

**powerMILL**

**GÜHRING**

PROGRAMMA UNIVERSALE DI FRESE

Uniche per  
**PREZZO ED EFFICIENZA**



PM05

# powerMILL

Con il **PROGRAMMA POWERMILL** Gühring introduce una gamma completa di frese universali sul mercato che promettono ottime performance a prezzi convenienti.



Uniche per  
**PREZZO ED EFFICIENZA**



Uniche per  
***PREZZO ED EFFICIENZA***

Per ottenere un elevato volume di asportazione truciolo ed una lunga durata dell'utensile con le frese universali, sono state ottimizzate le geometrie dei taglienti di fresatura stabilite dalla Gühring. Oltre a queste correzioni, la maggior parte del **PROGRAMMA POWERMILL** è fornito con il collaudato rivestimento Fire.

Proprie geometrie sviluppate per le massime prestazioni!

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Alta precisione di affilatura su macchine appositamente sviluppate!

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Miglior metallo duro a grana fine come materiale da taglio!

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Un programma completo con un materiale universale

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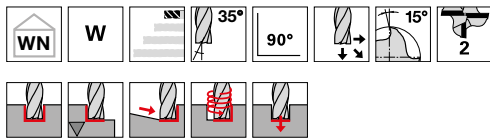
***powerMILL***



| P                                            | M | K | N | S | H | Descrizione degli utensili | Z | Impiego | Forma del codolo | Lunghezza | Materiale da taglio | Superficie     | d1/mm | Articolo n. | Dati di taglio pagina | Pagina |
|----------------------------------------------|---|---|---|---|---|----------------------------|---|---------|------------------|-----------|---------------------|----------------|-------|-------------|-----------------------|--------|
| Frese frontali per alluminio (a 2 taglienti) |   |   |   |   |   |                            |   |         |                  |           |                     |                |       |             |                       |        |
|                                              |   |   | • |   |   |                            | 2 |         | HA               | VHM       | ○                   | 2,000 - 20,000 | 19994 | 32          | 6                     |        |
|                                              |   |   | • |   |   |                            | 2 |         | HB               | VHM       | ○                   | 2,000 - 20,000 | 19995 | 32          | 6                     |        |
|                                              |   |   | • |   |   |                            | 2 |         | HA               | VHM       | ○                   | 2,000 - 20,000 | 19996 | 32          | 7                     |        |
|                                              |   |   | • |   |   |                            | 2 |         | HB               | VHM       | ○                   | 2,000 - 20,000 | 19997 | 32          | 7                     |        |
| Frese frontali (a 3 taglienti)               |   |   |   |   |   |                            |   |         |                  |           |                     |                |       |             |                       |        |
|                                              | ○ |   | • | ○ |   |                            | 3 |         | HA               | VHM       | ○                   | 2,000 - 20,000 | 19992 | 32          | 8                     |        |
|                                              | ○ |   | • | ○ |   |                            | 3 |         | HB               | VHM       | ○                   | 2,000 - 20,000 | 19993 | 32          | 8                     |        |
| Frese frontali (a 2 taglienti)               |   |   |   |   |   |                            |   |         |                  |           |                     |                |       |             |                       |        |
| •                                            | • | • | ○ | • |   |                            | 2 |         | HA               | VHM       | F                   | 2,000 - 20,000 | 19988 | 32          | 9                     |        |
| •                                            | • | • | ○ | • |   |                            | 2 |         | HB               | VHM       | F                   | 2,000 - 20,000 | 19989 | 32          | 9                     |        |
| •                                            | • | • | ○ | • |   |                            | 2 |         | Cyl              | VHM       | A                   | 2,000 - 20,000 | 19962 | 32          | 10                    |        |
| •                                            | • | • | ○ | • |   |                            | 2 |         | HA               | VHM       | F                   | 3,000 - 20,000 | 19990 | 32          | 11                    |        |
| •                                            | • | • | ○ | • |   |                            | 2 |         | HB               | VHM       | F                   | 3,000 - 20,000 | 19991 | 32          | 11                    |        |
| Frese frontali (a 3 taglienti)               |   |   |   |   |   |                            |   |         |                  |           |                     |                |       |             |                       |        |
| •                                            | • | • | ○ | • |   |                            | 3 |         | -HA              | VHM       | F                   | 2,000 - 20,000 | 19986 | 32          | 12                    |        |
| •                                            | • | • | ○ | • |   |                            | 3 |         | -HB              | VHM       | F                   | 2,000 - 20,000 | 19987 | 32          | 12                    |        |
| •                                            | • | • | ○ | • |   |                            | 3 |         | -HA              | VHM       | F                   | 2,000 - 20,000 | 19982 | 32          | 13                    |        |
| •                                            | • | • | ○ | • |   |                            | 3 |         | HB               | VHM       | F                   | 2,000 - 20,000 | 19983 | 32          | 13                    |        |
| •                                            | • | • | ○ | • |   |                            | 3 |         | Cyl              | VHM       | A                   | 2,000 - 20,000 | 19963 | 32          | 14                    |        |
| •                                            | • | • | ○ | • |   |                            | 3 |         | HA               | VHM       | F                   | 3,000 - 20,000 | 19984 | 32          | 15                    |        |
| •                                            | • | • | ○ | • |   |                            | 3 |         | HB               | VHM       | F                   | 3,000 - 20,000 | 19985 | 32          | 15                    |        |
| HPC Frese frontali (a 4 taglienti)           |   |   |   |   |   |                            |   |         |                  |           |                     |                |       |             |                       |        |
| •                                            | • | • | ○ | • | ○ |                            | 4 |         | HA               | VHM       | F                   | 3,000 - 20,000 | 19980 | 32          | 16                    |        |
| •                                            | • | • | ○ | • | ○ |                            | 4 |         | HB               | VHM       | F                   | 3,000 - 20,000 | 19981 | 32          | 16                    |        |
| •                                            | • | • | ○ | • | ○ |                            | 4 |         | HA               | VHM       | F                   | 3,000 - 20,000 | 19940 | 32          | 17                    |        |

| P                                                     | M | K | N | S | H | Descrizione degli utensili | Z   | Impiego | Forma del codolo | Lunghezza da taglio | Materiale da taglio | Superficie | d1/mm          | Articolo n. | Dati di taglio pagina | Pagina |
|-------------------------------------------------------|---|---|---|---|---|----------------------------|-----|---------|------------------|---------------------|---------------------|------------|----------------|-------------|-----------------------|--------|
| <b>HPC Frese frontali (a 4 taglienti)</b>             |   |   |   |   |   |                            |     |         |                  |                     |                     |            |                |             |                       |        |
| •                                                     | • | • | • | • | • |                            | 4   |         |                  | HB                  | VHM                 | F          | 3,000 - 20,000 | 19941       | 32                    | 17     |
| •                                                     | • | • | • | • | • |                            | 4   |         |                  | -HA                 | VHM                 | P          | 3,000 - 20,000 | 19950       | 32                    | 18     |
| •                                                     | • | • | • | • | • |                            | 4   |         |                  | -HA                 | VHM                 | P          | 3,000 - 20,000 | 19951       | 32                    | 19     |
| <b>Frese frontali (a 4 taglienti)</b>                 |   |   |   |   |   |                            |     |         |                  |                     |                     |            |                |             |                       |        |
| •                                                     | • | • | • | • | • |                            | 4   |         |                  | HA                  | VHM                 | F          | 2,000 - 20,000 | 19978       | 32                    | 21     |
| •                                                     | • | • | • | • | • |                            | 4   |         |                  | HB                  | VHM                 | F          | 2,000 - 20,000 | 19979       | 32                    | 21     |
| •                                                     | • | • | • | • | • |                            | 4   |         |                  | Cyl                 | VHM                 | A          | 2,000 - 20,000 | 19961       | 32                    | 22     |
| •                                                     | • | • | • | • | • |                            | 4   |         |                  | HA                  | VHM                 | F          | 3,000 - 20,000 | 19976       | 32                    | 23     |
| •                                                     | • | • | • | • | • |                            | 4   |         |                  | HB                  | VHM                 | F          | 3,000 - 20,000 | 19977       | 32                    | 23     |
| <b>Frese frontali a più taglienti (a 6 taglienti)</b> |   |   |   |   |   |                            |     |         |                  |                     |                     |            |                |             |                       |        |
| •                                                     | • | • | • | • | • |                            | 6   |         |                  | HA                  | VHM                 | F          | 3,000 - 20,000 | 19972       | 32                    | 24     |
| •                                                     | • | • | • | • | • |                            | 6   |         |                  | HB                  | VHM                 | F          | 3,000 - 20,000 | 19973       | 32                    | 24     |
| •                                                     | • | • | • | • | • |                            | 6   |         |                  | HA                  | VHM                 | F          | 4,000 - 20,000 | 19974       | 32                    | 25     |
| •                                                     | • | • | • | • | • |                            | 6   |         |                  | HB                  | VHM                 | F          | 4,000 - 20,000 | 19975       | 32                    | 25     |
| <b>Frese sferiche (a 2 taglienti)</b>                 |   |   |   |   |   |                            |     |         |                  |                     |                     |            |                |             |                       |        |
| •                                                     | • | • | • | • | • |                            | 2   |         |                  | HA                  | VHM                 | F          | 2,000 - 20,000 | 19968       | 32                    | 26     |
| •                                                     | • | • | • | • | • |                            | 2   |         |                  | HB                  | VHM                 | F          | 2,000 - 20,000 | 19969       | 32                    | 26     |
| •                                                     | • | • | • | • | • |                            | 2   |         |                  | HA                  | VHM                 | F          | 3,000 - 12,000 | 19970       | 32                    | 27     |
| •                                                     | • | • | • | • | • |                            | 2   |         |                  | HB                  | VHM                 | F          | 3,000 - 12,000 | 19971       | 32                    | 27     |
| <b>Frese di sgrossatura (dentatura fine)</b>          |   |   |   |   |   |                            |     |         |                  |                     |                     |            |                |             |                       |        |
| •                                                     | • | • | • | • | • |                            | 3-4 |         |                  | HA                  | VHM                 | F          | 4,000 - 20,000 | 19964       | 32                    | 28     |
| •                                                     | • | • | • | • | • |                            | 3-4 |         |                  | HB                  | VHM                 | F          | 4,000 - 20,000 | 19965       | 32                    | 28     |
| •                                                     | • | • | • | • | • |                            | 3-5 |         |                  | HA                  | VHM                 | F          | 5,000 - 25,000 | 19966       | 32                    | 29     |
| •                                                     | • | • | • | • | • |                            | 3-5 |         |                  | HB                  | VHM                 | F          | 5,000 - 25,000 | 19967       | 32                    | 29     |

**Frese frontali per alluminio (a 2 taglienti)**



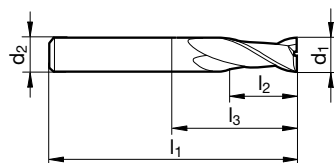
|   |   |
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| M |   |
| K |   |
| N | • |
| S |   |
| H |   |

**GÜHRING NAVIGATOR**

Dati di taglio a pag. 32

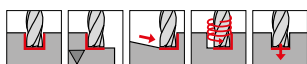
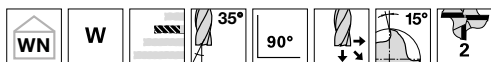
- tagliente al centro
- con speciale parte anteriore per foratura

|                     |     |    |
|---------------------|-----|----|
| Materiale da taglio | MDI |    |
| Superficie          | ○   | ○  |
| Tipo                | W   | W  |
| Forma del codolo    | HA  | HB |



|        |        |        |        |        |   |        | Articolo n.      | 19994 | 19995 |
|--------|--------|--------|--------|--------|---|--------|------------------|-------|-------|
|        |        |        |        |        |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1     | l2     | l3     | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm     | mm     | mm     |   |        |                  |       |       |
| 2,000  | 4,000  | 40,000 | 3,000  | 6,400  | 2 | 2,000  | •                |       |       |
| 3,000  | 4,000  | 40,000 | 4,000  | 8,900  | 2 | 3,000  | •                |       |       |
| 4,000  | 6,000  | 50,000 | 5,000  | 10,400 | 2 | 4,000  | •                | •     |       |
| 5,000  | 6,000  | 50,000 | 6,000  | 12,900 | 2 | 5,000  | •                | •     |       |
| 6,000  | 6,000  | 50,000 | 7,000  | 14,000 | 2 | 6,000  | •                | •     |       |
| 8,000  | 8,000  | 58,000 | 9,000  | 22,000 | 2 | 8,000  | •                | •     |       |
| 10,000 | 10,000 | 66,000 | 11,000 | 26,000 | 2 | 10,000 | •                | •     |       |
| 12,000 | 12,000 | 73,000 | 12,000 | 28,000 | 2 | 12,000 | •                | •     |       |
| 14,000 | 14,000 | 75,000 | 14,000 | 30,000 | 2 | 14,000 | •                | •     |       |
| 16,000 | 16,000 | 82,000 | 16,000 | 34,000 | 2 | 16,000 | •                | •     |       |
| 18,000 | 18,000 | 84,000 | 18,000 | 36,000 | 2 | 18,000 | •                | •     |       |
| 20,000 | 20,000 | 92,000 | 20,000 | 42,000 | 2 | 20,000 | •                | •     |       |

Frese frontali per alluminio (a 2 taglienti)



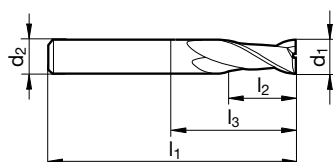
|   |   |
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| P |   |
| M |   |
| K |   |
| N | • |
| S |   |
| H |   |

**GÜHRING NAVIGATOR**

Dati di taglio a pag. 32

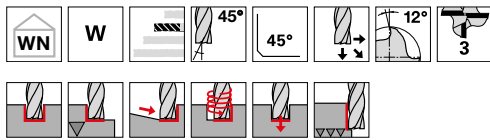
- tagliente al centro
- con speciale parte anteriore per foratura

|                     |     |    |
|---------------------|-----|----|
| Materiale da taglio | MDI |    |
| Superficie          | ○   | ○  |
| Tipo                | W   | W  |
| Forma del codolo    | HA  | HB |



|        |        |         |        |        |   |        | Articolo n.      | 19996 | 19997 |
|--------|--------|---------|--------|--------|---|--------|------------------|-------|-------|
|        |        |         |        |        |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     |   |        |                  |       |       |
| 2,000  | 4,000  | 40,000  | 7,000  | 10,400 | 2 | 2,000  | •                |       |       |
| 3,000  | 4,000  | 50,000  | 9,000  | 13,900 | 2 | 3,000  | •                |       |       |
| 4,000  | 6,000  | 57,000  | 11,000 | 16,400 | 2 | 4,000  | •                | •     |       |
| 5,000  | 6,000  | 57,000  | 13,000 | 19,900 | 2 | 5,000  | •                | •     |       |
| 6,000  | 6,000  | 57,000  | 13,000 | 21,000 | 2 | 6,000  | •                | •     |       |
| 8,000  | 8,000  | 63,000  | 19,000 | 28,000 | 2 | 8,000  | •                | •     |       |
| 10,000 | 10,000 | 72,000  | 22,000 | 33,000 | 2 | 10,000 | •                | •     |       |
| 12,000 | 12,000 | 83,000  | 26,000 | 40,000 | 2 | 12,000 | •                | •     |       |
| 14,000 | 14,000 | 83,000  | 26,000 | 41,000 | 2 | 14,000 | •                | •     |       |
| 16,000 | 16,000 | 92,000  | 32,000 | 49,000 | 2 | 16,000 | •                | •     |       |
| 18,000 | 18,000 | 92,000  | 32,000 | 50,000 | 2 | 18,000 | •                | •     |       |
| 20,000 | 20,000 | 104,000 | 38,000 | 58,000 | 2 | 20,000 | •                | •     |       |

**Frese frontali (a 3 taglienti)**



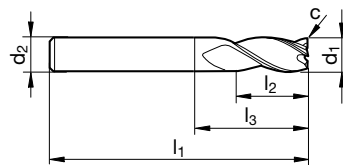
|   |   |
|---|---|
| P |   |
| M | ○ |
| K |   |
| N | ● |
| S | ○ |
| H |   |

**GÜHRING NAVIGATOR**

Dati di taglio a pag. 32

- frese ad alte prestazioni con elevato angolo di elica per il taglio particolarmente morbido
- tagliente al centro
- con speciale parte anteriore per foratura

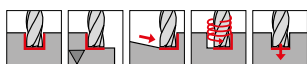
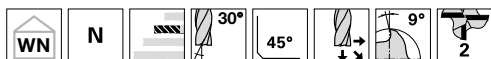
|                     |     |    |
|---------------------|-----|----|
| Materiale da taglio | MDI |    |
| Superficie          | ○   | ○  |
| Tipo                | W   | W  |
| Forma del codolo    | HA  | HB |



|        |        |         |        |        |          |   |        | Articolo n.      | 19992 | 19993 |
|--------|--------|---------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |         |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 2,000  | 4,000  | 50,000  | 6,000  | 8,900  | 0,030    | 3 | 2,000  | ●                |       |       |
| 3,000  | 6,000  | 57,000  | 8,000  | 11,900 | 0,050    | 3 | 3,000  | ●                | ●     |       |
| 4,000  | 6,000  | 57,000  | 11,000 | 14,900 | 0,060    | 3 | 4,000  | ●                | ●     |       |
| 5,000  | 6,000  | 57,000  | 13,000 | 18,400 | 0,080    | 3 | 5,000  | ●                | ●     |       |
| 6,000  | 6,000  | 57,000  | 13,000 | 21,000 | 0,090    | 3 | 6,000  | ●                | ●     |       |
| 8,000  | 8,000  | 63,000  | 19,000 | 27,000 | 0,120    | 3 | 8,000  | ●                | ●     |       |
| 10,000 | 10,000 | 72,000  | 22,000 | 32,000 | 0,150    | 3 | 10,000 | ●                | ●     |       |
| 12,000 | 12,000 | 83,000  | 26,000 | 38,000 | 0,180    | 3 | 12,000 | ●                | ●     |       |
| 14,000 | 14,000 | 83,000  | 26,000 | 38,000 | 0,210    | 3 | 14,000 | ●                | ●     |       |
| 16,000 | 16,000 | 92,000  | 32,000 | 44,000 | 0,190    | 3 | 16,000 | ●                | ●     |       |
| 20,000 | 20,000 | 104,000 | 38,000 | 54,000 | 0,240    | 3 | 20,000 | ●                | ●     |       |

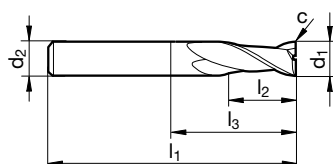


Frese frontali (a 2 taglienti)



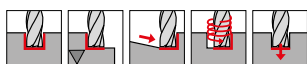
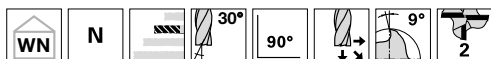
- P** • **GÜHRING NAVIGATOR**  
**M** • Dati di taglio a pag. 32  
**K** •  
**N** ○  
**S** •  
**H** •
- tagliente al centro
  - con speciale parte anteriore per foratura

|                     |          |          |
|---------------------|----------|----------|
| Materiale da taglio | MDI      |          |
| Superficie          | <b>F</b> | <b>F</b> |
| Tipo                | N        | N        |
| Forma del codolo    | HA       | HB       |



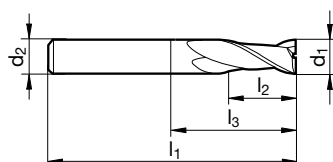
|        |        |         |        |        |          |   |        | Articolo n.      | 19988 | 19989 |
|--------|--------|---------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |         |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 2,000  | 4,000  | 40,000  | 6,000  | 9,000  | 0,020    | 2 | 2,000  | ●                |       |       |
| 3,000  | 4,000  | 50,000  | 8,000  | 12,500 | 0,030    | 2 | 3,000  | ●                |       |       |
| 4,000  | 6,000  | 50,000  | 11,000 | 16,400 | 0,040    | 2 | 4,000  | ●                | ●     |       |
| 5,000  | 6,000  | 50,000  | 13,000 | 19,900 | 0,050    | 2 | 5,000  | ●                | ●     |       |
| 6,000  | 6,000  | 50,000  | 13,000 | 20,000 | 0,060    | 2 | 6,000  | ●                | ●     |       |
| 7,000  | 8,000  | 60,000  | 16,000 | 23,000 | 0,070    | 2 | 7,000  | ●                | ●     |       |
| 8,000  | 8,000  | 60,000  | 19,000 | 27,000 | 0,080    | 2 | 8,000  | ●                | ●     |       |
| 9,000  | 10,000 | 70,000  | 19,000 | 29,000 | 0,090    | 2 | 9,000  | ●                | ●     |       |
| 10,000 | 10,000 | 70,000  | 22,000 | 30,000 | 0,100    | 2 | 10,000 | ●                | ●     |       |
| 11,000 | 12,000 | 75,000  | 22,000 | 29,000 | 0,110    | 2 | 11,000 | ●                | ●     |       |
| 12,000 | 12,000 | 75,000  | 26,000 | 39,000 | 0,120    | 2 | 12,000 | ●                | ●     |       |
| 14,000 | 14,000 | 75,000  | 26,000 | 40,000 | 0,140    | 2 | 14,000 | ●                | ●     |       |
| 16,000 | 16,000 | 75,000  | 26,000 | 43,000 | 0,160    | 2 | 16,000 | ●                | ●     |       |
| 18,000 | 18,000 | 100,000 | 32,000 | 52,000 | 0,180    | 2 | 18,000 | ●                | ●     |       |
| 20,000 | 20,000 | 100,000 | 32,000 | 50,000 | 0,200    | 2 | 20,000 | ●                | ●     |       |

Frese frontali (a 2 taglienti)



**P** • **GÜHRING NAVIGATOR**  
**M** • Dati di taglio a pag. 32  
**K** •  
**N** ○  
**S** •  
**H** • tagliente al centro

|                     |            |
|---------------------|------------|
| Materiale da taglio | <b>MDI</b> |
| Superficie          | <b>A</b>   |
| Tipo                | N          |
| Forma del codolo    | cil.       |

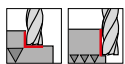
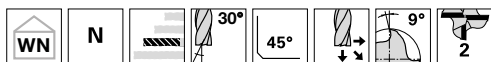


Articolo n. **19962**

Gruppo di sconto **206**

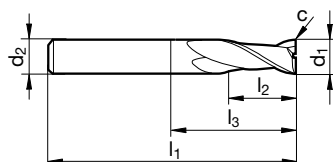
| d1 h8<br>mm | d2 h6<br>mm | l1<br>mm | l2<br>mm | l3<br>mm | Z | Codice | Disponibilità |
|-------------|-------------|----------|----------|----------|---|--------|---------------|
| 2,000       | 4,000       | 40,000   | 6,000    | 9,400    | 2 | 2,000  | ●             |
| 3,000       | 6,000       | 45,000   | 8,000    | 12,900   | 2 | 3,000  | ●             |
| 4,000       | 6,000       | 45,000   | 11,000   | 16,400   | 2 | 4,000  | ●             |
| 5,000       | 6,000       | 50,000   | 13,000   | 19,900   | 2 | 5,000  | ●             |
| 6,000       | 6,000       | 50,000   | 13,000   | 20,000   | 2 | 6,000  | ●             |
| 8,000       | 8,000       | 60,000   | 19,000   | 27,000   | 2 | 8,000  | ●             |
| 10,000      | 10,000      | 70,000   | 22,000   | 32,000   | 2 | 10,000 | ●             |
| 12,000      | 12,000      | 75,000   | 26,000   | 39,000   | 2 | 12,000 | ●             |
| 16,000      | 16,000      | 75,000   | 32,000   | 48,000   | 2 | 16,000 | ●             |
| 20,000      | 20,000      | 100,000  | 40,000   | 59,000   | 2 | 20,000 | ●             |

**Frese frontali XL (a 2 taglienti)**



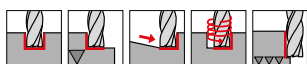
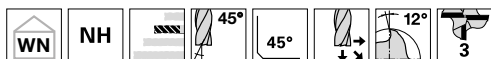
- |          |   |                          |
|----------|---|--------------------------|
| <b>P</b> | • | <b>GÜHRING NAVIGATOR</b> |
| <b>M</b> | • |                          |
| <b>K</b> | • |                          |
| <b>N</b> | ○ |                          |
| <b>S</b> | • |                          |
| <b>H</b> | • |                          |
- Dati di taglio a pag. 32
- tagliente al centro
  - con speciale parte anteriore per foratura

|                     |            |          |
|---------------------|------------|----------|
| Materiale da taglio | <b>MDI</b> |          |
| Superficie          | <b>F</b>   | <b>F</b> |
| Tipo                | N          | N        |
| Forma del codolo    | HA         | HB       |



|        |        |         |        |        |          |   |        | Articolo n.      | 19990 | 19991 |
|--------|--------|---------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |         |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 3,000  | 3,000  | 60,000  | 20,000 | 32,000 | 0,030    | 2 | 3,000  | •                |       |       |
| 4,000  | 4,000  | 60,000  | 20,000 | 32,000 | 0,040    | 2 | 4,000  | •                |       |       |
| 5,000  | 5,000  | 75,000  | 25,000 | 47,000 | 0,050    | 2 | 5,000  | •                |       |       |
| 6,000  | 6,000  | 75,000  | 30,000 | 39,000 | 0,060    | 2 | 6,000  | •                | •     |       |
| 8,000  | 8,000  | 75,000  | 30,000 | 39,000 | 0,080    | 2 | 8,000  | •                | •     |       |
| 10,000 | 10,000 | 100,000 | 40,000 | 60,000 | 0,100    | 2 | 10,000 | •                | •     |       |
| 12,000 | 12,000 | 100,000 | 45,000 | 55,000 | 0,120    | 2 | 12,000 | •                | •     |       |
| 14,000 | 14,000 | 100,000 | 45,000 | 55,000 | 0,140    | 2 | 14,000 | •                | •     |       |
| 16,000 | 16,000 | 100,000 | 45,000 | 62,000 | 0,160    | 2 | 16,000 | •                | •     |       |
| 18,000 | 18,000 | 100,000 | 45,000 | 63,000 | 0,180    | 2 | 18,000 | •                | •     |       |
| 20,000 | 20,000 | 100,000 | 45,000 | 62,000 | 0,200    | 2 | 20,000 | •                | •     |       |

**Frese frontali (a 3 taglienti)**



**P** • **GÜHRING NAVIGATOR**

**M** • Dati di taglio a pag. 32

**K** •

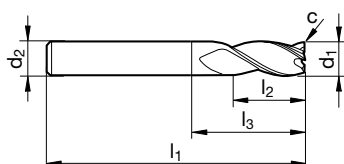
**N** ○

**S** •

**H**

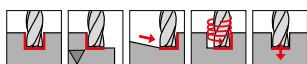
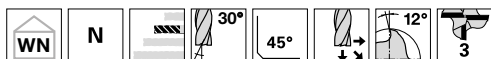
- frese ad alte prestazioni con elevato angolo di elica per il taglio particolarmente morbido
- tagliente al centro
- con speciale parte anteriore per foratura

|                     |     |     |
|---------------------|-----|-----|
| Materiale da taglio | MDI |     |
| Superficie          | ⓔ   | ⓔ   |
| Tipo                | NH  | NH  |
| Forma del codolo    | ~HA | ~HB |



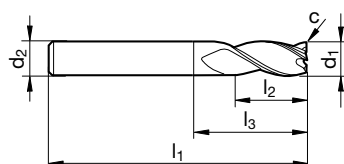
|        |        |         |        |        |          |   |        | Articolo n.      | 19986 | 19987 |
|--------|--------|---------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |         |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 2,000  | 4,000  | 50,000  | 6,000  | 8,900  | 0,030    | 3 | 2,000  | ●                |       |       |
| 3,000  | 6,000  | 57,000  | 8,000  | 11,900 | 0,050    | 3 | 3,000  | ●                | ●     |       |
| 4,000  | 6,000  | 57,000  | 11,000 | 14,900 | 0,060    | 3 | 4,000  | ●                | ●     |       |
| 5,000  | 6,000  | 57,000  | 13,000 | 18,400 | 0,080    | 3 | 5,000  | ●                | ●     |       |
| 6,000  | 6,000  | 57,000  | 13,000 | 21,000 | 0,090    | 3 | 6,000  | ●                | ●     |       |
| 8,000  | 8,000  | 63,000  | 19,000 | 27,000 | 0,120    | 3 | 8,000  | ●                | ●     |       |
| 10,000 | 10,000 | 72,000  | 22,000 | 32,000 | 0,150    | 3 | 10,000 | ●                | ●     |       |
| 12,000 | 12,000 | 83,000  | 26,000 | 38,000 | 0,180    | 3 | 12,000 | ●                | ●     |       |
| 14,000 | 14,000 | 83,000  | 26,000 | 38,000 | 0,210    | 3 | 14,000 | ●                | ●     |       |
| 16,000 | 16,000 | 92,000  | 32,000 | 44,000 | 0,240    | 3 | 16,000 | ●                | ●     |       |
| 20,000 | 20,000 | 104,000 | 38,000 | 54,000 | 0,300    | 3 | 20,000 | ●                | ●     |       |

**Frese frontali (a 3 taglienti)**



- GÜHRING NAVIGATOR**
- P** •
  - M** • Dati di taglio a pag. 32
  - K** •
  - N** ○
  - S** •
  - H** •
- tagliente al centro
  - con speciale parte anteriore per foratura

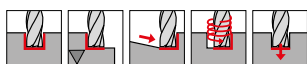
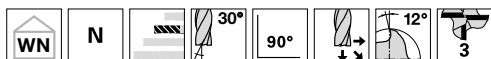
|                     |            |          |
|---------------------|------------|----------|
| Materiale da taglio | <b>MDI</b> |          |
| Superficie          | <b>F</b>   | <b>F</b> |
| Tipo                | N          | N        |
| Forma del codolo    | ~HA        | HB       |



|        |        |         |        |        |          |   |        | Articolo n.      | 19982 | 19983 |
|--------|--------|---------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |         |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 2,000  | 4,000  | 50,000  | 6,000  | 9,400  | 0,030    | 3 | 2,000  | ●                |       |       |
| 3,000  | 6,000  | 57,000  | 8,000  | 12,900 | 0,050    | 3 | 3,000  | ●                | ●     |       |
| 4,000  | 6,000  | 57,000  | 11,000 | 16,400 | 0,060    | 3 | 4,000  | ●                | ●     |       |
| 5,000  | 6,000  | 57,000  | 13,000 | 19,900 | 0,080    | 3 | 5,000  | ●                | ●     |       |
| 6,000  | 6,000  | 57,000  | 13,000 | 21,000 | 0,090    | 3 | 6,000  | ●                | ●     |       |
| 8,000  | 8,000  | 63,000  | 19,000 | 27,000 | 0,120    | 3 | 8,000  | ●                | ●     |       |
| 10,000 | 10,000 | 72,000  | 22,000 | 32,000 | 0,150    | 3 | 10,000 | ●                | ●     |       |
| 12,000 | 12,000 | 83,000  | 26,000 | 38,000 | 0,180    | 3 | 12,000 | ●                | ●     |       |
| 14,000 | 14,000 | 83,000  | 26,000 | 38,000 | 0,210    | 3 | 14,000 | ●                | ●     |       |
| 16,000 | 16,000 | 92,000  | 32,000 | 44,000 | 0,190    | 3 | 16,000 | ●                | ●     |       |
| 20,000 | 20,000 | 104,000 | 38,000 | 54,000 | 0,240    | 3 | 20,000 | ●                | ●     |       |

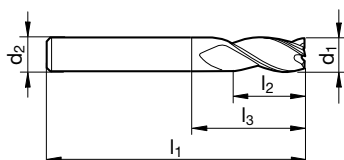


**Frese frontali (a 3 taglienti)**



- |          |   |                                                                                                                              |
|----------|---|------------------------------------------------------------------------------------------------------------------------------|
| <b>P</b> | • | <b>GÜHRING NAVIGATOR</b>                                                                                                     |
| <b>M</b> | • |                                                                                                                              |
| <b>K</b> | • |                                                                                                                              |
| <b>N</b> | ○ |                                                                                                                              |
| <b>S</b> | • |                                                                                                                              |
| <b>H</b> |   | <ul style="list-style-type: none"> <li>• tagliente al centro</li> <li>• con speciale parte anteriore per foratura</li> </ul> |
- Dati di taglio a pag. 32

|                     |            |
|---------------------|------------|
| Materiale da taglio | <b>MDI</b> |
| Superficie          | <b>A</b>   |
| Tipo                | N          |
| Forma del codolo    | cil.       |

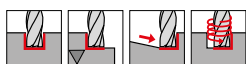
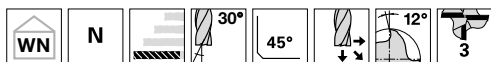


Articolo n. **19963**

Gruppo di sconto **206**

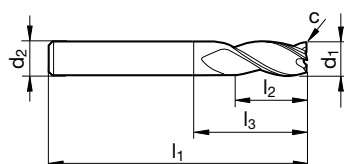
| d1 h8<br>mm | d2 h6<br>mm | l1<br>mm | l2<br>mm | l3<br>mm | Z | Codice | Disponibilità |
|-------------|-------------|----------|----------|----------|---|--------|---------------|
| 2,000       | 4,000       | 40,000   | 6,000    | 9,400    | 3 | 2,000  | ●             |
| 3,000       | 6,000       | 45,000   | 8,000    | 12,900   | 3 | 3,000  | ●             |
| 4,000       | 6,000       | 45,000   | 11,000   | 16,400   | 3 | 4,000  | ●             |
| 5,000       | 6,000       | 50,000   | 13,000   | 19,900   | 3 | 5,000  | ●             |
| 6,000       | 6,000       | 50,000   | 13,000   | 19,000   | 3 | 6,000  | ●             |
| 8,000       | 8,000       | 60,000   | 19,000   | 25,500   | 3 | 8,000  | ●             |
| 10,000      | 10,000      | 70,000   | 22,000   | 30,000   | 3 | 10,000 | ●             |
| 12,000      | 12,000      | 75,000   | 26,000   | 36,000   | 3 | 12,000 | ●             |
| 16,000      | 16,000      | 75,000   | 32,000   | 44,000   | 3 | 16,000 | ●             |
| 20,000      | 20,000      | 100,000  | 40,000   | 54,000   | 3 | 20,000 | ●             |

**Frese frontali XL (a 3 taglienti)**



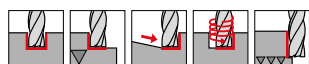
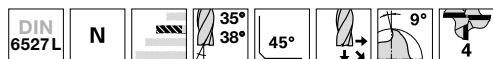
- P** • **GÜHRING NAVIGATOR**  
**M** • Dati di taglio a pag. 32  
**K** •  
**N** ○  
**S** •  
**H** •
- tagliente al centro
  - con speciale parte anteriore per foratura

|                     |          |          |
|---------------------|----------|----------|
| Materiale da taglio | MDI      |          |
| Superficie          | <b>F</b> | <b>F</b> |
| Tipo                | N        | N        |
| Forma del codolo    | HA       | HB       |



|        |        |         |        |        |          |   |        | Articolo n.      | 19984 | 19985 |
|--------|--------|---------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |         |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 3,000  | 6,000  | 57,000  | 12,000 | 16,900 | 0,050    | 3 | 3,000  | •                | •     |       |
| 4,000  | 6,000  | 63,000  | 19,000 | 24,400 | 0,060    | 3 | 4,000  | •                | •     |       |
| 5,000  | 6,000  | 68,000  | 24,000 | 30,900 | 0,080    | 3 | 5,000  | •                | •     |       |
| 6,000  | 6,000  | 72,000  | 24,000 | 36,000 | 0,090    | 3 | 6,000  | •                | •     |       |
| 8,000  | 8,000  | 88,000  | 38,000 | 52,000 | 0,120    | 3 | 8,000  | •                | •     |       |
| 10,000 | 10,000 | 95,000  | 45,000 | 55,000 | 0,150    | 3 | 10,000 | •                | •     |       |
| 12,000 | 12,000 | 110,000 | 53,000 | 65,000 | 0,180    | 3 | 12,000 | •                | •     |       |
| 14,000 | 14,000 | 110,000 | 53,000 | 65,000 | 0,210    | 3 | 14,000 | •                | •     |       |
| 16,000 | 16,000 | 125,000 | 63,000 | 80,000 | 0,190    | 3 | 16,000 | •                | •     |       |
| 20,000 | 20,000 | 141,000 | 75,000 | 95,000 | 0,240    | 3 | 20,000 | •                | •     |       |

**HPC Frese frontali (a 4 taglienti)**



**P** • **GUHRING NAVIGATOR**

**M** • Dati di taglio a pag. 32

**K** •

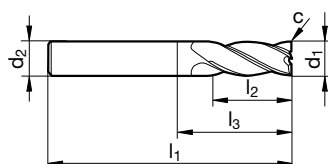
**N** ○

**S** •

**H** ○

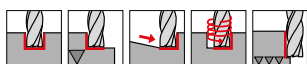
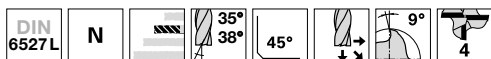
- frese ad alte prestazioni con angolo d'elica variabile
- tagliente al centro

|                     |          |          |
|---------------------|----------|----------|
| Materiale da taglio | MDI      |          |
| Superficie          | <b>F</b> | <b>F</b> |
| Tipo                | N        | N        |
| Forma del codolo    | HA       | HB       |



|        |        |         |        |        |          |   |        | Articolo n.      | 19980 | 19981 |
|--------|--------|---------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |         |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 3,000  | 6,000  | 57,000  | 8,000  | 11,400 | 0,060    | 4 | 3,000  | ●                | ●     |       |
| 4,000  | 6,000  | 57,000  | 11,000 | 14,900 | 0,080    | 4 | 4,000  | ●                | ●     |       |
| 5,000  | 6,000  | 57,000  | 13,000 | 17,400 | 0,100    | 4 | 5,000  | ●                | ●     |       |
| 6,000  | 6,000  | 57,000  | 13,000 | 21,000 | 0,120    | 4 | 6,000  | ●                | ●     |       |
| 8,000  | 8,000  | 63,000  | 19,000 | 27,000 | 0,160    | 4 | 8,000  | ●                | ●     |       |
| 10,000 | 10,000 | 72,000  | 22,000 | 32,000 | 0,200    | 4 | 10,000 | ●                | ●     |       |
| 12,000 | 12,000 | 83,000  | 26,000 | 38,000 | 0,240    | 4 | 12,000 | ●                | ●     |       |
| 14,000 | 14,000 | 83,000  | 26,000 | 38,000 | 0,280    | 4 | 14,000 | ●                | ●     |       |
| 16,000 | 16,000 | 92,000  | 32,000 | 44,000 | 0,320    | 4 | 16,000 | ●                | ●     |       |
| 20,000 | 20,000 | 104,000 | 38,000 | 54,000 | 0,400    | 4 | 20,000 | ●                | ●     |       |

HPC Frese frontali (a 4 taglienti)



**P** • **GUHRING NAVIGATOR**

**M** • Dati di taglio a pag. 32

**K** •

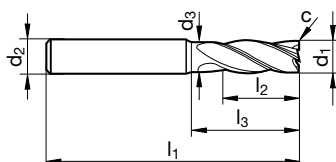
**N** ○

**S** •

**H** ○

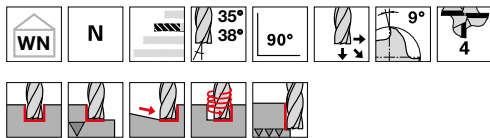
- frese ad alte prestazioni con angolo d'elica variabile
- rettifica della spoglia
- tagliente al centro

|                     |     |    |
|---------------------|-----|----|
| Materiale da taglio | MDI |    |
| Superficie          | F   | F  |
| Tipo                | N   | N  |
| Forma del codolo    | HA  | HB |



|        |        |        |         |        |          |       |   |        | Articolo n.      | 19940 | 19941 |
|--------|--------|--------|---------|--------|----------|-------|---|--------|------------------|-------|-------|
|        |        |        |         |        |          |       |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | d3     | l1      | l2     | l3       | c     | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm     | mm      | mm     | mm x 45° | mm    |   |        |                  |       |       |
| 3,000  | 6,000  | 2,800  | 57,000  | 8,000  | 12,000   | 0,060 | 4 | 3,000  | ●                | ●     |       |
| 4,000  | 6,000  | 3,800  | 57,000  | 11,000 | 15,000   | 0,080 | 4 | 4,000  | ●                | ●     |       |
| 5,000  | 6,000  | 4,800  | 57,000  | 13,000 | 18,000   | 0,100 | 4 | 5,000  | ●                | ●     |       |
| 6,000  | 6,000  | 5,700  | 57,000  | 13,000 | 20,000   | 0,120 | 4 | 6,000  | ●                | ●     |       |
| 8,000  | 8,000  | 7,700  | 63,000  | 19,000 | 26,000   | 0,160 | 4 | 8,000  | ●                | ●     |       |
| 10,000 | 10,000 | 9,500  | 72,000  | 22,000 | 30,000   | 0,200 | 4 | 10,000 | ●                | ●     |       |
| 12,000 | 12,000 | 11,500 | 83,000  | 26,000 | 36,000   | 0,240 | 4 | 12,000 | ●                | ●     |       |
| 14,000 | 14,000 | 13,500 | 83,000  | 26,000 | 36,000   | 0,280 | 4 | 14,000 | ●                | ●     |       |
| 16,000 | 16,000 | 15,500 | 92,000  | 32,000 | 42,000   | 0,320 | 4 | 16,000 | ●                | ●     |       |
| 20,000 | 20,000 | 19,500 | 104,000 | 38,000 | 52,000   | 0,400 | 4 | 20,000 | ●                | ●     |       |

**HPC Frese frontali (a 4 taglienti)**



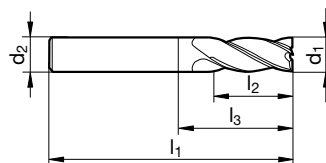
|   |   |
|---|---|
| P | • |
| M | • |
| K | • |
| N | ○ |
| S | • |
| H | ○ |

**GUHRING NAVIGATOR**

Dati di taglio a pag. 32

- frese ad alte prestazioni con angolo d'elica variabile
- tagliente al centro

|                     |            |
|---------------------|------------|
| Materiale da taglio | <b>MDI</b> |
| Superficie          | <b>P</b>   |
| Tipo                | N          |
| Forma del codolo    | ~HA        |



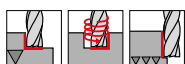
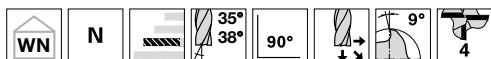
Articolo n. **19950**

Gruppo di sconto **206**

| d1 f8  | d2 h6  | l1      | l2     | l3     | Z | Codice | Disponibilità |
|--------|--------|---------|--------|--------|---|--------|---------------|
| mm     | mm     | mm      | mm     | mm     |   |        |               |
| 3,000  | 4,000  | 50,000  | 8,000  | 11,400 | 4 | 3,000  | •             |
| 4,000  | 4,000  | 50,000  | 11,000 | 18,000 | 4 | 4,000  | •             |
| 5,000  | 5,000  | 50,000  | 13,000 | 18,000 | 4 | 5,000  | •             |
| 6,000  | 6,000  | 50,000  | 15,000 | 20,000 | 4 | 6,000  | •             |
| 8,000  | 8,000  | 60,000  | 20,000 | 29,000 | 4 | 8,000  | •             |
| 10,000 | 10,000 | 70,000  | 27,000 | 34,000 | 4 | 10,000 | •             |
| 12,000 | 12,000 | 75,000  | 30,000 | 39,000 | 4 | 12,000 | •             |
| 14,000 | 14,000 | 75,000  | 30,000 | 39,000 | 4 | 14,000 | •             |
| 16,000 | 16,000 | 75,000  | 30,000 | 39,000 | 4 | 16,000 | •             |
| 20,000 | 20,000 | 100,000 | 40,000 | 54,000 | 4 | 20,000 | •             |



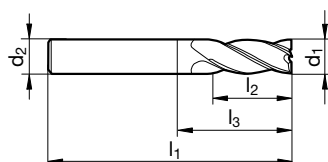
HPC Frese frontali (a 4 taglienti)



- |   |   |                                                                                                                                           |
|---|---|-------------------------------------------------------------------------------------------------------------------------------------------|
| P | • | <b>GUHRING NAVIGATOR</b>                                                                                                                  |
| M | • |                                                                                                                                           |
| K | • |                                                                                                                                           |
| N | ○ |                                                                                                                                           |
| S | • |                                                                                                                                           |
| H | ○ | <ul style="list-style-type: none"> <li>• frese ad alte prestazioni con angolo d'elica variabile</li> <li>• tagliente al centro</li> </ul> |

Dati di taglio a pag. 34

|                     |            |
|---------------------|------------|
| Materiale da taglio | <b>MDI</b> |
| Superficie          | <b>P</b>   |
| Tipo                | N          |
| Forma del codolo    | ~HA        |



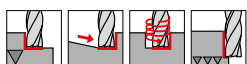
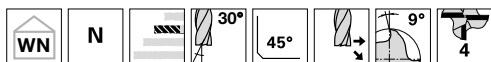
Articolo n. **19951**

Gruppo di sconto **206**

| d1 f8  | d2 h6  | l1      | l2     | l3     | Z | Codice | Disponibilità |
|--------|--------|---------|--------|--------|---|--------|---------------|
| mm     | mm     | mm      | mm     | mm     |   |        |               |
| 3,000  | 4,000  | 60,000  | 16,000 | 19,400 | 4 | 3,000  | •             |
| 4,000  | 4,000  | 60,000  | 20,000 | 23,000 | 4 | 4,000  | •             |
| 5,000  | 6,000  | 68,000  | 24,000 | 28,400 | 4 | 5,000  | •             |
| 6,000  | 6,000  | 68,000  | 24,000 | 32,000 | 4 | 6,000  | •             |
| 8,000  | 8,000  | 88,000  | 38,000 | 52,000 | 4 | 8,000  | •             |
| 10,000 | 10,000 | 100,000 | 50,000 | 60,000 | 4 | 10,000 | •             |
| 12,000 | 12,000 | 100,000 | 53,000 | 61,000 | 4 | 12,000 | •             |
| 14,000 | 14,000 | 100,000 | 53,000 | 62,000 | 4 | 14,000 | •             |
| 16,000 | 16,000 | 125,000 | 63,000 | 77,000 | 4 | 16,000 | •             |
| 20,000 | 20,000 | 141,000 | 75,000 | 91,000 | 4 | 20,000 | •             |



Frese frontali (a 4 taglienti)

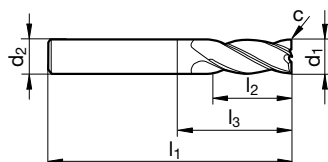


|          |   |                          |
|----------|---|--------------------------|
| <b>P</b> | • | <b>GÜHRING NAVIGATOR</b> |
| <b>M</b> | • |                          |
| <b>K</b> | • |                          |
| <b>N</b> | ○ |                          |
| <b>S</b> | • |                          |
| <b>H</b> | ○ |                          |

Dati di taglio a pag. 34

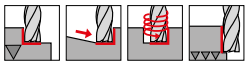
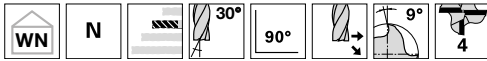
• tagliente al centro

|                     |          |          |
|---------------------|----------|----------|
| Materiale da taglio | MDI      |          |
| Superficie          | <b>F</b> | <b>F</b> |
| Tipo                | N        | N        |
| Forma del codolo    | HA       | HB       |



|        |        |         |        |        |          |   |        | Articolo n.      | 19978 | 19979 |
|--------|--------|---------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |         |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 2,000  | 2,000  | 32,000  | 8,000  | 10,000 | 0,025    | 4 | 2,000  | •                |       |       |
| 3,000  | 3,000  | 38,000  | 12,000 | 15,000 | 0,050    | 4 | 3,000  | •                |       |       |
| 4,000  | 4,000  | 40,000  | 12,000 | 16,000 | 0,050    | 4 | 4,000  | •                |       |       |
| 5,000  | 5,000  | 50,000  | 15,000 | 20,000 | 0,050    | 4 | 5,000  | •                |       |       |
| 6,000  | 6,000  | 57,000  | 16,000 | 21,000 | 0,050    | 4 | 6,000  | •                | •     |       |
| 7,000  | 8,000  | 60,000  | 16,000 | 23,000 | 0,100    | 4 | 7,000  | •                | •     |       |
| 8,000  | 8,000  | 68,000  | 22,000 | 32,000 | 0,100    | 4 | 8,000  | •                | •     |       |
| 9,000  | 10,000 | 72,000  | 22,000 | 31,400 | 0,100    | 4 | 9,000  | •                | •     |       |
| 10,000 | 10,000 | 72,000  | 25,000 | 32,000 | 0,100    | 4 | 10,000 | •                | •     |       |
| 11,000 | 12,000 | 83,000  | 26,000 | 37,000 | 0,100    | 4 | 11,000 | •                | •     |       |
| 12,000 | 12,000 | 83,000  | 28,000 | 38,000 | 0,100    | 4 | 12,000 | •                | •     |       |
| 14,000 | 14,000 | 83,000  | 28,000 | 38,000 | 0,150    | 4 | 14,000 | •                | •     |       |
| 16,000 | 16,000 | 92,000  | 35,000 | 44,000 | 0,150    | 4 | 16,000 | •                | •     |       |
| 18,000 | 18,000 | 92,000  | 35,000 | 44,000 | 0,150    | 4 | 18,000 | •                | •     |       |
| 20,000 | 20,000 | 104,000 | 40,000 | 54,000 | 0,150    | 4 | 20,000 | •                | •     |       |

**Frese frontali (a 4 taglienti)**

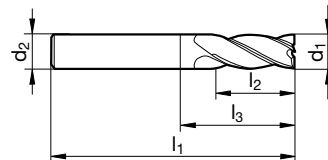


|          |   |                          |
|----------|---|--------------------------|
| <b>P</b> | • | <b>GÜHRING NAVIGATOR</b> |
| <b>M</b> | • |                          |
| <b>K</b> | • |                          |
| <b>N</b> | ○ |                          |
| <b>S</b> | • |                          |
| <b>H</b> | ○ |                          |

Dati di taglio a pag. 34

• tagliente al centro

|                     |            |
|---------------------|------------|
| Materiale da taglio | <b>MDI</b> |
| Superficie          | <b>A</b>   |
| Tipo                | N          |
| Forma del codolo    | cil.       |

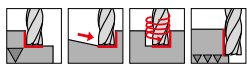
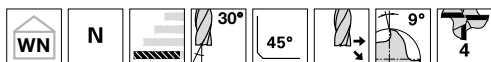


|             |              |
|-------------|--------------|
| Articolo n. | <b>19961</b> |
|-------------|--------------|

|                  |            |
|------------------|------------|
| Gruppo di sconto | <b>206</b> |
|------------------|------------|

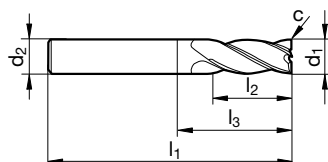
| d1 h8<br>mm | d2 h6<br>mm | l1<br>mm | l2<br>mm | l3<br>mm | Z | Codice | Disponibilità |
|-------------|-------------|----------|----------|----------|---|--------|---------------|
| 2,000       | 4,000       | 40,000   | 6,000    | 8,900    | 4 | 2,000  | •             |
| 3,000       | 6,000       | 45,000   | 8,000    | 11,900   | 4 | 3,000  | •             |
| 4,000       | 6,000       | 45,000   | 11,000   | 15,900   | 4 | 4,000  | •             |
| 5,000       | 6,000       | 50,000   | 13,000   | 18,900   | 4 | 5,000  | •             |
| 6,000       | 6,000       | 50,000   | 13,000   | 19,000   | 4 | 6,000  | •             |
| 8,000       | 8,000       | 60,000   | 19,000   | 25,500   | 4 | 8,000  | •             |
| 10,000      | 10,000      | 70,000   | 22,000   | 30,000   | 4 | 10,000 | •             |
| 12,000      | 12,000      | 75,000   | 26,000   | 36,000   | 4 | 12,000 | •             |
| 16,000      | 16,000      | 75,000   | 32,000   | 44,000   | 4 | 16,000 | •             |
| 20,000      | 20,000      | 100,000  | 40,000   | 54,000   | 4 | 20,000 | •             |

**Frese frontali XL (a 4 taglienti)**



**P** • **GÜHRING NAVIGATOR**  
**M** • Dati di taglio a pag. 34  
**K** •  
**N** ○  
**S** •  
**H** ○ • tagliente al centro

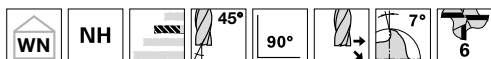
|                     |     |    |
|---------------------|-----|----|
| Materiale da taglio | MDI |    |
| Superficie          | ●   | ●  |
| Tipo                | N   | N  |
| Forma del codolo    | HA  | HB |



|        |        |         |        |        |          |   |        | Articolo n.      | 19976 | 19977 |
|--------|--------|---------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |         |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 3,000  | 6,000  | 57,000  | 15,000 | 18,900 | 0,050    | 4 | 3,000  | ●                | ●     |       |
| 4,000  | 6,000  | 63,000  | 19,000 | 23,900 | 0,050    | 4 | 4,000  | ●                | ●     |       |
| 5,000  | 6,000  | 68,000  | 24,000 | 29,900 | 0,050    | 4 | 5,000  | ●                | ●     |       |
| 6,000  | 6,000  | 68,000  | 24,000 | 32,000 | 0,050    | 4 | 6,000  | ●                | ●     |       |
| 8,000  | 8,000  | 88,000  | 38,000 | 52,000 | 0,100    | 4 | 8,000  | ●                | ●     |       |
| 10,000 | 10,000 | 95,000  | 45,000 | 55,000 | 0,100    | 4 | 10,000 | ●                | ●     |       |
| 12,000 | 12,000 | 110,000 | 53,000 | 65,000 | 0,100    | 4 | 12,000 | ●                | ●     |       |
| 14,000 | 14,000 | 110,000 | 53,000 | 65,000 | 0,150    | 4 | 14,000 | ●                | ●     |       |
| 16,000 | 16,000 | 125,000 | 63,000 | 77,000 | 0,150    | 4 | 16,000 | ●                | ●     |       |
| 18,000 | 18,000 | 125,000 | 63,000 | 77,000 | 0,150    | 4 | 18,000 | ●                | ●     |       |
| 20,000 | 20,000 | 141,000 | 75,000 | 91,000 | 0,150    | 4 | 20,000 | ●                | ●     |       |

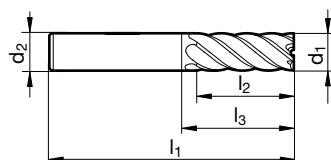


**Frese frontali a più taglienti (a 6 taglienti)**



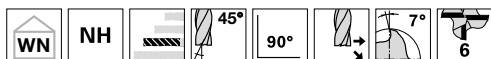
- GÜHRING NAVIGATOR**
- P** •
  - M** • Dati di taglio a pag. 34
  - K** •
  - N** •
  - S** •
  - H** ○ • senza tagliente centrale

|                     |          |          |
|---------------------|----------|----------|
| Materiale da taglio | MDI      |          |
| Superficie          | <b>F</b> | <b>F</b> |
| Tipo                | NH       | NH       |
| Forma del codolo    | HA       | HB       |



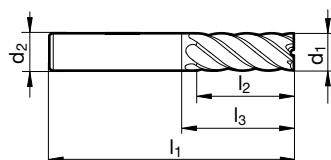
|        |        |         |        |        |   |        | Articolo n.      | 19972 | 19973 |
|--------|--------|---------|--------|--------|---|--------|------------------|-------|-------|
|        |        |         |        |        |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     |   |        |                  |       |       |
| 3,000  | 4,000  | 50,000  | 10,000 | 12,100 | 6 | 3,000  | •                |       |       |
| 4,000  | 6,000  | 57,000  | 11,000 | 15,900 | 6 | 4,000  | •                | •     |       |
| 5,000  | 6,000  | 57,000  | 13,000 | 15,900 | 6 | 5,000  | •                | •     |       |
| 6,000  | 6,000  | 57,000  | 13,000 | 21,000 | 6 | 6,000  | •                | •     |       |
| 8,000  | 8,000  | 63,000  | 19,000 | 27,000 | 6 | 8,000  | •                | •     |       |
| 10,000 | 10,000 | 72,000  | 22,000 | 32,000 | 6 | 10,000 | •                | •     |       |
| 12,000 | 12,000 | 83,000  | 26,000 | 38,000 | 6 | 12,000 | •                | •     |       |
| 14,000 | 14,000 | 83,000  | 26,000 | 38,000 | 6 | 14,000 | •                | •     |       |
| 16,000 | 16,000 | 92,000  | 32,000 | 44,000 | 6 | 16,000 | •                | •     |       |
| 18,000 | 18,000 | 92,000  | 32,000 | 44,000 | 6 | 18,000 | •                | •     |       |
| 20,000 | 20,000 | 104,000 | 38,000 | 54,000 | 6 | 20,000 | •                | •     |       |

Frese frontali a più taglienti (a 6 taglienti)



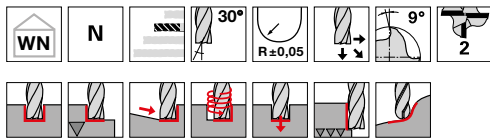
**P** • **GÜHRING NAVIGATOR**  
**M** • Dati di taglio a pag. 34  
**K** •  
**N** •  
**S** •  
**H** ○ • senza tagliente centrale

|                     |     |    |
|---------------------|-----|----|
| Materiale da taglio | MDI |    |
| Superficie          | ⓔ   | ⓔ  |
| Tipo                | NH  | NH |
| Forma del codolo    | HA  | HB |



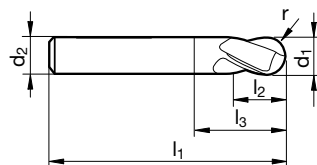
|        |        |         |        |        |   |        | Articolo n.      | 19974 | 19975 |
|--------|--------|---------|--------|--------|---|--------|------------------|-------|-------|
|        |        |         |        |        |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     |   |        |                  |       |       |
| 4,000  | 6,000  | 63,000  | 16,000 | 18,500 | 6 | 4,000  | •                | •     |       |
| 5,000  | 6,000  | 63,000  | 18,000 | 20,500 | 6 | 5,000  | •                | •     |       |
| 6,000  | 6,000  | 63,000  | 18,000 | 27,000 | 6 | 6,000  | •                | •     |       |
| 8,000  | 8,000  | 68,000  | 24,000 | 32,000 | 6 | 8,000  | •                | •     |       |
| 10,000 | 10,000 | 80,000  | 30,000 | 40,000 | 6 | 10,000 | •                | •     |       |
| 12,000 | 12,000 | 93,000  | 36,000 | 48,000 | 6 | 12,000 | •                | •     |       |
| 14,000 | 14,000 | 100,000 | 42,000 | 55,000 | 6 | 14,000 | •                | •     |       |
| 16,000 | 16,000 | 108,000 | 48,000 | 60,000 | 6 | 16,000 | •                | •     |       |
| 18,000 | 18,000 | 114,000 | 54,000 | 66,000 | 6 | 18,000 | •                | •     |       |
| 20,000 | 20,000 | 126,000 | 60,000 | 76,000 | 6 | 20,000 | •                | •     |       |

**Frese sferiche (a 2 taglienti)**



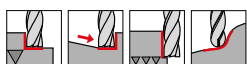
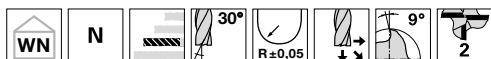
**P** • **GÜHRING NAVIGATOR**  
**M** • Dati di taglio a pag. 34  
**K** •  
**N** •  
**S** •  
**H** ○ • tagliente al centro

|                     |          |          |
|---------------------|----------|----------|
| Materiale da taglio | MDI      |          |
| Superficie          | <b>F</b> | <b>F</b> |
| Tipo                | N        | N        |
| Forma del codolo    | HA       | HB       |



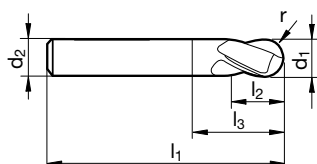
|        |        |         |        |        |        |   |        | Articolo n.      | 19968 | 19969 |
|--------|--------|---------|--------|--------|--------|---|--------|------------------|-------|-------|
|        |        |         |        |        |        |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | r      | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm     |   |        |                  |       |       |
| 2,000  | 4,000  | 40,000  | 6,000  | 9,400  | 1,000  | 2 | 2,000  | ●                |       |       |
| 3,000  | 4,000  | 50,000  | 7,000  | 11,900 | 1,500  | 2 | 3,000  | ●                |       |       |
| 4,000  | 6,000  | 50,000  | 8,000  | 13,400 | 2,000  | 2 | 4,000  | ●                | ●     |       |
| 5,000  | 6,000  | 50,000  | 10,000 | 16,900 | 2,500  | 2 | 5,000  | ●                | ●     |       |
| 6,000  | 6,000  | 50,000  | 10,000 | 20,000 | 3,000  | 2 | 6,000  | ●                | ●     |       |
| 8,000  | 8,000  | 60,000  | 19,000 | 27,000 | 4,000  | 2 | 8,000  | ●                | ●     |       |
| 10,000 | 10,000 | 70,000  | 22,000 | 30,000 | 5,000  | 2 | 10,000 | ●                | ●     |       |
| 12,000 | 12,000 | 75,000  | 26,000 | 39,000 | 6,000  | 2 | 12,000 | ●                | ●     |       |
| 14,000 | 14,000 | 75,000  | 26,000 | 40,000 | 7,000  | 2 | 14,000 | ●                | ●     |       |
| 16,000 | 16,000 | 75,000  | 26,000 | 43,000 | 8,000  | 2 | 16,000 | ●                | ●     |       |
| 18,000 | 18,000 | 100,000 | 32,000 | 52,000 | 9,000  | 2 | 18,000 | ●                | ●     |       |
| 20,000 | 20,000 | 100,000 | 32,000 | 50,000 | 10,000 | 2 | 20,000 | ●                | ●     |       |

**Frese sferiche XL (a 2 taglienti)**



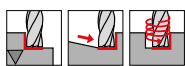
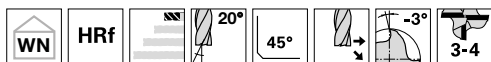
- P** • **GÜHRING NAVIGATOR**
- M** • Dati di taglio a pag. 34
- K** •
- N** •
- S** •
- H** ○ • tagliente al centro

|                     |            |          |
|---------------------|------------|----------|
| Materiale da taglio | <b>MDI</b> |          |
| Superficie          | <b>F</b>   | <b>F</b> |
| Tipo                | N          | N        |
| Forma del codolo    | HA         | HB       |



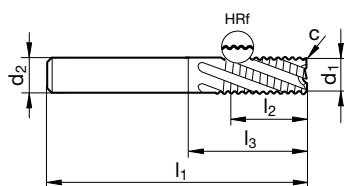
|        |        |         |        |        |       |   |        | Articolo n.      | 19970 | 19971 |
|--------|--------|---------|--------|--------|-------|---|--------|------------------|-------|-------|
|        |        |         |        |        |       |   |        | Gruppo di sconto | 206   | 206   |
| d1 e8  | d2 h6  | l1      | l2     | l3     | r     | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm    |   |        |                  |       |       |
| 3,000  | 3,000  | 60,000  | 20,000 | 32,000 | 1,500 | 2 | 3,000  | ●                |       |       |
| 4,000  | 4,000  | 60,000  | 20,000 | 32,000 | 2,000 | 2 | 4,000  | ●                |       |       |
| 5,000  | 5,000  | 75,000  | 25,000 | 47,000 | 2,500 | 2 | 5,000  | ●                |       |       |
| 6,000  | 6,000  | 75,000  | 30,000 | 39,000 | 3,000 | 2 | 6,000  | ●                | ●     |       |
| 8,000  | 8,000  | 75,000  | 30,000 | 39,000 | 4,000 | 2 | 8,000  | ●                | ●     |       |
| 10,000 | 10,000 | 100,000 | 40,000 | 60,000 | 5,000 | 2 | 10,000 | ●                | ●     |       |
| 12,000 | 12,000 | 100,000 | 45,000 | 55,000 | 6,000 | 2 | 12,000 | ●                | ●     |       |

**Frese di sgrossatura (dentatura fine)**



**P** • **GÜHRING NAVIGATOR**  
**M** • Dati di taglio a pag. 32  
**K** •  
**N** •  
**S** ○  
**H** • • tagliente al centro

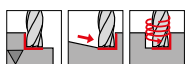
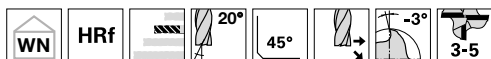
|                     |          |          |
|---------------------|----------|----------|
| Materiale da taglio | MDI      |          |
| Superficie          | <b>F</b> | <b>F</b> |
| Tipo                | HRf      | HRf      |
| Forma del codolo    | HA       | HB       |



|        |        |        |        |        |          |   |        | Articolo n.      | 19964 | 19965 |
|--------|--------|--------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |        |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 h10 | d2 h6  | l1     | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm     | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 4,000  | 6,000  | 54,000 | 8,000  | 12,900 | 0,160    | 3 | 4,000  | •                | •     |       |
| 5,000  | 6,000  | 54,000 | 8,000  | 14,400 | 0,200    | 3 | 5,000  | •                | •     |       |
| 6,000  | 6,000  | 54,000 | 8,000  | 18,000 | 0,240    | 3 | 6,000  | •                | •     |       |
| 8,000  | 8,000  | 58,000 | 11,000 | 22,000 | 0,320    | 3 | 8,000  | •                | •     |       |
| 10,000 | 10,000 | 66,000 | 13,000 | 26,000 | 0,200    | 4 | 10,000 | •                | •     |       |
| 12,000 | 12,000 | 73,000 | 16,000 | 28,000 | 0,240    | 4 | 12,000 | •                | •     |       |
| 16,000 | 16,000 | 82,000 | 19,000 | 34,000 | 0,320    | 4 | 16,000 | •                | •     |       |
| 20,000 | 20,000 | 92,000 | 19,000 | 42,000 | 0,400    | 4 | 20,000 | •                | •     |       |



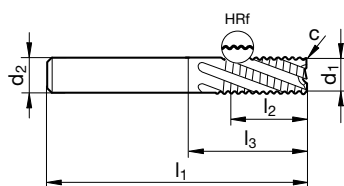
**Frese di sgrossatura (dentatura fine)**



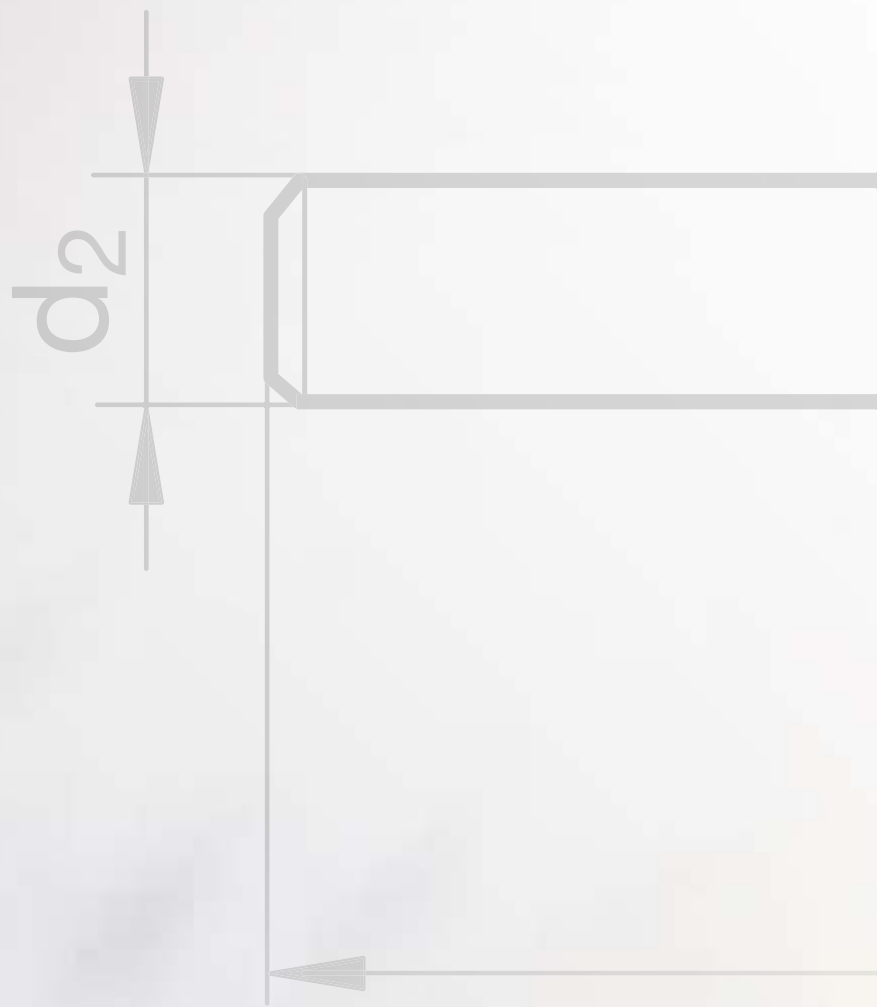
|          |   |                                                      |
|----------|---|------------------------------------------------------|
| <b>P</b> | • | <b>GÜHRING NAVIGATOR</b><br>Dati di taglio a pag. 32 |
| <b>M</b> |   |                                                      |
| <b>K</b> | • |                                                      |
| <b>N</b> |   |                                                      |
| <b>S</b> | ○ |                                                      |
| <b>H</b> | • |                                                      |

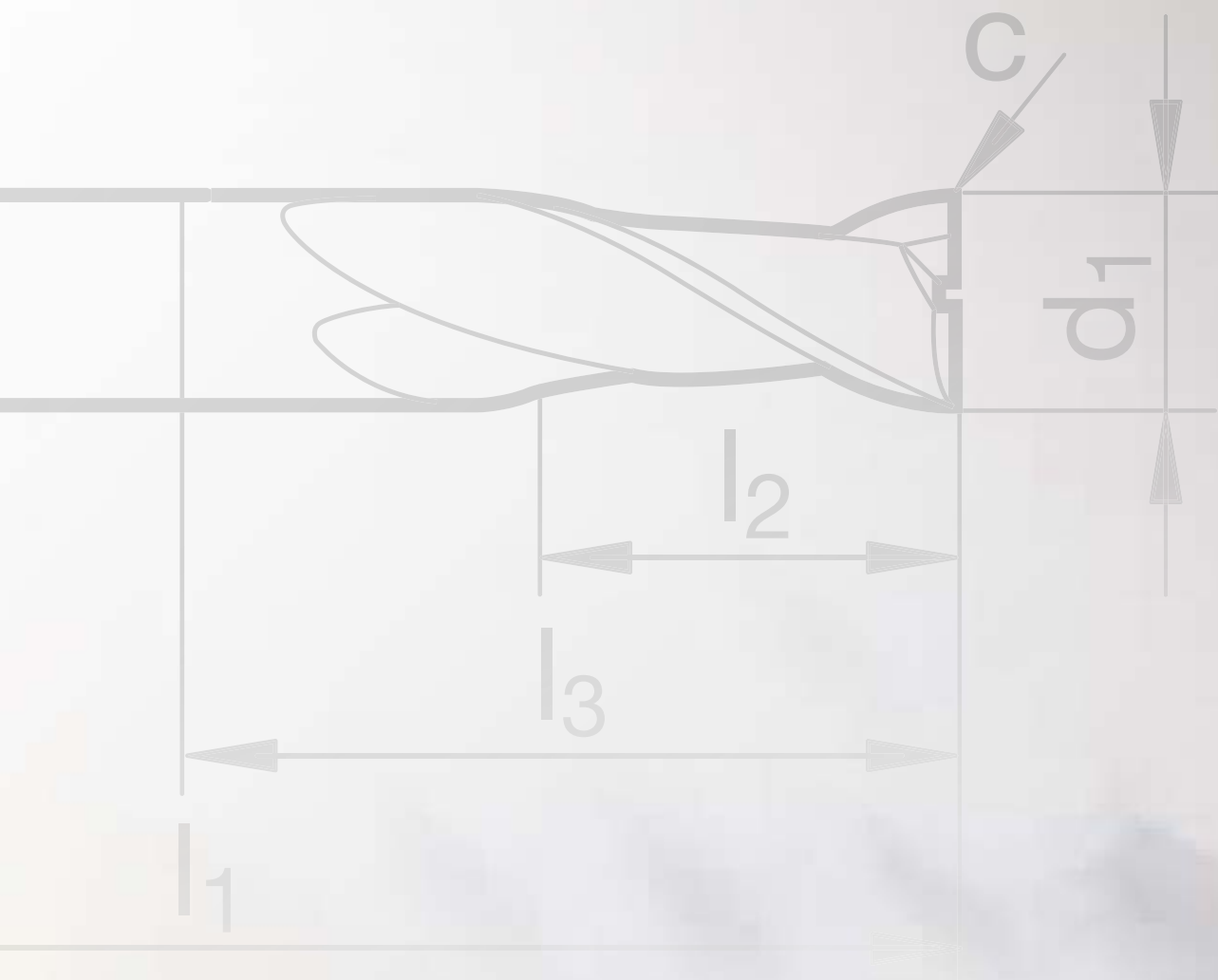
• tagliente al centro

|                     |            |          |
|---------------------|------------|----------|
| Materiale da taglio | <b>MDI</b> |          |
| Superficie          | <b>F</b>   | <b>F</b> |
| Tipo                | HRf        | HRf      |
| Forma del codolo    | HA         | HB       |



|        |        |         |        |        |          |   |        | Articolo n.      | 19966 | 19967 |
|--------|--------|---------|--------|--------|----------|---|--------|------------------|-------|-------|
|        |        |         |        |        |          |   |        | Gruppo di sconto | 206   | 206   |
| d1 h10 | d2 h6  | l1      | l2     | l3     | c        | Z | Codice | Disponibilità    |       |       |
| mm     | mm     | mm      | mm     | mm     | mm x 45° |   |        |                  |       |       |
| 5,000  | 6,000  | 57,000  | 16,000 | 19,000 | 0,200    | 3 | 5,000  | •                | •     |       |
| 6,000  | 6,000  | 57,000  | 16,000 | 21,000 | 0,240    | 3 | 6,000  | •                | •     |       |
| 8,000  | 8,000  | 63,000  | 19,000 | 27,000 | 0,320    | 3 | 8,000  | •                | •     |       |
| 10,000 | 10,000 | 72,000  | 22,000 | 32,000 | 0,200    | 4 | 10,000 | •                | •     |       |
| 12,000 | 12,000 | 83,000  | 26,000 | 38,000 | 0,240    | 4 | 12,000 | •                | •     |       |
| 16,000 | 16,000 | 92,000  | 32,000 | 44,000 | 0,320    | 4 | 16,000 | •                | •     |       |
| 20,000 | 20,000 | 104,000 | 38,000 | 54,000 | 0,400    | 4 | 20,000 | •                | •     |       |
| 25,000 | 25,000 | 121,000 | 45,000 | 65,000 | 0,600    | 5 | 25,000 | •                | •     |       |





NAVIGATOR

# GUHRING NAVIGATOR Utensili a fresare

I numeri in **grassetto** delle colonne avanzamento indicano gli utensili da preferire.

$a_e$  = larghezza di taglio

$a_p$  = profondità di taglio

**Articolo nr.** N. di fabb.  
N. di fabb.

\* Con grosse profondità di passata su macchine instabili, occorre ridurre l'avanzamento per dente e la velocità di taglio oppure impiegare un utensile a 4 taglienti.

| Frese Ø mm | Numero colonna avanzamento |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|------------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|            | 37                         | 38    | 39    | 40    | 41    | 42    | 43    | 44    | 45    | 46    | 47    | 48    | 49    | 50    | 51    | 52    |
|            | $f_z$ (mm/denti)           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 2,00       | 0,001                      | 0,001 | 0,001 | 0,002 | 0,002 | 0,004 | 0,005 | 0,006 | 0,007 | 0,008 | 0,010 | 0,012 | 0,014 | 0,016 | 0,018 | 0,020 |
| 3,00       | 0,002                      | 0,002 | 0,003 | 0,003 | 0,004 | 0,007 | 0,010 | 0,010 | 0,010 | 0,015 | 0,016 | 0,013 | 0,019 | 0,022 | 0,024 | 0,030 |
| 5,00       | 0,005                      | 0,006 | 0,007 | 0,009 | 0,010 | 0,014 | 0,020 | 0,020 | 0,022 | 0,025 | 0,026 | 0,026 | 0,028 | 0,030 | 0,032 | 0,038 |
| 6,00       | 0,006                      | 0,008 | 0,009 | 0,011 | 0,013 | 0,017 | 0,024 | 0,025 | 0,027 | 0,031 | 0,029 | 0,033 | 0,039 | 0,036 | 0,041 | 0,047 |
| 8,00       | 0,010                      | 0,012 | 0,014 | 0,016 | 0,019 | 0,024 | 0,032 | 0,032 | 0,035 | 0,042 | 0,042 | 0,047 | 0,053 | 0,052 | 0,058 | 0,064 |
| 10,00      | 0,013                      | 0,015 | 0,018 | 0,021 | 0,025 | 0,030 | 0,038 | 0,039 | 0,044 | 0,050 | 0,053 | 0,059 | 0,065 | 0,066 | 0,073 | 0,080 |
| 12,00      | 0,010                      | 0,018 | 0,022 | 0,026 | 0,030 | 0,036 | 0,046 | 0,048 | 0,052 | 0,059 | 0,063 | 0,072 | 0,079 | 0,085 | 0,090 | 0,100 |
| 16,00      | 0,020                      | 0,023 | 0,027 | 0,032 | 0,038 | 0,045 | 0,054 | 0,058 | 0,063 | 0,071 | 0,079 | 0,088 | 0,095 | 0,100 | 0,110 | 0,120 |
| 20,00      | 0,023                      | 0,028 | 0,033 | 0,038 | 0,045 | 0,057 | 0,066 | 0,073 | 0,080 | 0,090 | 0,097 | 0,100 | 0,110 | 0,120 | 0,130 | 0,140 |
| 25,00      | 0,030                      | 0,035 | 0,040 | 0,045 | 0,055 | 0,065 | 0,075 | 0,100 | 0,120 | 0,130 | 0,140 | 0,150 | 0,165 | 0,170 | 0,180 | 0,190 |

| Materiali                                 | Esempi di materiali, nuove designazioni (tra parentesi quelle precedenti) numeri in grassetto = numero materiale a DIN EN | Resistenza N/mm <sup>2</sup> | Durezza |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------|---------|
| Acciai da costruzione                     | <b>1.0035</b> S185(St33), <b>1.0486</b> P275N(StE285), <b>1.0345</b> P235GH(H1), <b>1.0425</b> P265GH(H2)                 | ≤500                         |         |
|                                           | <b>1.0050</b> E295 (St50-2), <b>1.0070</b> E360 (St70-2), <b>1.8937</b> P500NH (WStE500)                                  | ≤1000                        |         |
| Acciai automatici                         | <b>1.0718</b> 11SMnPb30 (9SMnPb28), <b>1.0736</b> 11SMn37 (9SMn36)                                                        | ≤850                         |         |
|                                           | <b>1.0727</b> 46S20 (45S20), <b>1.0728</b> (60S20), <b>1.0757</b> 46SPb20 (45SPb20)                                       | ≤1000                        |         |
| Acciai da bonifica non legati             | <b>1.0402</b> C22, <b>1.1178</b> C30E (Ck30)                                                                              | ≤700                         |         |
|                                           | <b>1.0503</b> C45, <b>1.1191</b> C45E (Ck45)                                                                              | ≤850                         |         |
|                                           | <b>1.0601</b> C60, <b>1.1221</b> C60E (Ck60)                                                                              | ≤1000                        |         |
| Acciai da bonifica legati                 | <b>1.5131</b> 50MnSi4, <b>1.7003</b> 38Cr2, <b>1.7030</b> 28Cr4                                                           | ≤1000                        |         |
|                                           | <b>1.5710</b> 36NiCr6, <b>1.7035</b> 41Cr4, <b>1.7225</b> 42CrMo4                                                         | ≤1400                        |         |
| Acc. da cement. non legati                | <b>1.0301</b> (C10), <b>1.1121</b> C10E (Ck10)                                                                            | ≤850                         |         |
| Acciai da cementazione legati             | <b>1.7276</b> 10CrMo11, <b>1.5125</b> 11MnSi6                                                                             | ≤1000                        |         |
|                                           | <b>1.5752</b> 15NiCr13, <b>1.7131</b> 16MnCr5, <b>1.7264</b> 20CrMo5                                                      | ≤1400                        |         |
| Acciai nitrurati                          | <b>1.8504</b> 34CrAl6                                                                                                     | ≤1000                        |         |
|                                           | <b>1.8519</b> 31CrMoV9, <b>1.8550</b> 34CrAlNi7                                                                           | ≤1400                        |         |
| Acciai utensili                           | <b>1.1750</b> C75W, <b>1.2067</b> 102Cr6, <b>1.2307</b> 29CrMoV9                                                          | ≤850                         |         |
|                                           | <b>1.2080</b> X210Cr12, <b>1.2083</b> X42Cr13, <b>1.2419</b> 105WCr6, <b>1.2767</b> X45NiCrMo4                            | ≤1400                        |         |
| Acciai super rapidi                       | <b>1.3243</b> S 6-5-2-5, <b>1.3343</b> S 6-5-2, <b>1.3344</b> S 6-5-3                                                     | ≤1400                        |         |
| Acciai per molle                          | <b>1.5026</b> 55Si7, <b>1.7176</b> 55Cr3, <b>1.8159</b> 51CrV4 (51CrV4)                                                   |                              | ≤350 HB |
| Acciai temprati                           | -                                                                                                                         |                              | ≤48 HRC |
|                                           |                                                                                                                           |                              | ≤66 HRC |
| Acc. inossidabili, allo zolfo austenitici | <b>1.4005</b> X12CrS13, <b>1.4104</b> X14CrMoS17, <b>1.4105</b> X6CrMoS17, <b>1.4305</b> X8CrNiS18-9                      | ≤900                         |         |
|                                           | <b>1.4301</b> X5CrNi18-10 (V2A), <b>1.4541</b> X6CrNiTi18-10, <b>1.4571</b> X6CrNiMoTi 17-12-2 (V4A)                      | ≤1100                        |         |
| martensitici                              | <b>1.4057</b> X20CrNi172 (X17CrNi16-2), <b>1.4122</b> X39CrMo17-1, <b>1.4521</b> X2CrMoTi18-2                             | ≤1500                        |         |
| Ghise                                     | <b>0.6010</b> EN-GJL-100 (GG10), <b>0.6020</b> EN-GJL-200 (GG20)                                                          |                              | ≤240 HB |
|                                           | <b>0.6025</b> EN-GJL-250 (GG25), <b>0.6035</b> EN-GJL-350 (GG35)                                                          |                              | ≤350 HB |
| Ghise sferoidali e temperate              | <b>0.7050</b> EN-GJS-500-7 (GGG50), <b>0.8035</b> EN-GJMW-350-4 (GTW35)                                                   |                              | ≤240 HB |
|                                           | <b>0.7070</b> EN-GJS-700-2 (GGG70), <b>0.8170</b> EN-GJMB-700-2 (GTS70)                                                   |                              | ≤350 HB |
| Ghisa in conchiglia                       | -                                                                                                                         |                              | ≤350 HB |
| Nuove ghise GGV                           | <b>EN-GJV250</b> (GGV25), <b>EN-GJV350</b> (GGV35)                                                                        |                              | ≤220 HB |
|                                           | <b>EN-GJV400</b> (GGV40), <b>EN-GJV500</b> (GGV50), SiMo 6                                                                |                              | ≤300 HB |
| Nuove ghise                               | <b>EN-GJS-800-8</b> (ADI800), <b>EN-GJS-1000-5</b> (ADI1000)                                                              | ≤1000                        |         |
|                                           | <b>EN-GJS-1200-2</b> (ADI1200), <b>EN-GJS-1400-1</b> (ADI1400)                                                            | ≤1400                        |         |
| Leghe speciali                            | Nimonic, Inconel, Monel, Hastelloy                                                                                        | ≤2000                        |         |
| Titanio e leghe di titanio                | <b>3.7024</b> Ti99,5, <b>3.7114</b> TiAl5Sn2,5, <b>3.7124</b> TiCu2                                                       | ≤850                         |         |
|                                           | <b>3.7154</b> TiAl6Zr5, <b>3.7165</b> TiAl6V4, <b>3.7184</b> TiAl4Mo4Sn2,5, - TiAl8Mo1V1                                  | ≤1400                        |         |
| Alluminio e leghe di alu                  | <b>3.0255</b> Al99,5, <b>3.2315</b> AlMgSi1, <b>3.3515</b> AlMg1                                                          | ≤400                         |         |
| Leghe di alu per lav. plastiche           | <b>3.0615</b> AlMgSiPb, <b>3.1325</b> AlCuMg1, <b>3.3245</b> AlMg3Si, <b>3.4365</b> AlZnMgCu1,5                           | ≤650                         |         |
| Leghe di alu-ghisa ≤ 10 % Si              | <b>3.2131</b> G-AlSi5Cu1, <b>3.2153</b> G-AlSi7Cu3, <b>3.2573</b> G-AlSi9                                                 | ≤600                         |         |
| > 24 % Si                                 | <b>3.2581</b> G-AlSi12, <b>3.2583</b> G-AlSi12Cu, - G-AlSi12CuNiMg                                                        | ≤600                         |         |
| Leghe di magnesio                         | <b>3.5200</b> MgMn2, <b>3.5812.05</b> G-MgAl8Zn1, <b>3.5612.05</b> G-MgAl6Zn1                                             | ≤400                         |         |
| Rame legato in bassa                      | <b>2.0070</b> SE-Cu, <b>2.1020</b> CuSn6, <b>2.1096</b> G-CuSn5ZnPb                                                       | ≤500                         |         |
| Ottone a truciolo corto                   | <b>2.0380</b> CuZn39Pb2, <b>2.0401</b> CuZn39Pb3, <b>2.0410</b> CuZn43Pb2                                                 | ≤600                         |         |
| a truciolo lungo                          | <b>2.0250</b> CuZn20, <b>2.0280</b> CuZn33, <b>2.0332</b> CuZn37Pb0,5                                                     | ≤600                         |         |
| Bronzi a truciolo corto                   | <b>2.1090</b> CuSn7ZnPb, <b>2.1170</b> CuPb5Sn5, <b>2.1176</b> CuPb10Sn                                                   | ≤600                         |         |
|                                           | <b>2.0790</b> CuNi18Zn19Pb                                                                                                | ≤850                         |         |
| Bronzi a truciolo lungo                   | <b>2.0916</b> CuAl5, <b>2.0960</b> CuAl9Mn, <b>2.1050</b> CuSn10                                                          | ≤850                         |         |
|                                           | <b>2.0980</b> CuAl11Ni, <b>2.1247</b> CuBe2                                                                               | ≤1000                        |         |
| Mat. plastiche termoindurenti             | Resina epossidica, Resopal, Pertinax, Moltopren                                                                           | ≤150                         |         |
| Materie termoplastiche                    | Plexiglas, Hostalen, Novodur, Makralon                                                                                    | ≤100                         |         |
| Mat. plast. a fibre aramidiche            | Kevlar                                                                                                                    | ≤1000                        |         |
| Mat. pl. a fibre di vetro/C rinforzate    | Materie plastiche a fibre di vetro rinforzate/a fibre di carbonio rinforzate                                              | ≤1000                        |         |

Correzioni  $v_c$  e  $f_z$

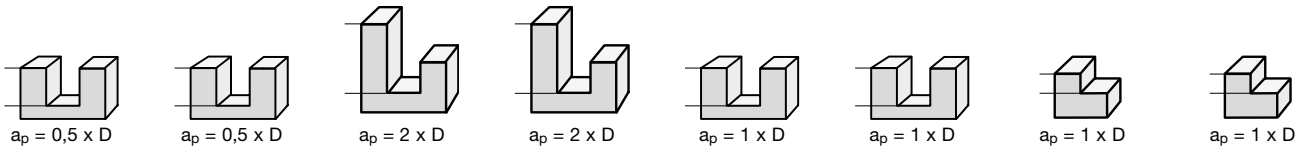
**Frese per cave**

**Frese di sgrossatura**

|    | MDI         | MDI         | MDI   | MDI   | MDI   | MDI                        | MDI         | MDI         |
|----|-------------|-------------|-------|-------|-------|----------------------------|-------------|-------------|
|    | N           | N           | N     | N     | NH    | W                          | N           | HRf         |
| HA | 19988/19962 | 19982/19963 | 19990 | 19984 | 19986 | 19994/19996                | 19980/19940 | 19964/19966 |
| HB | 19989       | 19983       | 19991 | 19985 | 19987 | 19995/19997<br>19992/19993 | 19981/19941 | 19965/19967 |



$a_e = 1 \times D$     $a_e = 1 \times D$     $a_e = 1 \times D$     $a_e = 1 \times D$     $a_e = 1 \times D$     $a_e = 1 \times D$     $a_e = 0,5-1,0 \times D$     $a_e = 0,5-1,0 \times D$



| $v_c$<br>m/min | Col.<br>avanz. | $v_c$<br>m/min | Col.<br>avanz. | $v_c$<br>m/min | Col.<br>avanz. | $v_c$<br>m/min | Col.<br>avanz. | $v_c$<br>m/min | Col.<br>avanz. | $v_c$<br>m/min | Col.<br>avanz. | $v_c$<br>m/min | Col.<br>avanz. | $v_c$<br>m/min | Col.<br>avanz. |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 85 - 105       | 42             | 85 - 105       | 42             | 72 - 88        | 39             | 72 - 88        | 39             | 94 - 116       | 43             |                |                | 170 - 208      | 51             |                |                |
| 81 - 99        | 41             | 81 - 99        | 41             | 67 - 83        | 38             | 67 - 83        | 38             | 89 - 109       | 42             |                |                | 157 - 193      | 50             |                |                |
| 85 - 105       | 41             | 85 - 105       | 41             | 72 - 88        | 38             | 72 - 88        | 38             | 94 - 116       | 42             |                |                | 170 - 208      | 50             |                |                |
| 63 - 77        | 42             | 63 - 77        | 42             | 54 - 66        | 39             | 54 - 66        | 39             | 69 - 85        | 43             |                |                | 126 - 154      | 49             |                |                |
| 85 - 105       | 41             | 85 - 105       | 41             | 72 - 88        | 38             | 72 - 88        | 38             | 94 - 116       | 42             |                |                | 170 - 208      | 50             |                |                |
| 76 - 94        | 41             | 76 - 94        | 41             | 63 - 77        | 38             | 63 - 77        | 38             | 84 - 104       | 42             |                |                | 151 - 185      | 50             |                |                |
| 63 - 77        | 42             | 63 - 77        | 42             | 54 - 66        | 39             | 54 - 66        | 39             | 69 - 85        | 43             |                |                | 126 - 154      | 49             |                |                |
| 76 - 94        | 42             | 76 - 94        | 42             | 63 - 77        | 39             | 63 - 77        | 39             | 84 - 104       | 43             |                |                | 151 - 185      | 49             |                |                |
| 63 - 77        | 42             | 63 - 77        | 42             | 54 - 66        | 39             | 54 - 66        | 39             | 69 - 85        | 43             |                |                | 126 - 154      | 48             | 72 - 88        | 39             |
| 90 - 110       | 41             | 90 - 110       | 41             | 67 - 83        | 38             | 67 - 83        | 38             | 99 - 121       | 42             |                |                | 189 - 231      | 50             |                |                |
| 76 - 94        | 41             | 76 - 94        | 41             | 63 - 77        | 38             | 63 - 77        | 38             | 84 - 104       | 42             |                |                | 151 - 185      | 50             | 86 - 106       | 41             |
| 54 - 66        | 42             | 54 - 66        | 42             | 45 - 55        | 39             | 45 - 55        | 39             | 59 - 73        | 43             |                |                | 113 - 139      | 49             | 64 - 80        | 40             |
| 85 - 105       | 41             | 85 - 105       | 41             | 72 - 88        | 38             | 72 - 88        | 38             | 94 - 116       | 42             |                |                | 170 - 208      | 50             | 97 - 119       | 41             |
| 76 - 94        | 40             | 76 - 94        | 40             | 63 - 77        | 37             | 63 - 77        | 37             | 84 - 104       | 41             |                |                | 151 - 185      | 48             | 86 - 106       | 39             |
| 76 - 94        | 41             | 76 - 94        | 41             | 63 - 77        | 38             | 63 - 77        | 38             | 84 - 104       | 42             |                |                | 151 - 185      | 50             | 86 - 106       | 41             |
| 63 - 77        | 40             | 63 - 77        | 40             | 54 - 66        | 37             | 54 - 66        | 37             | 69 - 85        | 41             |                |                | 126 - 154      | 48             | 72 - 88        | 39             |
| 45 - 55        | 42             | 45 - 55        | 42             | 40 - 50        | 39             | 40 - 50        | 39             | 49 - 61        | 43             |                |                | 94 - 116       | 49             | 54 - 66        | 47             |
| 45 - 55        | 40             |                |                |                |                |                |                | 49 - 61        | 41             |                |                | 94 - 116       | 48             | 54 - 66        | 26             |
| 45 - 55        | 40             |                |                |                |                |                |                | 49 - 61        | 41             |                |                | 44 - 54        | 46             | 25 - 31        | 38             |
| 45 - 55        | 42             | 45 - 55        | 42             |                |                |                |                | 49 - 61        | 43             |                |                | 80 - 100       | 49             |                |                |
| 40 - 50        | 40             | 40 - 50        | 40             |                |                |                |                | 45 - 55        | 41             |                |                | 70 - 90        | 48             |                |                |
| 36 - 44        | 41             | 36 - 44        | 41             |                |                |                |                | 39 - 49        | 42             |                |                | 65 - 70        | 49             | 43 - 53        | 40             |
| 108 - 132      | 41             | 108 - 132      | 41             | 94 - 116       | 38             | 94 - 116       | 38             | 118 - 146      | 42             |                |                | 220 - 270      | 50             | 126 - 154      | 42             |
| 99 - 121       | 40             | 99 - 121       | 40             | 85 - 105       | 37             | 85 - 105       | 37             | 108 - 134      | 41             |                |                | 201 - 247      | 49             | 115 - 141      | 41             |
| 90 - 110       | 41             | 90 - 110       | 41             | 81 - 99        | 38             | 81 - 99        | 38             | 99 - 121       | 42             |                |                | 182 - 224      | 50             | 104 - 128      | 42             |
| 81 - 99        | 40             | 81 - 99        | 40             | 67 - 83        | 37             | 67 - 83        | 37             | 89 - 109       | 41             |                |                | 157 - 193      | 49             | 90 - 110       | 41             |
| 54 - 66        | 40             | 54 - 66        | 40             |                |                |                |                | 59 - 73        | 41             |                |                | 107 - 131      | 47             | 61 - 75        | 39             |
|                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
|                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
|                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |                |
| 27 - 33        | 40             | 27 - 33        | 40             |                |                |                |                | 29 - 37        | 41             |                |                | 56 - 70        | 48             |                |                |
| 45 - 55        | 40             | 45 - 55        | 40             | 58 - 72        | 37             | 58 - 72        | 37             | 49 - 61        | 41             |                |                | 54 - 86        | 43             |                |                |
| 36 - 44        | 40             | 36 - 44        | 40             | 31 - 39        | 37             | 31 - 39        | 37             | 39 - 49        | 41             |                |                | 44 - 72        | 42             |                |                |
| 405 - 495      | 43             |                |                |                |                |                |                |                |                | 297 - 363      | 46             |                |                |                |                |
| 495 - 605      | 43             |                |                |                |                |                |                |                |                | 360 - 440      | 46             |                |                |                |                |
| 198 - 242      | 42             |                |                |                |                |                |                | 217 - 267      | 43             | 144 - 176      | 45             |                |                |                |                |
| 162 - 198      | 43             |                |                |                |                |                |                | 178 - 218      | 44             | 117 - 143      | 46             |                |                |                |                |
| 225 - 275      | 44             |                |                |                |                |                |                |                |                | 171 - 209      | 47             |                |                |                |                |
| 108 - 132      | 43             |                |                |                |                |                |                | 118 - 146      | 44             | 81 - 99        | 46             |                |                |                |                |
| 90 - 110       | 43             |                |                |                |                |                |                | 99 - 121       | 44             | 72 - 88        | 46             |                |                | 117 - 143      | 42             |
| 81 - 99        | 42             |                |                |                |                |                |                |                |                | 67 - 83        | 45             |                |                |                |                |
| 90 - 110       | 42             |                |                |                |                |                |                | 99 - 121       | 43             | 72 - 88        | 45             |                |                | 117 - 143      | 42             |
| 72 - 88        | 41             |                |                |                |                |                |                | 79 - 97        | 42             | 63 - 77        | 44             |                |                | 87 - 107       | 41             |
| 72 - 88        | 42             |                |                |                |                |                |                |                |                | 63 - 77        | 45             |                |                |                |                |
| 63 - 77        | 40             |                |                |                |                |                |                |                |                | 54 - 66        | 43             |                |                |                |                |
| 108 - 132      | 40             |                |                |                |                |                |                |                |                | 81 - 99        | 43             |                |                |                |                |
| 99 - 121       | 40             |                |                |                |                |                |                |                |                | 72 - 88        | 43             |                |                |                |                |

1 x D = 75%   1,5 x D = 50%   1 x D = 75%   1,5 x D = 50%   3 x D = 50%   3 x D = 50%   1,5 x D = 50%   1,5 x D = 50%    $a_e = 1,5 \times D = 50%$     $a_e = 0,5 \times D = 120%$     $a_p = 0,25 \times D = 150%$

**GUHRING NAVIGATOR** Utensili a fresare

I numeri in **grassetto** delle colonne avanzamento indicano gli utensili da preferire.

$a_e$  = larghezza di taglio

$a_p$  = profondità di taglio

**Articolo nr.** N. di fabb.  
N. di fabb.

\* Con grosse profondità di passata su macchine instabili, occorre ridurre l'avanzamento per dente e la velocità di taglio oppure impiegare un utensile a 4 taglienti.

| Frese Ø<br>mm | Numero colonna avanzamento |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
|---------------|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|               | 37                         | 38    | 39    | 40    | 41    | 42    | 43    | 44    | 45    | 46    | 47    | 48    | 49    | 50    | 51    | 52    |
|               | $f_z$ (mm/denti)           |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |
| 2,00          | 0,001                      | 0,001 | 0,001 | 0,002 | 0,002 | 0,004 | 0,005 | 0,006 | 0,007 | 0,008 | 0,010 | 0,012 | 0,014 | 0,016 | 0,018 | 0,020 |
| 3,00          | 0,002                      | 0,002 | 0,003 | 0,003 | 0,004 | 0,007 | 0,010 | 0,010 | 0,010 | 0,015 | 0,016 | 0,013 | 0,019 | 0,022 | 0,024 | 0,030 |
| 5,00          | 0,005                      | 0,006 | 0,007 | 0,009 | 0,010 | 0,014 | 0,020 | 0,020 | 0,022 | 0,025 | 0,026 | 0,026 | 0,028 | 0,030 | 0,032 | 0,038 |
| 6,00          | 0,006                      | 0,008 | 0,009 | 0,011 | 0,013 | 0,017 | 0,024 | 0,025 | 0,027 | 0,031 | 0,029 | 0,033 | 0,039 | 0,036 | 0,041 | 0,047 |
| 8,00          | 0,010                      | 0,012 | 0,014 | 0,016 | 0,019 | 0,024 | 0,032 | 0,032 | 0,035 | 0,042 | 0,042 | 0,047 | 0,053 | 0,052 | 0,058 | 0,064 |
| 10,00         | 0,013                      | 0,015 | 0,018 | 0,021 | 0,025 | 0,030 | 0,038 | 0,039 | 0,044 | 0,050 | 0,053 | 0,059 | 0,065 | 0,066 | 0,073 | 0,080 |
| 12,00         | 0,010                      | 0,018 | 0,022 | 0,026 | 0,030 | 0,036 | 0,046 | 0,048 | 0,052 | 0,059 | 0,063 | 0,072 | 0,079 | 0,085 | 0,090 | 0,100 |
| 16,00         | 0,020                      | 0,023 | 0,027 | 0,032 | 0,038 | 0,045 | 0,054 | 0,058 | 0,063 | 0,071 | 0,079 | 0,088 | 0,095 | 0,100 | 0,110 | 0,120 |
| 20,00         | 0,023                      | 0,028 | 0,033 | 0,038 | 0,045 | 0,057 | 0,066 | 0,073 | 0,080 | 0,090 | 0,097 | 0,100 | 0,110 | 0,120 | 0,130 | 0,140 |
| 25,00         | 0,030                      | 0,035 | 0,040 | 0,045 | 0,055 | 0,065 | 0,075 | 0,100 | 0,120 | 0,130 | 0,140 | 0,150 | 0,165 | 0,170 | 0,180 | 0,190 |

| Materiali                                 | Esempi di materiali, nuove designazioni (tra parentesi quelle precedenti) numeri in grassetto = numero materiale a DIN EN | Resistenza N/mm <sup>2</sup> | Durezza |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|------------------------------|---------|
| Acciai da costruzione                     | <b>1.0035</b> S185(St33), <b>1.0486</b> P275N(StE285), <b>1.0345</b> P235GH(H1), <b>1.0425</b> P265GH(H2)                 | ≤500                         |         |
|                                           | <b>1.0050</b> E295 (St50-2), <b>1.0070</b> E360 (St70-2), <b>1.8937</b> P500NH (WStE500)                                  | ≤1000                        |         |
| Acciai automatici                         | <b>1.0718</b> 11SMnPb30 (9SMnPb28), <b>1.0736</b> 11SMn37 (9SMn36)                                                        | ≤850                         |         |
|                                           | <b>1.0727</b> 46S20 (45S20), <b>1.0728</b> (60S20), <b>1.0757</b> 46SPb20 (45SPb20)                                       | ≤1000                        |         |
| Acciai da bonifica non legati             | <b>1.0402</b> C22, <b>1.1178</b> C30E (Ck30)                                                                              | ≤700                         |         |
|                                           | <b>1.0503</b> C45, <b>1.1191</b> C45E (Ck45)                                                                              | ≤850                         |         |
|                                           | <b>1.0601</b> C60, <b>1.1221</b> C60E (Ck60)                                                                              | ≤1000                        |         |
| Acciai da bonifica legati                 | <b>1.5131</b> 50MnSi4, <b>1.7003</b> 38Cr2, <b>1.7030</b> 28Cr4                                                           | ≤1000                        |         |
|                                           | <b>1.5710</b> 36NiCr6, <b>1.7035</b> 41Cr4, <b>1.7225</b> 42CrMo4                                                         | ≤1400                        |         |
| Acc. da cement. non legati                | <b>1.0301</b> (C10), <b>1.1121</b> C10E (Ck10)                                                                            | ≤850                         |         |
| Acciai da cementazione legati             | <b>1.7276</b> 10CrMo11, <b>1.5125</b> 11MnSi6                                                                             | ≤1000                        |         |
|                                           | <b>1.5752</b> 15NiCr13, <b>1.7131</b> 16MnCr5, <b>1.7264</b> 20CrMo5                                                      | ≤1400                        |         |
| Acciai nitrurati                          | <b>1.8504</b> 34CrAl6                                                                                                     | ≤1000                        |         |
|                                           | <b>1.8519</b> 31CrMoV9, <b>1.8550</b> 34CrAlNi7                                                                           | ≤1400                        |         |
| Acciai utensili                           | <b>1.1750</b> C75W, <b>1.2067</b> 102Cr6, <b>1.2307</b> 29CrMoV9                                                          | ≤850                         |         |
|                                           | <b>1.2080</b> X210Cr12, <b>1.2083</b> X42Cr13, <b>1.2419</b> 105WCr6, <b>1.2767</b> X45NiCrMo4                            | ≤1400                        |         |
| Acciai super rapidi                       | <b>1.3243</b> S 6-5-2-5, <b>1.3343</b> S 6-5-2, <b>1.3344</b> S 6-5-3                                                     | ≤1400                        |         |
| Acciai per molle                          | <b>1.5026</b> 55Si7, <b>1.7176</b> 55Cr3, <b>1.8159</b> 51CrV4 (51CrV4)                                                   |                              | ≤350 HB |
| Acciai temprati                           | -                                                                                                                         |                              | ≤48 HRC |
|                                           |                                                                                                                           |                              | ≤66 HRC |
| Acc. inossidabili, allo zolfo austenitici | <b>1.4005</b> X12CrS13, <b>1.4104</b> X14CrMoS17, <b>1.4105</b> X6CrMoS17, <b>1.4305</b> X8CrNiS18-9                      | ≤900                         |         |
|                                           | <b>1.4301</b> X5CrNi18-10 (V2A), <b>1.4541</b> X6CrNiTi18-10, <b>1.4571</b> X6CrNiMoTi 17-12-2 (V4A)                      | ≤1100                        |         |
| martensitici                              | <b>1.4057</b> X20CrNi172 (X17CrNi16-2), <b>1.4122</b> X39CrMo17-1, <b>1.4521</b> X2CrMoTi18-2                             | ≤1500                        |         |
| Ghise                                     | <b>0.6010</b> EN-GJL-100 (GG10), <b>0.6020</b> EN-GJL-200 (GG20)                                                          |                              | ≤240 HB |
|                                           | <b>0.6025</b> EN-GJL-250 (GG25), <b>0.6035</b> EN-GJL-350 (GG35)                                                          |                              | ≤350 HB |
| Ghise sferoidali e temperate              | <b>0.7050</b> EN-GJS-500-7 (GGG50), <b>0.8035</b> EN-GJMW-350-4 (GTW35)                                                   |                              | ≤240 HB |
|                                           | <b>0.7070</b> EN-GJS-700-2 (GGG70), <b>0.8170</b> EN-GJMB-700-2 (GTS70)                                                   |                              | ≤350 HB |
| Ghisa in conchiglia                       | -                                                                                                                         |                              | ≤350 HB |
| Nuove ghise GGV                           | <b>EN-GJV250</b> (GGV25), <b>EN-GJV350</b> (GGV35)                                                                        |                              | ≤220 HB |
|                                           | <b>EN-GJV400</b> (GGV40), <b>EN-GJV500</b> (GGV50), SiMo 6                                                                |                              | ≤300 HB |
| Nuove ghise                               | <b>EN-GJS-800-8</b> (ADI800), <b>EN-GJS-1000-5</b> (ADI1000)                                                              | ≤1000                        |         |
|                                           | <b>EN-GJS-1200-2</b> (ADI1200), <b>EN-GJS-1400-1</b> (ADI1400)                                                            | ≤1400                        |         |
| Leghe speciali                            | Nimonic, Inconel, Monel, Hastelloy                                                                                        | ≤2000                        |         |
| Titanio e leghe di titanio                | <b>3.7024</b> Ti99,5, <b>3.7114</b> TiAl5Sn2,5, <b>3.7124</b> TiCu2                                                       | ≤850                         |         |
|                                           | <b>3.7154</b> TiAl6Zr5, <b>3.7165</b> TiAl6V4, <b>3.7184</b> TiAl4Mo4Sn2,5, - TiAl8Mo1V1                                  | ≤1400                        |         |
| Alluminio e leghe di alu                  | <b>3.0255</b> Al99,5, <b>3.2315</b> AlMgSi1, <b>3.3515</b> AlMg1                                                          | ≤400                         |         |
| Leghe di alu per lav. plastiche           | <b>3.0615</b> AlMgSiPb, <b>3.1325</b> AlCuMg1, <b>3.3245</b> AlMg3Si, <b>3.4365</b> AlZnMgCu1,5                           | ≤650                         |         |
| Leghe di alu-ghisa ≤ 10 % Si              | <b>3.2131</b> G-AlSi5Cu1, <b>3.2153</b> G-AlSi7Cu3, <b>3.2573</b> G-AlSi9                                                 | ≤600                         |         |
| > 24 % Si                                 | <b>3.2581</b> G-AlSi12, <b>3.2583</b> G-AlSi12Cu, - G-AlSi12CuNiMg                                                        | ≤600                         |         |
| Leghe di magnesio                         | <b>3.5200</b> MgMn2, <b>3.5812.05</b> G-MgAl8Zn1, <b>3.5612.05</b> G-MgAl6Zn1                                             | ≤400                         |         |
| Rame legato in bassa                      | <b>2.0070</b> SE-Cu, <b>2.1020</b> CuSn6, <b>2.1096</b> G-CuSn5ZnPb                                                       | ≤500                         |         |
| Ottone a truciolo corto                   | <b>2.0380</b> CuZn39Pb2, <b>2.0401</b> CuZn39Pb3, <b>2.0410</b> CuZn43Pb2                                                 | ≤600                         |         |
| a truciolo lungo                          | <b>2.0250</b> CuZn20, <b>2.0280</b> CuZn33, <b>2.0332</b> CuZn37Pb0,5                                                     | ≤600                         |         |
| Bronzi a truciolo corto                   | <b>2.1090</b> CuSn7ZnPb, <b>2.1170</b> CuPb5Sn5, <b>2.1176</b> CuPb10Sn                                                   | ≤600                         |         |
|                                           | <b>2.0790</b> CuNi18Zn19Pb                                                                                                | ≤850                         |         |
| Bronzi a truciolo lungo                   | <b>2.0916</b> CuAl5, <b>2.0960</b> CuAl9Mn, <b>2.1050</b> CuSn10                                                          | ≤850                         |         |
|                                           | <b>2.0980</b> CuAl11Ni, <b>2.1247</b> CuBe2                                                                               | ≤1000                        |         |
| Mat. plastiche termoindurenti             | Resina epossidica, Resopal, Pertinax, Moltopren                                                                           | ≤150                         |         |
| Materie termoplastiche                    | Plexiglas, Hostalen, Novodur, Makralon                                                                                    | ≤100                         |         |
| Mat. plast. a fibre aramidiche            | Kevlar                                                                                                                    | ≤1000                        |         |
| Mat. pl. a fibre di vetro/C rinforzate    | Materie plastiche a fibre di vetro rinforzate/a fibre di carbonio rinforzate                                              | ≤1000                        |         |

Correzioni  $v_c$  e  $f_z$

|    | Frese di finitura |       | Frese di superfinitura |        | Frese per copiatori |       |
|----|-------------------|-------|------------------------|--------|---------------------|-------|
|    | MDI               | MDI   | MDI                    | MDI    | MDI                 | MDI   |
|    | N                 | N     | NH                     | NH     | N                   | N     |
| HA | 19978/19961       | 19976 | 19972                  | 19974* | 19968               | 19970 |
| HB | 19979             | 19977 | 19973                  | 19975* | 19969               | 19971 |
|    |                   | 19951 |                        |        |                     |       |



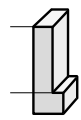
$a_e = 0,1 \times D$



$a_p = 1 \times D$



$a_e = 0,1 \times D$



$a_p = 2 \times D$



$a_e = 0,05 \times D$



$a_p = 1,5 \times D$



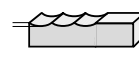
$a_e = 0,05 \times D$



$a_p = 3 \times D$



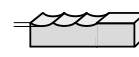
$a_e = 0,05 \times D$



$a_p = 0,05 \times D$



$a_e = 0,05 \times D$



$a_p = 0,05 \times D$

| $V_c$<br>m/min | Col.<br>avanz. | $V_c$<br>m/min | Col.<br>avanz. | $V_c$<br>m/min | Col.<br>avanz. | $V_c$<br>m/min | Col.<br>avanz. | $V_c$<br>m/min | Col.<br>avanz. | $V_c$<br>m/min | Col.<br>avanz. |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| 157 - 193      | 48             | 103 - 127      | 43             | 171 - 209      | 48             | 136 - 168      | 45             | 153 - 187      | 48             | 153 - 187      | 46             |
| 144 - 176      | 47             | 94 - 116       | 42             | 157 - 193      | 47             | 126 - 154      | 44             | 144 - 176      | 47             | 144 - 176      | 45             |
| 157 - 193      | 47             | 103 - 127      | 42             | 171 - 209      | 47             | 136 - 168      | 44             | 153 - 187      | 47             | 153 - 187      | 45             |
| 117 - 143      | 46             | 81 - 99        | 41             | 126 - 154      | 46             | 100 - 124      | 43             | 153 - 187      | 46             | 153 - 187      | 44             |
| 157 - 193      | 47             | 103 - 127      | 42             | 171 - 209      | 47             | 136 - 168      | 44             | 135 - 165      | 47             | 135 - 165      | 45             |
| 144 - 176      | 47             | 90 - 110       | 42             | 153 - 187      | 47             | 122 - 150      | 44             | 135 - 165      | 47             | 135 - 165      | 45             |
| 117 - 143      | 46             | 76 - 94        | 41             | 126 - 154      | 46             | 100 - 124      | 43             | 117 - 143      | 46             | 117 - 143      | 44             |
| 139 - 171      | 46             | 90 - 110       | 41             | 153 - 187      | 46             | 122 - 150      | 43             | 126 - 154      | 46             | 126 - 154      | 44             |
| 117 - 143      | 45             | 76 - 94        | 40             | 126 - 154      | 45             | 100 - 124      | 42             | 153 - 187      | 45             | 153 - 187      | 43             |
| 175 - 215      | 47             | 99 - 121       | 42             | 189 - 231      | 47             | 151 - 185      | 44             | 198 - 242      | 47             | 198 - 242      | 45             |
| 139 - 171      | 47             | 90 - 110       | 42             | 153 - 187      | 47             | 122 - 150      | 44             | 171 - 209      | 47             | 171 - 209      | 45             |
| 103 - 127      | 46             | 67 - 83        | 41             | 117 - 143      | 46             | 93 - 115       | 43             | 108 - 132      | 46             | 108 - 132      | 44             |
| 157 - 193      | 47             | 103 - 127      | 42             | 171 - 209      | 47             | 136 - 168      | 44             | 144 - 176      | 47             | 144 - 176      | 45             |
| 144 - 176      | 45             | 90 - 110       | 40             | 153 - 187      | 45             | 122 - 150      | 42             | 135 - 165      | 45             | 135 - 165      | 43             |
| 139 - 171      | 47             | 90 - 110       | 42             | 153 - 187      | 47             | 122 - 150      | 44             | 135 - 165      | 47             | 135 - 165      | 45             |
| 117 - 143      | 45             | 76 - 94        | 40             | 126 - 154      | 45             | 100 - 124      | 42             | 117 - 143      | 45             | 117 - 143      | 43             |
| 90 - 110       | 46             | 58 - 72        | 41             | 94 - 116       | 46             | 75 - 93        | 43             | 85 - 105       | 46             | 85 - 105       | 44             |
|                |                |                |                | 94 - 116       | 45             | 75 - 93        | 42             | 85 - 105       | 45             | 85 - 105       | 43             |
|                |                |                |                | 49 - 61        | 43             | 39 - 49        | 41             | 49 - 61        | 44             | 49 - 61        | 42             |
| 90 - 110       | 46             |                |                | 94 - 116       | 46             | 75 - 93        | 43             | 85 - 105       | 46             | 85 - 105       | 44             |
| 76 - 94        | 45             |                |                | 81 - 99        | 45             | 64 - 80        | 42             | 76 - 94        | 45             | 76 - 94        | 43             |
| 72 - 88        | 46             |                |                | 76 - 94        | 46             | 61 - 75        | 43             | 67 - 83        | 46             | 67 - 83        | 44             |
| 189 - 231      | 47             | 135 - 165      | 42             | 220 - 270      | 47             | 132 - 162      | 44             | 198 - 242      | 47             | 198 - 242      | 45             |
| 189 - 231      | 46             | 121 - 149      | 41             | 202 - 248      | 46             | 121 - 149      | 43             | 189 - 231      | 46             | 189 - 231      | 44             |
| 171 - 209      | 47             | 112 - 138      | 42             | 180 - 220      | 47             | 108 - 132      | 44             | 171 - 209      | 47             | 171 - 209      | 45             |
| 144 - 176      | 46             | 94 - 116       | 41             | 157 - 193      | 46             | 94 - 116       | 41             | 144 - 176      | 46             | 144 - 176      | 44             |
| 99 - 121       | 44             |                |                |                |                |                |                | 99 - 121       | 44             | 99 - 121       | 42             |
| 54 - 66        | 45             |                |                | 54 - 66        | 45             | 32 - 40        | 42             | 49 - 61        | 45             | 49 - 61        | 43             |
| 90 - 110       | 45             | 58 - 72        | 40             | 94 - 116       | 45             | 56 - 70        | 42             |                |                |                |                |
| 72 - 88        | 44             | 45 - 55        | 39             | 76 - 94        | 44             | 45 - 57        | 41             |                |                |                |                |
| 765 - 935      | 50             | 450 - 550      | 45             | 810 - 990      | 50             | 486 - 594      | 41             | 720 - 880      | 50             | 720 - 880      | 48             |
|                |                |                |                | 720 - 880      | 50             | 432 - 528      | 41             | 855 - 1045     | 50             | 855 - 1045     | 48             |
| 373 - 457      | 48             | 225 - 275      | 43             | 405 - 495      | 48             | 243 - 297      | 45             | 342 - 418      | 48             | 342 - 418      | 46             |
| 306 - 374      | 49             | 180 - 220      | 44             | 324 - 396      | 49             | 194 - 238      | 46             | 288 - 352      | 49             | 288 - 352      | 47             |
|                |                |                |                | 450 - 550      | 50             |                |                | 405 - 495      | 50             | 405 - 495      | 48             |
| 198 - 242      | 49             | 135 - 165      | 44             | 216 - 264      | 49             |                |                | 180 - 220      | 49             | 180 - 220      | 47             |
| 180 - 220      | 48             | 108 - 132      | 43             | 198 - 242      | 48             | 118 - 146      | 45             | 171 - 209      | 48             | 171 - 209      | 46             |
| 144 - 176      | 48             | 90 - 110       | 43             | 162 - 198      | 48             |                |                | 162 - 198      | 48             | 162 - 198      | 46             |
| 180 - 220      | 48             | 108 - 132      | 43             | 198 - 242      | 48             | 118 - 146      | 45             | 180 - 220      | 48             | 180 - 220      | 46             |
| 135 - 165      | 47             |                |                | 153 - 187      | 47             | 91 - 113       | 44             | 171 - 209      | 47             | 171 - 209      | 45             |
|                |                |                |                | 153 - 187      | 47             |                |                | 198 - 242      | 47             | 198 - 242      | 45             |
|                |                |                |                | 126 - 154      | 46             | 75 - 93        | 43             | 189 - 231      | 46             | 189 - 231      | 44             |
|                |                |                |                | 216 - 264      | 46             |                |                |                |                |                |                |
|                |                |                |                | 198 - 242      | 46             |                |                |                |                |                |                |

$a_p 2 \times D = 50\%$

$a_p 3 \times D = 50\%$

$a_p 0,1 \times D = 75\%$

I sistemi di erogazione utensili Gühring TM 326, TM 426 e TM 526 ottimizzano il magazzino utensili e la gestione degli utensili. Maggiore controllo del magazzino e maggiore trasparenza della gestione utensili!



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**GTMS**  
Gühring Tool Management Software



**GÜHRING**

# GM 300 | GÜHROJET |

Attacchi utensili con raffreddamento periferico



Ulteriori portautensili  
possono essere trovati  
nel nostro catalogo  
GM300.

# Codice ISO

|   |                                                   |
|---|---------------------------------------------------|
| P | acciaio, acciaio legato in alta percentuale       |
| M | acciaio inossidabile                              |
| K | ghisa grigia, ghisa sferoidale e ghisa malleabile |
| N | alluminio ed altri metalli non ferrosi            |
| S | leghe speciali, superleghe e leghe di titanio     |
| H | acciaio temprato e ghisa temprata                 |

Nelle pagine seguenti potrete trovare per ogni utensile raccomandazioni riguardanti l'idoneità per i gruppi di applicazioni e dettagli per la max. resistenza alla trazione e durezza:

- Idoneità ottima
- Idoneità limitata

## Superficie

- Lucido
- A TiAlN
- P AlCrN
- F FIRE

## Pittogrammi

|                     |                                                   |                                                                                     |                       |             |                                                                                              |          |           |
|---------------------|---------------------------------------------------|-------------------------------------------------------------------------------------|-----------------------|-------------|----------------------------------------------------------------------------------------------|----------|-----------|
| Materiale tagliente | <b>VHM</b>                                        |                                                                                     |                       |             |                                                                                              |          |           |
|                     | Metallo duro integrale a grana ultrafine (MD-UF)  |                                                                                     |                       |             |                                                                                              |          |           |
| Forma codolo        | HA                                                | HB                                                                                  | -HA                   | -HB         | Cyl                                                                                          |          |           |
|                     | a DIN 6535                                        |                                                                                     |                       |             | cilindrico                                                                                   |          |           |
| Norma               | DIN 6527 L                                        |                                                                                     | WN                    |             |                                                                                              |          |           |
|                     | a DIN                                             |                                                                                     | a standard Gühring    |             |                                                                                              |          |           |
| Tipo                | N                                                 | W                                                                                   | NH                    | HRf         |                                                                                              |          |           |
| Applicazioni        |                                                   |                                                                                     |                       |             |                                                                                              |          |           |
|                     | cava                                              | sgrossatura                                                                         | rampa                 | elicoidale  | foratura                                                                                     | finitura | copiatura |
| Lunghezza           |                                                   |                                                                                     |                       |             |                                                                                              |          |           |
|                     | corta (DIN)                                       | lunga (DIN)                                                                         | media                 | extra lunga |                                                                                              |          |           |
| Numero taglienti    |                                                   |                                                                                     |                       |             |                                                                                              |          |           |
|                     | numero di taglienti                               |                                                                                     |                       |             |                                                                                              |          |           |
| Angolo dell'elica   |                                                   |                                                                                     |                       |             |                                                                                              |          |           |
|                     | grandezza angoli dell'elica / numero degli angoli |                                                                                     |                       |             |                                                                                              |          |           |
| Angolo di spoglia   |                                                   |                                                                                     |                       |             |                                                                                              |          |           |
|                     | Angolo di taglio relativa ai taglienti            |                                                                                     |                       |             |                                                                                              |          |           |
| Forma dei taglienti |                                                   |                                                                                     |                       |             |                                                                                              |          |           |
|                     | Smusso                                            |                                                                                     | Raggio con tolleranza |             |                                                                                              |          |           |
| Impiego             |                                                   |                                                                                     |                       |             |                                                                                              |          |           |
|                     | per avanzamento laterale                          | per avanzamento laterale e rettificazione a tuffo inclinata con tagliente al centro |                       |             | per avanzamento laterale, per fresatura a tuffo inclinata e foratura con tagliente al centro |          |           |

Punte



Maschi/Frese a filettare/Maschi a rollare



Frese



PCD



Alesatori



Svasatori/Sbavatori



Servizi



Utensili speciali



Sistemi modulari



Utensili di tornitura

Gühring (Schweiz) AG | Tel. + 41 41 798 20 80

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