220 | EHC570220 | 22.0          | 20             | 22            | 88             |
| ESH570230 | EHC570230 | 23.0          | 25             | 22            | 88             |
| ESH570240 | EHC570240 | 24.0          | 25             | 26            | 102            |
| ESH570250 | EHC570250 | 25.0          | 25             | 26            | 102            |
| ESH570280 | EHC570280 | 28.0          | 25             | 26            | 102            |
| ESH570300 | EHC570300 | 30.0          | 25             | 26            | 102            |
| ESH570320 | EHC570320 | 32.0          | 32             | 32            | 112            |