

**Richiedete il nostro  
catalogo completo!**

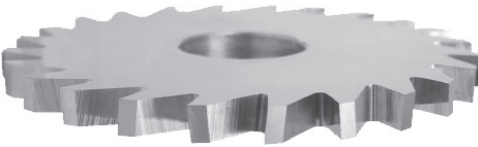
# Utensili EXPERT TITANIO



## Utensili EXPERT raccomandati per la lavorazione del titanio

Materia dell'utensile : **METALLO DURO**

Rivestimento consigliato : **RICO**

| Operazione                    | Rif.        | Foto                                                                                 | Pagina      |
|-------------------------------|-------------|--------------------------------------------------------------------------------------|-------------|
| Perforazione                  | 353         |    | 4           |
| Fresatura                     | 3100        |    | 7           |
| Tagli                         | 226         |  | 8           |
| Filettare                     | 5600        |  | 10          |
| Incisione                     | 119-2       |  | 11          |
| Utensili con profilo speciale | Hélicoïdale |  | A richiesta |

Questa tabella presenta unicamente un utensile ottimale per tipo d'operazione, troverete altri utensili adattati alla lavorazione del titanio nel nostro catalogo.

## Index - Titanio

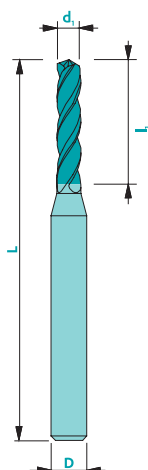
| N° Wsn | DIN                                     | Gr. |
|--------|-----------------------------------------|-----|
| Grades | 1,2,3,4,7,11,12,13,14,15,16,17,26,27,30 | a   |
| Grades | 5,6,9,10,18,19,20,21,22,23,24,25,28,29  | b   |
| 3.7024 | Ti99.8                                  | a   |
| 3.7112 | Ti5Al2,5Sn                              | a   |
| 3.7114 | TiAl5Sn2                                | b   |
| 3.7124 | TiCu2                                   | b   |
| 3.7154 | TiAl6Zr5                                | b   |
| 3.7165 | TiAl6V4 (TA6V)                          | b   |
| 3.7174 | TiAl6V6Sn2                              | b   |
| 3.7184 | TiAl4Mo4Sn2                             | b   |
| 3.7144 | TiAl6Sn2Zr4Mo2                          | b   |

353

# Punta elicoidale Z3 - codolo Ø3



Disponibile con o  
senza rivestimento



## Gruppo materia (vedi pagina 3)

|                             | a     | b     |
|-----------------------------|-------|-------|
| Rivestimento consigliato    | -     | -     |
| $V_c$ non rivestito [m/min] | 31    | 28    |
| $V_c$ rivestito [m/min]     | 36    | 34    |
| F [mm]                      | Ø/120 | Ø/120 |
| Sblocco                     | Øx1.2 | Øx1.2 |

$d_1$ : -0.002/-0.004

D: h5

| Art. n°  | $d_1$ | $L_1$ | D   | L  |
|----------|-------|-------|-----|----|
| 353d0.15 | 0.15  | 2.0   | 3.0 | 38 |
| 353d0.18 | 0.18  | 2.0   | 3.0 | 38 |
| 353d0.20 | 0.20  | 3.0   | 3.0 | 38 |
| 353d0.21 | 0.21  | 3.0   | 3.0 | 38 |
| 353d0.22 | 0.22  | 3.0   | 3.0 | 38 |
| 353d0.23 | 0.23  | 3.0   | 3.0 | 38 |
| 353d0.24 | 0.24  | 3.0   | 3.0 | 38 |
| 353d0.25 | 0.25  | 3.5   | 3.0 | 38 |
| 353d0.26 | 0.26  | 3.5   | 3.0 | 38 |
| 353d0.27 | 0.27  | 3.5   | 3.0 | 38 |
| 353d0.28 | 0.28  | 3.5   | 3.0 | 38 |
| 353d0.29 | 0.29  | 3.5   | 3.0 | 38 |
| 353d0.30 | 0.30  | 5.0   | 3.0 | 38 |
| 353d0.31 | 0.31  | 5.0   | 3.0 | 38 |
| 353d0.32 | 0.32  | 5.0   | 3.0 | 38 |
| 353d0.33 | 0.33  | 5.0   | 3.0 | 38 |
| 353d0.34 | 0.34  | 5.0   | 3.0 | 38 |
| 353d0.35 | 0.35  | 5.0   | 3.0 | 38 |
| 353d0.36 | 0.36  | 5.0   | 3.0 | 38 |
| 353d0.37 | 0.37  | 5.0   | 3.0 | 38 |
| 353d0.38 | 0.38  | 5.0   | 3.0 | 38 |
| 353d0.39 | 0.39  | 5.0   | 3.0 | 38 |
| 353d0.40 | 0.40  | 6.0   | 3.0 | 38 |
| 353d0.41 | 0.41  | 6.0   | 3.0 | 38 |
| 353d0.42 | 0.42  | 6.0   | 3.0 | 38 |
| 353d0.43 | 0.43  | 6.0   | 3.0 | 38 |
| 353d0.44 | 0.44  | 6.0   | 3.0 | 38 |
| 353d0.45 | 0.45  | 6.0   | 3.0 | 38 |
| 353d0.46 | 0.46  | 6.0   | 3.0 | 38 |

| Art. n°  | $d_1$ | $L_1$ | D   | L  |
|----------|-------|-------|-----|----|
| 353d0.47 | 0.47  | 6.0   | 3.0 | 38 |
| 353d0.48 | 0.48  | 6.0   | 3.0 | 38 |
| 353d0.49 | 0.49  | 6.0   | 3.0 | 38 |
| 353d0.50 | 0.50  | 6.0   | 3.0 | 38 |
| 353d0.51 | 0.51  | 6.0   | 3.0 | 38 |
| 353d0.52 | 0.52  | 6.0   | 3.0 | 38 |
| 353d0.53 | 0.53  | 6.0   | 3.0 | 38 |
| 353d0.54 | 0.54  | 6.0   | 3.0 | 38 |
| 353d0.55 | 0.55  | 7.0   | 3.0 | 38 |
| 353d0.56 | 0.56  | 7.0   | 3.0 | 38 |
| 353d0.57 | 0.57  | 7.0   | 3.0 | 38 |
| 353d0.58 | 0.58  | 7.0   | 3.0 | 38 |
| 353d0.59 | 0.59  | 7.0   | 3.0 | 38 |
| 353d0.60 | 0.60  | 7.0   | 3.0 | 38 |
| 353d0.61 | 0.61  | 7.0   | 3.0 | 38 |
| 353d0.62 | 0.62  | 7.0   | 3.0 | 38 |
| 353d0.63 | 0.63  | 7.0   | 3.0 | 38 |
| 353d0.64 | 0.64  | 7.0   | 3.0 | 38 |
| 353d0.65 | 0.65  | 7.0   | 3.0 | 38 |
| 353d0.66 | 0.66  | 7.0   | 3.0 | 38 |
| 353d0.67 | 0.67  | 7.0   | 3.0 | 38 |
| 353d0.68 | 0.68  | 7.0   | 3.0 | 38 |
| 353d0.69 | 0.69  | 7.0   | 3.0 | 38 |
| 353d0.70 | 0.70  | 9.5   | 3.0 | 38 |
| 353d0.71 | 0.71  | 9.5   | 3.0 | 38 |
| 353d0.72 | 0.72  | 9.5   | 3.0 | 38 |
| 353d0.73 | 0.73  | 9.5   | 3.0 | 38 |
| 353d0.74 | 0.74  | 9.5   | 3.0 | 38 |
| 353d0.75 | 0.75  | 9.5   | 3.0 | 38 |

## Formule

$$F = F_z \cdot Z$$

$$V_f = F_z \cdot Z \cdot n$$

$$n = \frac{V_c \cdot 1000}{\pi \cdot d_1}$$

$$V_c = \frac{\pi \cdot d_1 \cdot n}{1000}$$

$$f_z = \frac{V_f}{Z \cdot n}$$

## Leggenda

F [mm]: Avanzamento per giro

FZ [mm]: Avanzamento per dente

Z: Numero di denti

n: Numero di giri al minuto

Vf [mm/min]: Velocità d'avanzamento



# Punta elicoidale Z3 - codolo Ø3

**353**

Continuazione

| Art. n°  | d <sub>1</sub> | l <sub>1</sub> | D   | L  | Art. n°  | d <sub>1</sub> | l <sub>1</sub> | D   | L  |
|----------|----------------|----------------|-----|----|----------|----------------|----------------|-----|----|
| 353d0.76 | 0.76           | 9.5            | 3.0 | 38 | 353d1.20 | 1.20           | 10.5           | 3.0 | 38 |
| 353d0.77 | 0.77           | 9.5            | 3.0 | 38 | 353d1.21 | 1.21           | 10.5           | 3.0 | 38 |
| 353d0.78 | 0.78           | 9.5            | 3.0 | 38 | 353d1.22 | 1.22           | 10.5           | 3.0 | 38 |
| 353d0.79 | 0.79           | 9.5            | 3.0 | 38 | 353d1.23 | 1.23           | 10.5           | 3.0 | 38 |
| 353d0.80 | 0.80           | 9.5            | 3.0 | 38 | 353d1.24 | 1.24           | 10.5           | 3.0 | 38 |
| 353d0.81 | 0.81           | 9.5            | 3.0 | 38 | 353d1.25 | 1.25           | 10.5           | 3.0 | 38 |
| 353d0.82 | 0.82           | 9.5            | 3.0 | 38 | 353d1.26 | 1.26           | 10.5           | 3.0 | 38 |
| 353d0.83 | 0.83           | 9.5            | 3.0 | 38 | 353d1.27 | 1.27           | 10.5           | 3.0 | 38 |
| 353d0.84 | 0.84           | 9.5            | 3.0 | 38 | 353d1.28 | 1.28           | 10.5           | 3.0 | 38 |
| 353d0.85 | 0.85           | 9.5            | 3.0 | 38 | 353d1.29 | 1.29           | 10.5           | 3.0 | 38 |
| 353d0.86 | 0.86           | 9.5            | 3.0 | 38 | 353d1.30 | 1.30           | 10.5           | 3.0 | 38 |
| 353d0.87 | 0.87           | 9.5            | 3.0 | 38 | 353d1.31 | 1.31           | 10.5           | 3.0 | 38 |
| 353d0.88 | 0.88           | 9.5            | 3.0 | 38 | 353d1.32 | 1.32           | 10.5           | 3.0 | 38 |
| 353d0.89 | 0.89           | 9.5            | 3.0 | 38 | 353d1.33 | 1.33           | 10.5           | 3.0 | 38 |
| 353d0.90 | 0.90           | 9.5            | 3.0 | 38 | 353d1.34 | 1.34           | 10.5           | 3.0 | 38 |
| 353d0.91 | 0.91           | 9.5            | 3.0 | 38 | 353d1.35 | 1.35           | 10.5           | 3.0 | 38 |
| 353d0.92 | 0.92           | 9.5            | 3.0 | 38 | 353d1.36 | 1.36           | 10.5           | 3.0 | 38 |
| 353d0.93 | 0.93           | 9.5            | 3.0 | 38 | 353d1.37 | 1.37           | 10.5           | 3.0 | 38 |
| 353d0.94 | 0.94           | 9.5            | 3.0 | 38 | 353d1.38 | 1.38           | 10.5           | 3.0 | 38 |
| 353d0.95 | 0.95           | 9.5            | 3.0 | 38 | 353d1.39 | 1.39           | 10.5           | 3.0 | 38 |
| 353d0.96 | 0.96           | 9.5            | 3.0 | 38 | 353d1.40 | 1.40           | 10.5           | 3.0 | 38 |
| 353d0.97 | 0.97           | 9.5            | 3.0 | 38 | 353d1.41 | 1.41           | 10.5           | 3.0 | 38 |
| 353d0.98 | 0.98           | 9.5            | 3.0 | 38 | 353d1.42 | 1.42           | 10.5           | 3.0 | 38 |
| 353d0.99 | 0.99           | 9.5            | 3.0 | 38 | 353d1.43 | 1.43           | 10.5           | 3.0 | 38 |
| 353d1.00 | 1.00           | 9.5            | 3.0 | 38 | 353d1.44 | 1.44           | 10.5           | 3.0 | 38 |
| 353d1.01 | 1.01           | 9.5            | 3.0 | 38 | 353d1.45 | 1.45           | 10.5           | 3.0 | 38 |
| 353d1.02 | 1.02           | 9.5            | 3.0 | 38 | 353d1.46 | 1.46           | 10.5           | 3.0 | 38 |
| 353d1.03 | 1.03           | 9.5            | 3.0 | 38 | 353d1.47 | 1.47           | 10.5           | 3.0 | 38 |
| 353d1.04 | 1.04           | 9.5            | 3.0 | 38 | 353d1.48 | 1.48           | 10.5           | 3.0 | 38 |
| 353d1.05 | 1.05           | 10.5           | 3.0 | 38 | 353d1.49 | 1.49           | 10.5           | 3.0 | 38 |
| 353d1.06 | 1.06           | 10.5           | 3.0 | 38 | 353d1.50 | 1.50           | 10.5           | 3.0 | 38 |
| 353d1.07 | 1.07           | 10.5           | 3.0 | 38 | 353d1.51 | 1.51           | 10.5           | 3.0 | 38 |
| 353d1.08 | 1.08           | 10.5           | 3.0 | 38 | 353d1.52 | 1.52           | 10.5           | 3.0 | 38 |
| 353d1.09 | 1.09           | 10.5           | 3.0 | 38 | 353d1.53 | 1.53           | 10.5           | 3.0 | 38 |
| 353d1.10 | 1.10           | 10.5           | 3.0 | 38 | 353d1.54 | 1.54           | 10.5           | 3.0 | 38 |
| 353d1.11 | 1.11           | 10.5           | 3.0 | 38 | 353d1.55 | 1.55           | 10.5           | 3.0 | 38 |
| 353d1.12 | 1.12           | 10.5           | 3.0 | 38 | 353d1.56 | 1.56           | 10.5           | 3.0 | 38 |
| 353d1.13 | 1.13           | 10.5           | 3.0 | 38 | 353d1.57 | 1.57           | 10.5           | 3.0 | 38 |
| 353d1.14 | 1.14           | 10.5           | 3.0 | 38 | 353d1.58 | 1.58           | 10.5           | 3.0 | 38 |
| 353d1.15 | 1.15           | 10.5           | 3.0 | 38 | 353d1.59 | 1.59           | 10.5           | 3.0 | 38 |
| 353d1.16 | 1.16           | 10.5           | 3.0 | 38 | 353d1.60 | 1.60           | 10.5           | 3.0 | 38 |
| 353d1.17 | 1.17           | 10.5           | 3.0 | 38 | 353d1.61 | 1.61           | 10.5           | 3.0 | 38 |
| 353d1.18 | 1.18           | 10.5           | 3.0 | 38 | 353d1.62 | 1.62           | 10.5           | 3.0 | 38 |
| 353d1.19 | 1.19           | 10.5           | 3.0 | 38 |          |                |                |     |    |



Disponibile con o senza rivestimento



140°

**Z3**



λ  
34°

**CARB**

## Punta elicoidale Z3 - codolo Ø3



Disponibile con o  
senza rivestimento



140°

Z3


 $\lambda$   
34°

CARB

| Art. n°  | d <sub>1</sub> | l <sub>1</sub> | D   | L  |
|----------|----------------|----------------|-----|----|
| 353d1.63 | 1.63           | 10.5           | 3.0 | 38 |
| 353d1.64 | 1.64           | 10.5           | 3.0 | 38 |
| 353d1.65 | 1.65           | 10.5           | 3.0 | 38 |
| 353d1.66 | 1.66           | 10.5           | 3.0 | 38 |
| 353d1.67 | 1.67           | 10.5           | 3.0 | 38 |
| 353d1.68 | 1.68           | 10.5           | 3.0 | 38 |
| 353d1.69 | 1.69           | 10.5           | 3.0 | 38 |
| 353d1.70 | 1.70           | 10.5           | 3.0 | 38 |
| 353d1.71 | 1.71           | 10.5           | 3.0 | 38 |
| 353d1.72 | 1.72           | 10.5           | 3.0 | 38 |
| 353d1.73 | 1.73           | 10.5           | 3.0 | 38 |
| 353d1.74 | 1.74           | 10.5           | 3.0 | 38 |
| 353d1.75 | 1.75           | 10.5           | 3.0 | 38 |
| 353d1.76 | 1.76           | 10.5           | 3.0 | 38 |
| 353d1.77 | 1.77           | 10.5           | 3.0 | 38 |
| 353d1.78 | 1.78           | 10.5           | 3.0 | 38 |
| 353d1.79 | 1.79           | 10.5           | 3.0 | 38 |
| 353d1.80 | 1.80           | 10.5           | 3.0 | 38 |
| 353d1.81 | 1.81           | 10.5           | 3.0 | 38 |
| 353d1.82 | 1.82           | 10.5           | 3.0 | 38 |
| 353d1.83 | 1.83           | 10.5           | 3.0 | 38 |
| 353d1.84 | 1.84           | 10.5           | 3.0 | 38 |
| 353d1.85 | 1.85           | 10.5           | 3.0 | 38 |
| 353d1.86 | 1.86           | 10.5           | 3.0 | 38 |
| 353d1.87 | 1.87           | 10.5           | 3.0 | 38 |
| 353d1.88 | 1.88           | 10.5           | 3.0 | 38 |
| 353d1.89 | 1.89           | 10.5           | 3.0 | 38 |
| 353d1.90 | 1.90           | 10.5           | 3.0 | 38 |
| 353d1.91 | 1.91           | 10.5           | 3.0 | 38 |
| 353d1.92 | 1.92           | 10.5           | 3.0 | 38 |
| 353d1.93 | 1.93           | 10.5           | 3.0 | 38 |
| 353d1.94 | 1.94           | 10.5           | 3.0 | 38 |
| 353d1.95 | 1.95           | 10.5           | 3.0 | 38 |
| 353d1.96 | 1.96           | 10.5           | 3.0 | 38 |
| 353d1.97 | 1.97           | 10.5           | 3.0 | 38 |
| 353d1.98 | 1.98           | 10.5           | 3.0 | 38 |
| 353d1.99 | 1.99           | 10.5           | 3.0 | 38 |
| 353d2.00 | 2.00           | 10.5           | 3.0 | 38 |
| 353d2.05 | 2.05           | 10.5           | 3.0 | 38 |
| 353d2.10 | 2.10           | 10.5           | 3.0 | 38 |
| 353d2.15 | 2.15           | 10.5           | 3.0 | 38 |
| 353d2.20 | 2.20           | 10.5           | 3.0 | 38 |
| 353d2.25 | 2.25           | 10.5           | 3.0 | 38 |

| Art. n°  | d <sub>1</sub> | l <sub>1</sub> | D   | L  |
|----------|----------------|----------------|-----|----|
| 353d2.30 | 2.30           | 10.5           | 3.0 | 38 |
| 353d2.35 | 2.35           | 10.5           | 3.0 | 38 |
| 353d2.40 | 2.40           | 10.5           | 3.0 | 38 |
| 353d2.45 | 2.45           | 10.5           | 3.0 | 38 |
| 353d2.50 | 2.50           | 10.5           | 3.0 | 38 |
| 353d2.55 | 2.55           | 10.5           | 3.0 | 38 |
| 353d2.60 | 2.60           | 10.5           | 3.0 | 38 |
| 353d2.65 | 2.65           | 10.5           | 3.0 | 38 |
| 353d2.70 | 2.70           | 10.5           | 3.0 | 38 |
| 353d2.75 | 2.75           | 10.5           | 3.0 | 38 |
| 353d2.80 | 2.80           | 10.5           | 3.0 | 38 |
| 353d2.85 | 2.85           | 10.5           | 3.0 | 38 |
| 353d2.90 | 2.90           | 10.5           | 3.0 | 38 |
| 353d2.95 | 2.95           | 10.5           | 3.0 | 38 |
| 353d3.00 | 3.00           | 10.5           | 3.0 | 38 |

# Fresa EXPERT titanio

3100

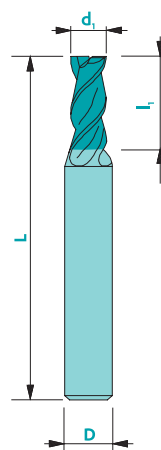
## Gruppo materia (vedi pagina 3)

|                              | a     | b     |
|------------------------------|-------|-------|
| Rivestimento consigliato     | Rico  | Rico  |
| $V_c$ non rivestito [m/min]  | 70    | 90    |
| $V_c$ rivestito [m/min]      | 60    | 80    |
| $F_z \varnothing 0.25$ [mm]  | 0.002 | 0.002 |
| $F_z \varnothing 0.50$ [mm]  | 0.004 | 0.002 |
| $F_z \varnothing 1.00$ [mm]  | 0.007 | 0.004 |
| $F_z \varnothing 2.00$ [mm]  | 0.010 | 0.008 |
| $F_z \varnothing 4.00$ [mm]  | 0.015 | 0.016 |
| $F_z \varnothing 6.00$ [mm]  | 0.024 | 0.024 |
| $F_z \varnothing 8.00$ [mm]  | 0.032 | 0.032 |
| $F_z \varnothing 10.00$ [mm] | 0.04  | 0.04  |
| $F_z \varnothing 12.00$ [mm] | 0.05  | 0.05  |
| $F_z \varnothing 16.00$ [mm] | 0.06  | 0.06  |
| $F_z \varnothing 20.00$ [mm] | 0.07  | 0.07  |

## Tolleranze

$d_1 \leq 1 \text{ mm} \rightarrow +0/-0.01$   
 $d_1 > 1 \text{ mm} \rightarrow +0/-0.02$   
 $d_1 = D \rightarrow d_1: e8$

D: h5



Disponibile con o senza rivestimento

| Art. n°   | $d_1$ | $l_1$ | D | L  | Z |
|-----------|-------|-------|---|----|---|
| 3100d0.50 | 0.5   | 1.0   | 6 | 57 | 3 |
| 3100d0.60 | 0.6   | 1.2   | 6 | 57 | 3 |
| 3100d0.70 | 0.7   | 1.4   | 6 | 57 | 3 |
| 3100d0.80 | 0.8   | 1.6   | 6 | 57 | 3 |
| 3100d0.90 | 0.9   | 1.8   | 6 | 57 | 3 |
| 3100d1.00 | 1.0   | 2.0   | 6 | 57 | 3 |
| 3100d1.10 | 1.1   | 2.2   | 6 | 57 | 3 |
| 3100d1.20 | 1.2   | 2.4   | 6 | 57 | 3 |
| 3100d1.30 | 1.3   | 2.6   | 6 | 57 | 3 |
| 3100d1.40 | 1.4   | 2.8   | 6 | 57 | 3 |
| 3100d1.50 | 1.5   | 3.0   | 6 | 57 | 3 |
| 3100d1.60 | 1.6   | 3.2   | 6 | 57 | 3 |
| 3100d1.70 | 1.7   | 3.4   | 6 | 57 | 3 |
| 3100d1.80 | 1.8   | 3.6   | 6 | 57 | 3 |
| 3100d1.90 | 1.9   | 3.8   | 6 | 57 | 3 |
| 3100d2.00 | 2.0   | 4.0   | 6 | 57 | 3 |
| 3100d2.10 | 2.1   | 4.2   | 6 | 57 | 3 |

| Art. n°    | $d_1$ | $l_1$ | D  | L  | Z |
|------------|-------|-------|----|----|---|
| 3100d2.20  | 2.2   | 4.4   | 6  | 57 | 3 |
| 3100d2.30  | 2.3   | 4.6   | 6  | 57 | 3 |
| 3100d2.40  | 2.4   | 4.8   | 6  | 57 | 3 |
| 3100d2.50  | 2.5   | 5.0   | 6  | 57 | 3 |
| 3100d2.60  | 2.6   | 5.2   | 6  | 57 | 3 |
| 3100d2.70  | 2.7   | 5.4   | 6  | 57 | 3 |
| 3100d2.80  | 2.8   | 5.6   | 6  | 57 | 3 |
| 3100d2.90  | 2.9   | 5.8   | 6  | 57 | 3 |
| 3100d3.00  | 3.0   | 6.0   | 6  | 57 | 3 |
| 3100d3.50  | 3.5   | 7.0   | 6  | 57 | 3 |
| 3100d4.00  | 4.0   | 8.0   | 6  | 57 | 3 |
| 3100d5.00  | 5.0   | 10.0  | 6  | 57 | 3 |
| 3100d6.00  | 6.0   | 12.0  | 8  | 63 | 3 |
| 3100d8.00  | 8.0   | 16.0  | 8  | 63 | 3 |
| 3100d10.00 | 10.0  | 20.0  | 10 | 72 | 4 |
| 3100d12.00 | 12.0  | 24.0  | 12 | 83 | 4 |



Z3-4



$\lambda$   
45°

$\gamma$   
8°

CARB



$ap=1 \times d_1$



$ae=0.10 \times d_1$   
 $ap=1 \times d_1$

## Formule

$$F = F_z \cdot Z$$

$$V_f = F_z \cdot Z \cdot n$$

$$n = \frac{V_c \cdot 1000}{\pi \cdot d_1}$$

$$V_c = \frac{\pi \cdot d_1 \cdot n}{1000}$$

$$f_z = \frac{V_f}{Z \cdot n}$$

## Leggenda

$F$  [mm]: Avanzamento per giro

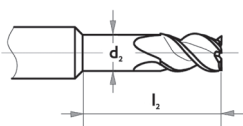
$F_z$  [mm]: Avanzamento per dente

Z: Numero di denti

n: Numero di giri al minuto

$V_f$  [mm/min]: Velocità d'avanzamento

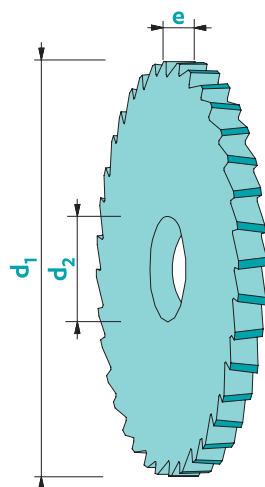
## A richiesta



# Fresa circolare dentatura alternata



Disponibile con o  
senza rivestimento



## Gruppo materia (vedi pagina 4)

|                             | a       | b       |
|-----------------------------|---------|---------|
| Rivestimento consigliato    | Rico    | Rico    |
| $V_c$ non rivestito [m/min] | 50      | 60      |
| $V_c$ rivestito [m/min]     | 40      | 50      |
| $F_z$ [mm]                  | Ø/10000 | Ø/10000 |

Tolleranze e: +0/-0.01  
d<sub>2</sub>: H5

|                        |                   |
|------------------------|-------------------|
|                        | <b>Z</b><br>12-36 |
|                        |                   |
| <b>λ</b><br><b>ALT</b> | <b>γ</b><br>8°    |
| <b>CARB</b>            |                   |

| Art. n°         | d <sub>1</sub> | e   | d <sub>2</sub> | Z       |
|-----------------|----------------|-----|----------------|---------|
| 226d15e1.5a5Z## | 15             | 1.5 | 5              | 12 - 18 |
| 226d15e2.0a5Z## | 15             | 2.0 | 5              | 12 - 18 |
| 226d15e2.5a5Z## | 15             | 2.5 | 5              | 12 - 18 |
| 226d15e3.0a5Z## | 15             | 3.0 | 5              | 12 - 18 |
| 226d15e3.5a5Z## | 15             | 3.5 | 5              | 12 - 18 |
| 226d15e4.0a5Z## | 15             | 4.0 | 5              | 12 - 18 |
| 226d15e4.5a5Z## | 15             | 4.5 | 5              | 12 - 18 |
| 226d15e5.0a5Z## | 15             | 5.0 | 5              | 12 - 18 |
| 226d15e5.5a5Z## | 15             | 5.5 | 5              | 12 - 18 |
| 226d15e6.0a5Z## | 15             | 6.0 | 5              | 12 - 18 |
| 226d20e1.5a5Z## | 20             | 1.5 | 5              | 20 - 24 |
| 226d20e2.0a5Z## | 20             | 2.0 | 5              | 20 - 24 |
| 226d20e2.5a5Z## | 20             | 2.5 | 5              | 20 - 24 |
| 226d20e3.0a5Z## | 20             | 3.0 | 5              | 20 - 24 |
| 226d20e3.5a5Z## | 20             | 3.5 | 5              | 20 - 24 |
| 226d20e4.0a5Z## | 20             | 4.0 | 5              | 20 - 24 |
| 226d20e4.5a5Z## | 20             | 4.5 | 5              | 20 - 24 |
| 226d20e5.0a5Z## | 20             | 5.0 | 5              | 20 - 24 |
| 226d20e5.5a5Z## | 20             | 5.5 | 5              | 20 - 24 |
| 226d20e6.0a5Z## | 20             | 6.0 | 5              | 20 - 24 |
| 226d25e1.5a8Z## | 25             | 1.5 | 8              | 24 - 28 |
| 226d25e2.0a8Z## | 25             | 2.0 | 8              | 24 - 28 |
| 226d25e2.5a8Z## | 25             | 2.5 | 8              | 24 - 28 |
| 226d25e3.0a8Z## | 25             | 3.0 | 8              | 24 - 28 |
| 226d25e3.5a8Z## | 25             | 3.5 | 8              | 24 - 28 |
| 226d25e4.0a8Z## | 25             | 4.0 | 8              | 24 - 28 |
| 226d25e4.5a8Z## | 25             | 4.5 | 8              | 24 - 28 |
| 226d25e5.0a8Z## | 25             | 5.0 | 8              | 24 - 28 |
| 226d25e5.5a8Z## | 25             | 5.5 | 8              | 24 - 28 |

| Art. n°          | d <sub>1</sub> | e    | d <sub>2</sub> | Z       |
|------------------|----------------|------|----------------|---------|
| 226d25e6.0a8Z##  | 25             | 6.0  | 8              | 24 - 28 |
| 226d25e6.5a8Z##  | 25             | 6.5  | 8              | 24 - 28 |
| 226d25e7.0a8Z##  | 25             | 7.0  | 8              | 24 - 28 |
| 226d25e7.5a8Z##  | 25             | 7.5  | 8              | 24 - 28 |
| 226d25e8.0a8Z##  | 25             | 8.0  | 8              | 24 - 28 |
| 226d30e1.5a8Z##  | 30             | 1.5  | 8              | 24 - 28 |
| 226d30e2.0a8Z##  | 30             | 2.0  | 8              | 24 - 28 |
| 226d30e2.5a8Z##  | 30             | 2.5  | 8              | 24 - 28 |
| 226d30e3.0a8Z##  | 30             | 3.0  | 8              | 24 - 28 |
| 226d30e3.5a8Z##  | 30             | 3.5  | 8              | 24 - 28 |
| 226d30e4.0a8Z##  | 30             | 4.0  | 8              | 24 - 28 |
| 226d30e4.5a8Z##  | 30             | 4.5  | 8              | 24 - 28 |
| 226d30e5.0a8Z##  | 30             | 5.0  | 8              | 24 - 28 |
| 226d30e5.5a8Z##  | 30             | 5.5  | 8              | 24 - 28 |
| 226d30e6.0a8Z##  | 30             | 6.0  | 8              | 24 - 28 |
| 226d30e6.5a8Z##  | 30             | 6.5  | 8              | 24 - 28 |
| 226d30e7.0a8Z##  | 30             | 7.0  | 8              | 24 - 28 |
| 226d30e7.5a8Z##  | 30             | 7.5  | 8              | 24 - 28 |
| 226d30e8.0a8Z##  | 30             | 8.0  | 8              | 24 - 28 |
| 226d30e8.5a8Z##  | 30             | 8.5  | 8              | 24 - 28 |
| 226d30e9.0a8Z##  | 30             | 9.0  | 8              | 24 - 28 |
| 226d30e9.5a8Z##  | 30             | 9.5  | 8              | 24 - 28 |
| 226d30e10.0a8Z## | 30             | 10.0 | 8              | 24 - 28 |
| 226d40e2.0a10Z## | 40             | 2.0  | 10             | 28 - 32 |
| 226d40e2.5a10Z## | 40             | 2.5  | 10             | 28 - 32 |
| 226d40e3.0a10Z## | 40             | 3.0  | 10             | 28 - 32 |
| 226d40e3.5a10Z## | 40             | 3.5  | 10             | 28 - 32 |
| 226d40e4.0a10Z## | 40             | 4.0  | 10             | 28 - 32 |
| 226d40e4.5a10Z## | 40             | 4.5  | 10             | 28 - 32 |

## Formule

$$F = F_z \cdot Z$$

$$V_f = F_z \cdot Z \cdot n$$

$$n = \frac{V_c \cdot 1000}{\pi \cdot d_1}$$

$$V_c = \frac{\pi \cdot d_1 \cdot n}{1000}$$

$$f_z = \frac{V_f}{Z \cdot n}$$

## Leggenda

F [mm]: Avanzamento per giro

FZ [mm]: Avanzamento per dente

Z: Numero di denti

n: Numero di giri al minuto

Vf [mm/min]: Velocità d'avanzamento



# Fresa circolare dentatura alternata

226

Continuazione

| Art. n°           | d <sub>1</sub> | e    | d <sub>2</sub> | Z       | Art. n°           | d <sub>1</sub> | e    | d <sub>2</sub> | Z       |
|-------------------|----------------|------|----------------|---------|-------------------|----------------|------|----------------|---------|
| 226d40e5.0a10Z##  | 40             | 5.0  | 10             | 28 - 32 | 226d63e8.0a16Z##  | 63             | 8.0  | 16             | 28 - 36 |
| 226d40e5.5a10Z##  | 40             | 5.5  | 10             | 28 - 32 | 226d63e8.5a16Z##  | 63             | 8.5  | 16             | 28 - 36 |
| 226d40e6.0a10Z##  | 40             | 6.0  | 10             | 28 - 32 | 226d63e9.0a16Z##  | 63             | 9.0  | 16             | 28 - 36 |
| 226d40e6.5a10Z##  | 40             | 6.5  | 10             | 28 - 32 | 226d63e10.0a16Z## | 63             | 10.0 | 16             | 28 - 36 |
| 226d40e7.0a10Z##  | 40             | 7.0  | 10             | 28 - 32 | 226d80e2.0a22Z##  | 80             | 2.0  | 22             | 28 - 36 |
| 226d40e7.5a10Z##  | 40             | 7.5  | 10             | 28 - 32 | 226d80e2.5a22Z##  | 80             | 2.5  | 22             | 28 - 36 |
| 226d40e8.0a10Z##  | 40             | 8.0  | 10             | 28 - 32 | 226d80e3.0a22Z##  | 80             | 3.0  | 22             | 28 - 36 |
| 226d40e8.5a10Z##  | 40             | 8.5  | 10             | 28 - 32 | 226d80e3.5a22Z##  | 80             | 3.5  | 22             | 28 - 36 |
| 226d40e9.0a10Z##  | 40             | 9.0  | 10             | 28 - 32 | 226d80e4.0a22Z##  | 80             | 4.0  | 22             | 28 - 36 |
| 226d40e9.5a10Z##  | 40             | 9.5  | 10             | 28 - 32 | 226d80e4.5a22Z##  | 80             | 4.5  | 22             | 28 - 36 |
| 226d40e10.0a10Z## | 40             | 10.0 | 10             | 28 - 32 | 226d80e5.0a22Z##  | 80             | 5.0  | 22             | 28 - 36 |
| 226d40e11.0a10Z## | 40             | 11.0 | 10             | 28 - 32 | 226d80e5.5a22Z##  | 80             | 5.5  | 22             | 28 - 36 |
| 226d40e12.0a10Z## | 40             | 12.0 | 10             | 28 - 32 | 226d80e6.0a22Z##  | 80             | 6.0  | 22             | 28 - 36 |
| 226d50e2.0a13Z##  | 50             | 2.0  | 13             | 28 - 32 | 226d80e6.5a22Z##  | 80             | 6.5  | 22             | 28 - 36 |
| 226d50e2.5a13Z##  | 50             | 2.5  | 13             | 28 - 32 | 226d80e7.0a22Z##  | 80             | 7.0  | 22             | 28 - 36 |
| 226d50e3.0a13Z##  | 50             | 3.0  | 13             | 28 - 32 | 226d80e7.5a22Z##  | 80             | 7.5  | 22             | 28 - 36 |
| 226d50e3.5a13Z##  | 50             | 3.5  | 13             | 28 - 32 | 226d80e8.0a22Z##  | 80             | 8.0  | 22             | 28 - 36 |
| 226d50e4.0a13Z##  | 50             | 4.0  | 13             | 28 - 32 | 226d80e8.5a22Z##  | 80             | 8.5  | 22             | 28 - 36 |
| 226d50e4.5a13Z##  | 50             | 4.5  | 13             | 28 - 32 | 226d80e9.0a22Z##  | 80             | 9.0  | 22             | 28 - 36 |
| 226d50e5.0a13Z##  | 50             | 5.0  | 13             | 28 - 32 | 226d80e9.5a22Z##  | 80             | 9.5  | 22             | 28 - 36 |
| 226d50e5.5a13Z##  | 50             | 5.5  | 13             | 28 - 32 | 226d80e10.0a22Z## | 80             | 10.0 | 22             | 28 - 36 |
| 226d50e6.0a13Z##  | 50             | 6.0  | 13             | 28 - 32 | 226d80e11.0a22Z## | 80             | 11.0 | 22             | 28 - 36 |
| 226d50e6.5a13Z##  | 50             | 6.5  | 13             | 28 - 32 | 226d80e12.0a22Z## | 80             | 12.0 | 22             | 28 - 36 |
| 226d50e7.0a13Z##  | 50             | 7.0  | 13             | 28 - 32 |                   |                |      |                |         |
| 226d50e7.5a13Z##  | 50             | 7.5  | 13             | 28 - 32 |                   |                |      |                |         |
| 226d50e8.0a13Z##  | 50             | 8.0  | 13             | 28 - 32 |                   |                |      |                |         |
| 226d50e8.5a13Z##  | 50             | 8.5  | 13             | 28 - 32 |                   |                |      |                |         |
| 226d50e9.0a13Z##  | 50             | 9.0  | 13             | 28 - 32 |                   |                |      |                |         |
| 226d50e9.5a13Z##  | 50             | 9.5  | 13             | 28 - 32 |                   |                |      |                |         |
| 226d50e10.0a13Z## | 50             | 10.0 | 13             | 28 - 32 |                   |                |      |                |         |
| 226d50e11.0a13Z## | 50             | 11.0 | 13             | 28 - 32 |                   |                |      |                |         |
| 226d50e12.0a13Z## | 50             | 12.0 | 13             | 28 - 32 |                   |                |      |                |         |
| 226d63e2.0a16Z##  | 63             | 2.0  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e2.5a16Z##  | 63             | 2.5  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e3.0a16Z##  | 63             | 3.0  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e3.5a16Z##  | 63             | 3.5  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e4.0a16Z##  | 63             | 4.0  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e4.5a16Z##  | 63             | 4.5  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e5.0a16Z##  | 63             | 5.0  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e5.5a16Z##  | 63             | 5.5  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e6.0a16Z##  | 63             | 6.0  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e6.5a16Z##  | 63             | 6.5  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e7.0a16Z##  | 63             | 7.0  | 16             | 28 - 36 |                   |                |      |                |         |
| 226d63e7.5a16Z##  | 63             | 7.5  | 16             | 28 - 36 |                   |                |      |                |         |



Disponibile con o  
senza rivestimento



Z  
12-36



λ  
ALT

γ  
8°

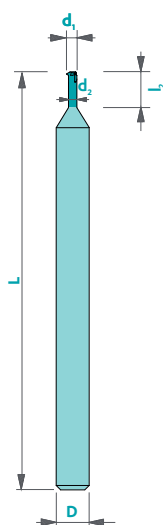
CARB

5600

# Utensiler per rullare - NIHS 06-02 & 06-03 - Z3



Disponibile con o  
senza rivestimento



## Gruppo materia (vedi pagina 4)

|                             | a    | b    |
|-----------------------------|------|------|
| Rivestimento consigliato    | Rico | Rico |
| $V_c$ non rivestito [m/min] | 90   | 80   |
| $V_c$ rivestito [m/min]     | 110  | 100  |

Tolleranze D: h5

Z3

CARB

| Art. n°   | Ø Nominale | Passo | $d_1$ | $l_2$ | $d_2$ | D | L  |
|-----------|------------|-------|-------|-------|-------|---|----|
| 5600S0.80 | S0.80      | 0.200 | 0.60  | 2.00  | 0.38  | 3 | 38 |
| 5600S0.90 | S0.90      | 0.225 | 0.68  | 2.25  | 0.43  | 3 | 38 |
| 5600S1.00 | S1.00      | 0.250 | 0.76  | 2.50  | 0.48  | 3 | 38 |
| 5600S1.20 | S1.20      | 0.250 | 0.94  | 2.50  | 0.66  | 3 | 38 |
| 5600S1.40 | S1.40      | 0.300 | 1.10  | 3.00  | 0.76  | 3 | 38 |
| 5600M1.00 | M1.00      | 0.250 | 0.76  | 2.50  | 0.48  | 3 | 38 |
| 5600M1.20 | M1.20      | 0.250 | 0.94  | 2.50  | 0.66  | 3 | 38 |
| 5600M1.40 | M1.40      | 0.300 | 1.10  | 3.00  | 0.76  | 3 | 38 |
| 5600M1.60 | M1.60      | 0.350 | 1.25  | 3.50  | 0.85  | 3 | 38 |
| 5600M1.80 | M1.80      | 0.350 | 1.45  | 3.50  | 1.05  | 3 | 38 |
| 5600M2.20 | M2.20      | 0.450 | 1.70  | 4.50  | 1.19  | 3 | 38 |
| 5600M2.50 | M2.50      | 0.450 | 2.00  | 5.00  | 1.49  | 3 | 38 |
| 5600M3.00 | M3.00      | 0.500 | 2.40  | 4.50  | 1.84  | 3 | 38 |

## Formule

$$F = F_z \cdot Z$$

$$V_f = F_z \cdot Z \cdot n$$

$$n = \frac{V_c \cdot 1000}{\pi \cdot d_1}$$

$$V_c = \frac{\pi \cdot d_1 \cdot n}{1000}$$

$$f_z = \frac{V_f}{Z \cdot n}$$

## Leggenda

F [mm]: Avanzamento per giro

FZ [mm]: Avanzamento per dente

Z : Numero di denti

n : Numero di giri al minuto

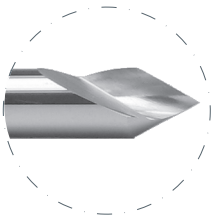
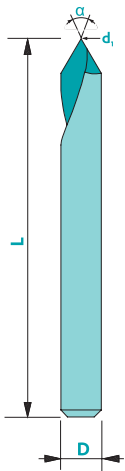
Vf [mm/min]: Velocità d'avanzamento

# Fresa a incidere (bulino) elicoidale piatto alla punta

119-2

| Gruppo materia (vedi pagina 4) | a      | b      |
|--------------------------------|--------|--------|
| Rivestimento consigliato       | Rico   | Rico   |
| n [rpm]                        | 30'000 | 30'000 |
| Fz↓ [mm]                       | 0.003  | 0.003  |
| Fz→ [mm]                       | 0.0065 | 0.0065 |

Tolleranze  
d<sub>1</sub>: +/- 0.01  
D: h5



Disponibile con o  
senza rivestimento

Codice art.: 119-2a##d#.##  
Esempio: fresa ref. 119-2 con angolo di 25° e diametro all'estremità 0.05mm: 119-2a25d0.05

| $\alpha^*$ | d <sub>1</sub> ** | D | L  |
|------------|-------------------|---|----|
| 15-45°     | 0.02-0.09         | 3 | 33 |
| 15-45°     | 0.10-0.30         | 3 | 33 |
| 50-140°    | 0.02-0.09         | 3 | 33 |
| 50-140°    | 0.10-0.30         | 3 | 33 |

\* Angoli possibili: tutti i 5° tra 15° e 45° e tutti i 10° tra 50° e 140°

\*\* Diametri possibili: tutti gli 0.01 mm tra 0.02 e 0.09 e tutti gli 0.05 mm tra 0.10 e 0.30 mm

Altre dimensioni (angolo, diametro all'estremità, codolo) a richiesta

0.02-0.30



$\lambda$   
24°

CARB

## Formule

$$F = F_z \cdot Z$$

$$V_f = F_z \cdot Z \cdot n$$

$$n = \frac{V_c \cdot 1000}{\pi \cdot d_1}$$

$$V_c = \frac{\pi \cdot d_1 \cdot n}{1000}$$

$$f_z = \frac{V_f}{Z \cdot n}$$

## Leggenda

F [mm]: Avanzamento per giro

FZ [mm]: Avanzamento per dente

Z: Numero di denti

n: Numero di giri al minuto

Vf [mm/min]: Velocità d'avanzamento

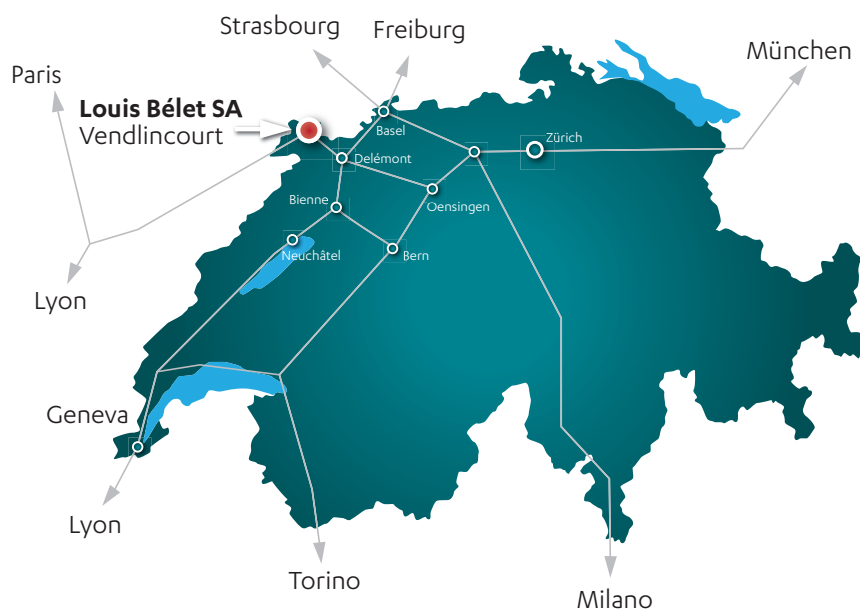


### Dal 1948

Dal 1948, Louis Bélet SA, un'impresa a conduzione familiare con oltre 150 collaboratori, produce utensili di alta precisione in metallo duro, PCD e ceramica. Nel 2008, la direzione della ditta è stata ripresa dai due nipoti del fondatore, la signora Roxane Piquerez e il signor Arnaud Maître.

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### La ricerca dell'eccellenza

Lo spirito della ditta Belet si basa sulla continua ricerca dell'eccellenza. In tutte le nostre attività, cerchiamo sempre di trovare le soluzioni migliori per i nostri clienti e dipendenti.

La gestione della qualità e la gestione ambientale sono attestate di certificati ISO 9001:2008 e ISO 14001:2004

**Lista dei agenti  
disponibili su [www.louisbelet.ch](http://www.louisbelet.ch)**

