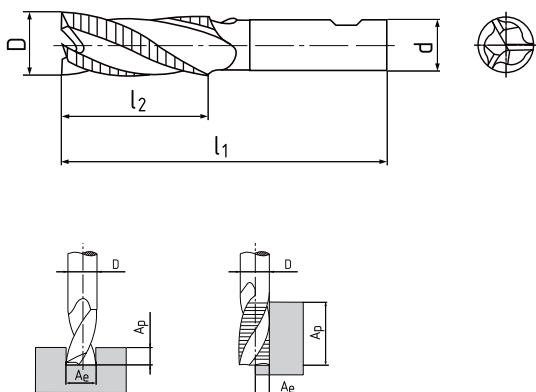


# End mills

1 tooth cut over centre



- CZ** Frézy válčové čelní | hrubovací, na slitiny hliníku, 1 břit přes střed  
**DE** Schaftfräser | für Aluminium schrappen, 1 Schneide über die Mitte  
**RU** Фрезы концевые с цилиндрическим хвостовиком | черновые по Алюминию с центрорежущим зубом



**114418**



**115418**



| D<br>k12 | d<br>h6 | l1<br>114418 | l1<br>115418 | l2<br>114418 | l2<br>115418 | Z | 114418 | 115418 |
|----------|---------|--------------|--------------|--------------|--------------|---|--------|--------|
| 6        | 6       | 57           | 68           | 13           | 24           | 3 | .060   | .060   |
| 8        | 10      | 69           | 88           | 19           | 38           | 3 | .080   | .080   |
| 10       | 10      | 72           | 95           | 22           | 45           | 3 | .100   | .100   |
| 12       | 12      | 83           | 110          | 26           | 53           | 3 | .120   | .120   |
| 16       | 16      | 92           | 123          | 32           | 63           | 3 | .160   | .160   |
| 20       | 20      | 104          | 141          | 38           | 75           | 3 | .200   | .200   |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|               |             | fz (mm/z) |       |     |       |       |       |       |       |       |
|---------------|-------------|-----------|-------|-----|-------|-------|-------|-------|-------|-------|
| Material      |             | Ap        | Ae    | Vc  | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 20  |
| <b>114418</b> |             |           |       |     |       |       |       |       |       |       |
| <b>N.1</b>    | ≤ 400 N/mm² | 1,5xD     | 0,5xD | 108 | 0,025 | 0,033 | 0,041 | 0,049 | 0,066 | 0,082 |
| <b>N.2</b>    | ≤ 600 N/mm² | 1,5xD     | 0,5xD | 165 | 0,026 | 0,035 | 0,044 | 0,053 | 0,07  | 0,088 |
| <b>N.3</b>    | ≤ 600 N/mm² | 1,5xD     | 0,5xD | 196 | 0,028 | 0,037 | 0,046 | 0,055 | 0,074 | 0,092 |
| <b>115418</b> |             |           |       |     |       |       |       |       |       |       |
| <b>N.1</b>    | ≤ 400 N/mm² | 1,5xD     | 0,5xD | 123 | 0,027 | 0,036 | 0,045 | 0,054 | 0,072 | 0,09  |
| <b>N.2</b>    | ≤ 600 N/mm² | 1,5xD     | 0,5xD | 138 | 0,029 | 0,038 | 0,048 | 0,058 | 0,077 | 0,096 |
| <b>N.3</b>    | ≤ 600 N/mm² | 1,5xD     | 0,5xD | 143 | 0,031 | 0,041 | 0,051 | 0,061 | 0,082 | 0,102 |

# End mills

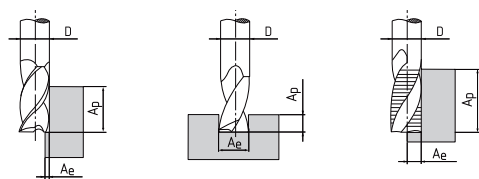
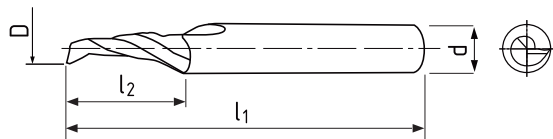
short, 1 tooth cut over centre



**CZ** Frézy válcové čelní | krátké, jednobřité

**DE** Schaftfräser | Kurz, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | короткие, с центрорежущим зубом



**100405**



| D<br>k 12 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 100405 | 100405   |
|-----------|----------|----------------|----------------|---|--------|----------|
| 3         | 8        | 60             | 10             | 1 | .030   | .030 ZrN |
| 4         | 8        | 60             | 12             | 1 | .040   | .040 ZrN |
| 5         | 8        | 60             | 14             | 1 | .050   | .050 ZrN |
| 6         | 8        | 60             | 14             | 1 | .060   | .060 ZrN |
| 7         | 8        | 60             | 14             | 1 | .070   | .070 ZrN |
| 8         | 8        | 80             | 14             | 1 | .080   | .080 ZrN |
| 9         | 8        | 80             | 14             | 1 | .090   | .090 ZrN |
| 10        | 8        | 80             | 14             | 1 | .100   | .100 ZrN |
| 12        | 8        | 80             | 14             | 1 | .120   | .120 ZrN |

Also in the set / Také v sadě / Auch im Set / Также в комплекте (68)

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|                                    |                | f <sub>z</sub> (mm/z) |                |       |       |       |      |       |  |
|------------------------------------|----------------|-----------------------|----------------|-------|-------|-------|------|-------|--|
| Material                           | A <sub>p</sub> | A <sub>e</sub>        | V <sub>c</sub> | Ø 3   | Ø 6   | Ø 8   | Ø 10 | Ø 12  |  |
| <b>N.2</b> ≤ 600 N/mm <sup>2</sup> | 1,5xD          | 0,5xD                 | 160–260        | 0,008 | 0,018 | 0,024 | 0,03 | 0,033 |  |

# End mills

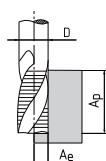
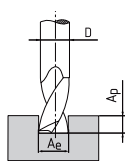
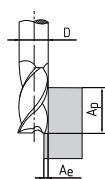
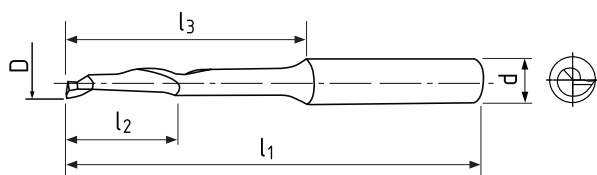
long 1 tooth cut over centre



**CZ** Frézy válcové čelní | dlouhé, jednobřité

**DE** Schaftfräser | Lang, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | длинные, с центрорежущим зубом



**101405**



| D<br>k 12 | d<br>h 6 | l1  | l2 | l3 | Z | 101405  | 101405      |
|-----------|----------|-----|----|----|---|---------|-------------|
| 3,2       | 8        | 80  | 10 | 38 | 1 | .032080 | .032080 ZrN |
| 4         | 8        | 80  | 16 | 45 | 1 | .040    | .040 ZrN    |
| 4,2       | 8        | 80  | 10 | 37 | 1 | .042080 | .042080 ZrN |
| 5         | 8        | 80  | 14 | 36 | 1 | .050080 | .050080 ZrN |
| 5         | 8        | 80  | 16 | 45 | 1 | .050    | .050 ZrN    |
| 5         | 8        | 120 | 16 | 84 | 1 | .050120 | .050120 ZrN |
| 6         | 8        | 80  | 14 | 37 | 1 | .060080 | .060080 ZrN |
| 6         | 8        | 90  | 16 | 45 | 1 | .060    | .060 ZrN    |
| 8         | 8        | 80  | 14 | 55 | 1 | .080080 | .080080 ZrN |
| 8         | 8        | 100 | 30 | 70 | 1 | .080100 | .080100 ZrN |
| 8         | 8        | 120 | 16 | 90 | 1 | .080120 | .080120 ZrN |
| 10        | 10       | 80  | 14 | 60 | 1 | .10010  | .10010 ZrN  |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

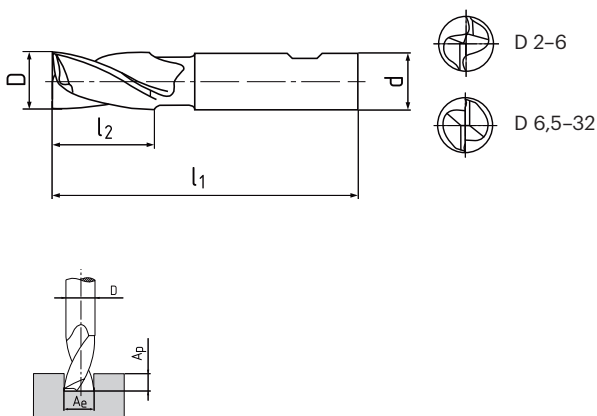
|            |             | fz (mm/z) |       |         |        |       |       |        |        |       |
|------------|-------------|-----------|-------|---------|--------|-------|-------|--------|--------|-------|
| Material   |             | Ap        | Ae    | Vc      | Ø 3    | Ø 4   | Ø 5   | Ø 6    | Ø 8    | Ø 10  |
| <b>N.2</b> | ≤ 600 N/mm² | 1,5xD     | 0,5xD | 160–260 | 0,0056 | 0,008 | 0,010 | 0,0126 | 0,0168 | 0,021 |

# End mills

2 – fluted, 2 teeth cut to centre



**CZ** Frézy pro drážky per | dvouzubé, 2 břity do středu  
**DE** Langlochfräser | zweischneider, 2 Schneide bis Mitte  
**RU** Фрезы шпоночные | двузубые, 2 режущие кромки ч. центр



**270618**

**273618**



| D<br>e 8 | d<br>h 6 | I1<br>270618 | I1<br>273618 | I2<br>270618 | I2<br>273618 | Z | 270618 | 273618 |
|----------|----------|--------------|--------------|--------------|--------------|---|--------|--------|
| 2        | 6        | 51           | 54           | 7            | 10           | 2 | .020   | .020   |
| 2,5      | 6        | 52           |              | 8            |              | 2 | .025   |        |
| 3        | 6        | 52           | 56           | 8            | 12           | 2 | .030   | .030   |
| 3,5      | 6        | 54           |              | 10           |              | 2 | .035   |        |
| 4        | 6        | 55           | 63           | 11           | 19           | 2 | .040   | .040   |
| 4,5      | 6        | 55           |              | 11           |              | 2 | .045   |        |
| 5        | 6        | 57           | 68           | 13           | 24           | 2 | .050   | .050   |
| 5,5      | 6        | 57           |              | 13           |              | 2 | .055   |        |
| 6        | 6        | 57           | 68           | 13           | 24           | 2 | .060   | .060   |
| 6,5      | 10       | 66           |              | 16           |              | 2 | .065   |        |
| 7        | 10       | 66           | 80           | 16           | 30           | 2 | .070   | .070   |
| 7,5      | 10       | 66           |              | 16           |              | 2 | .075   |        |
| 8        | 10       | 69           | 88           | 19           | 38           | 2 | .080   | .080   |
| 8,5      | 10       | 69           |              | 19           |              | 2 | .085   |        |
| 9        | 10       | 69           | 88           | 19           | 38           | 2 | .090   | .090   |
| 9,5      | 10       | 69           |              | 19           |              | 2 | .095   |        |
| 10       | 10       | 72           | 95           | 22           | 45           | 2 | .100   | .100   |
| 11       | 12       | 79           | 102          | 22           | 45           | 2 | .110   | .110   |
| 12       | 12       | 83           | 110          | 26           | 53           | 2 | .120   | .120   |
| 13       | 12       | 83           | 110          | 26           | 53           | 2 | .130   | .130   |
| 14       | 12       | 83           | 110          | 26           | 53           | 2 | .140   | .140   |
| 15       | 12       | 83           | 110          | 26           | 53           | 2 | .150   | .150   |
| 16       | 16       | 92           | 123          | 32           | 63           | 2 | .160   | .160   |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

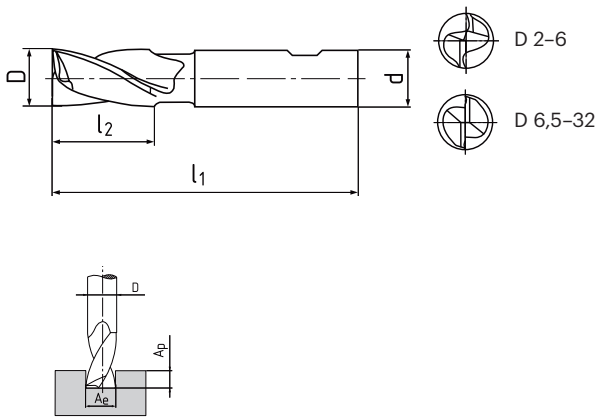
|          |             | fz (mm/z) |     |         |        |        |        |        |        |        |
|----------|-------------|-----------|-----|---------|--------|--------|--------|--------|--------|--------|
| Material |             | Ap        | Ae  | Vc      | Ø 3    | Ø 6    | Ø 8    | Ø 10   | Ø 12   | Ø 16   |
| P.1      | ≤ 600 N/mm² | 0,5xD     | 1xD | 45      | 0,009  | 0,022  | 0,029  | 0,036  | 0,044  | 0,058  |
| N.2      | ≤ 600 N/mm² | 0,5xD     | 1xD | 160-300 | 0,0117 | 0,0286 | 0,0377 | 0,0468 | 0,0572 | 0,0754 |

# End mills

2 – fluted, 2 teeth cut to centre



- CZ** Frézy pro drážky per | dvouzubé, 2 břity do středu  
**DE** Langlochfräser | zweischneider, 2 Schneide bis Mitte  
**RU** Фрезы шпоночные | двузубые, 2 режущие кромки ч. центр



**270618**

**273618**



| D<br>e 8 | d<br>h 6 | I1<br>270618 | I1<br>273618 | I2<br>270618 | I2<br>273618 | Z | 270618 | 273618 |
|----------|----------|--------------|--------------|--------------|--------------|---|--------|--------|
| 17       | 16       | 92           |              | 32           |              | 2 | .170   |        |
| 18       | 16       | 92           | 123          | 32           | 63           | 2 | .180   | .180   |
| 19       | 16       | 92           |              | 32           |              | 2 | .190   |        |
| 20       | 20       | 104          | 141          | 38           | 75           | 2 | .200   | .200   |
| 21       | 20       | 104          |              | 38           |              | 2 | .210   |        |
| 22       | 20       | 104          | 141          | 38           | 75           | 2 | .220   | .220   |
| 23       | 20       | 104          |              | 38           |              | 2 | .230   |        |
| 24       | 25       | 121          |              | 45           |              | 2 | .240   |        |
| 25       | 25       | 121          | 166          | 45           | 90           | 2 | .250   | .250   |
| 26       | 25       | 121          |              | 45           |              | 2 | .260   |        |
| 28       | 25       | 121          |              | 45           |              | 2 | .280   |        |
| 30       | 25       | 121          |              | 45           |              | 2 | .300   |        |
| 32       | 32       | 133          |              | 53           |              | 2 | .320   |        |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |             | fz (mm/z) |     |         |        |        |        |        |       |
|------------|-------------|-----------|-----|---------|--------|--------|--------|--------|-------|
| Material   |             | Ap        | Ae  | Vc      | Ø 16   | Ø 18   | Ø 20   | Ø 25   | Ø 30  |
| <b>P.1</b> | ≤ 600 N/mm² | 0,5xD     | 1xD | 45      | 0,058  | 0,065  | 0,073  | 0,091  | 0,11  |
| <b>N.2</b> | ≤ 600 N/mm² | 0,5xD     | 1xD | 160-300 | 0,0754 | 0,0845 | 0,0949 | 0,1183 | 0,143 |

# End mills

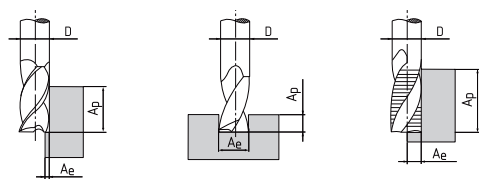
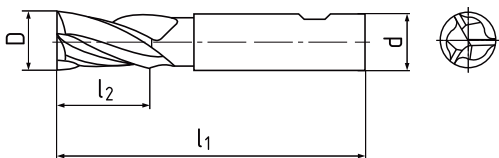
1 tooth cut over centre



**CZ** Frézy válcové čelní | 1 břit přes střed

**DE** Schaftfräser | 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | с центрорежущим зубом



**110418**

**111418**



| D<br>k 10 | d<br>h 6 | I1<br>110418 | I1<br>111418 | I2<br>110418 | I2<br>111418 | Z | 110418 | 111418 |
|-----------|----------|--------------|--------------|--------------|--------------|---|--------|--------|
| 2         | 6        | 51           |              | 7            |              | 3 | .020   |        |
| 2,5       | 6        | 52           |              | 8            |              | 3 | .025   |        |
| 3         | 6        | 52           |              | 8            |              | 3 | .030   |        |
| 4         | 6        | 55           |              | 11           |              | 3 | .040   |        |
| 4,5       | 6        | 55           |              | 11           |              | 3 | .045   |        |
| 5         | 6        | 57           |              | 13           |              | 3 | .050   |        |
| 6         | 6        | 57           | 68           | 13           | 24           | 3 | .060   | .060   |
| 7         | 10       | 66           | 80           | 16           | 30           | 3 | .070   | .070   |
| 8         | 10       | 69           | 88           | 19           | 38           | 3 | .080   | .080   |
| 9         | 10       | 69           | 88           | 19           | 38           | 3 | .090   | .090   |
| 10        | 10       | 72           | 95           | 22           | 45           | 3 | .100   | .100   |
| 11        | 12       |              | 102          |              | 45           | 3 |        | .110   |
| 12        | 12       | 83           | 110          | 26           | 53           | 3 | .120   | .120   |
| 14        | 12       | 83           | 110          | 26           | 53           | 3 | .140   | .140   |
| 15        | 12       | 83           | 110          | 26           | 53           | 3 | .150   | .150   |
| 16        | 16       | 92           | 123          | 32           | 63           | 3 | .160   | .160   |
| 18        | 16       | 92           | 123          | 32           | 63           | 3 | .180   | .180   |
| 20        | 20       | 104          | 141          | 38           | 75           | 3 | .200   | .200   |
| 25        | 25       | 121          | 166          | 45           | 90           | 3 | .250   | .250   |
| 30        | 25       | 121          | 166          | 45           | 90           | 3 | .300   | .300   |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |             |                |                |                | fz (mm/z) |       |       |       |       |       |       |       |       |
|----------|-------------|----------------|----------------|----------------|-----------|-------|-------|-------|-------|-------|-------|-------|-------|
| Material |             | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 3       | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25  |
| P.1      | ≤ 600 N/mm² | 1,5xD          | 0,1xD          | 45             | 0,006     | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 |
| N.2      | ≤ 600 N/mm² | 1,5xD          | 0,1xD          | 160-300        | 0,008     | 0,02  | 0,027 | 0,036 | 0,044 | 0,057 | 0,066 | 0,074 | 0,092 |

# End mills

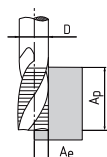
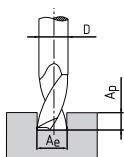
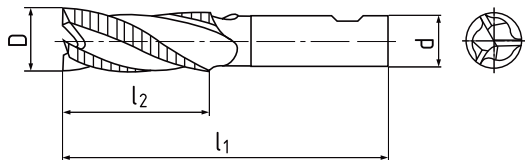
NR-F, 1 tooth cut over centre



**CZ** Frézy válcové čelní | NR-F, 1 břit přes střed

**DE** Schaftfräser | NR-F, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | NR-F, с центроврежущим зубом



**104418P**

**105418P**



| D<br>k 12 | d<br>h 6 | I1<br>104418P | I1<br>105418P | I2<br>104418P | I2<br>105418P | Z | 104418P | 105418P |
|-----------|----------|---------------|---------------|---------------|---------------|---|---------|---------|
| 6         | 6        | 57            | 68            | 13            | 24            | 3 | .060    | .060    |
| 8         | 10       | 69            | 88            | 19            | 38            | 3 | .080    | .080    |
| 9         | 10       | 69            | 88            | 19            | 38            | 3 | .090*   | .090    |
| 10        | 10       | 72            | 95            | 22            | 45            | 3 | .100    | .100    |
| 12        | 12       | 83            | 110           | 26            | 53            | 3 | .120    | .120    |
| 13        | 12       |               | 110           |               | 53            | 3 |         | .130    |
| 14        | 12       | 83            | 110           | 26            | 53            | 3 | .140    | .140    |
| 15        | 12       |               | 110           |               |               | 3 |         | .150    |
| 16        | 16       | 92            | 123           | 32            | 63            | 3 | .160    | .160    |
| 18        | 16       | 92            | 123           | 32            | 63            | 3 | .180    | .180    |
| 20        | 20       | 104           | 141           | 38            | 75            | 3 | .200    | .200    |
| 22        | 20       | 104           | 141           | 38            | 75            | 3 | .220    | .220    |
| 24        | 25       | 121           |               | 45            |               | 3 | .240    |         |
| 25        | 25       | 121           | 166           | 45            | 90            | 3 | .250    | .250    |
| 26        | 25       | 121           | 166           | 45            | 90            | 3 | .260    | .260    |
| 28        | 25       | 121           |               | 45            |               | 3 | .280    |         |
| 30        | 25       | 121           |               | 45            |               | 3 | .300    |         |
| 32        | 32       | 133           | 186           | 53            | 106           | 3 | .320    | .320    |

\*) On demand / Na požádání / auf Anfrage / По запросу

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |              | fz (mm/z) |       |    |      |       |       |      |      |      |      |      |      |
|----------|--------------|-----------|-------|----|------|-------|-------|------|------|------|------|------|------|
| Material |              | Ap        | Ae    | Vc | Ø 6  | Ø 8   | Ø 10  | Ø 12 | Ø 16 | Ø 18 | Ø 20 | Ø 25 | Ø 32 |
| P.1      | ≤ 600 N/mm²  | 1,5xD     | 0,5xD | 45 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |
| P.2      | ≤ 850 N/mm²  | 1,5xD     | 0,5xD | 39 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |
| P.3      | ≤ 1100 N/mm² | 1,5xD     | 0,5xD | 24 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |
| P.4      | ≤ 900 N/mm²  | 1,5xD     | 0,5xD | 30 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |
| P.5      | ≤ 1100 N/mm² | 1,5xD     | 0,5xD | 24 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |
| K.1      | ≤ 820 N/mm²  | 1,5xD     | 0,5xD | 35 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |

# End mills

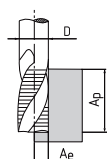
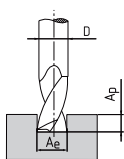
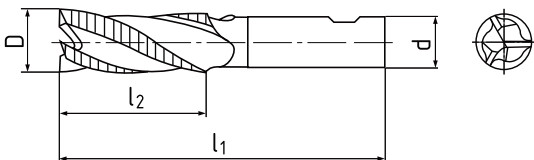
NR, 1 tooth cut over centre



**CZ** Frézy válcové čelní | NR, 1 břit přes střed

**DE** Schaftfräser | NR, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | NR, с центрорежущим зубом



**124417**



| D<br>k 12 | d<br>h 6 | l1  | l2 | Z | 124417     |  |  |  |  |
|-----------|----------|-----|----|---|------------|--|--|--|--|
| 6         | 6        | 57  | 13 | 3 | .060 ALTIN |  |  |  |  |
| 8         | 10       | 69  | 19 | 3 | .080 ALTIN |  |  |  |  |
| 10        | 10       | 72  | 22 | 3 | .100 ALTIN |  |  |  |  |
| 12        | 12       | 83  | 26 | 3 | .120 ALTIN |  |  |  |  |
| 14        | 12       | 83  | 26 | 3 | .140 ALTIN |  |  |  |  |
| 16        | 16       | 92  | 32 | 3 | .160 ALTIN |  |  |  |  |
| 18        | 16       | 92  | 32 | 3 | .180 ALTIN |  |  |  |  |
| 20        | 20       | 104 | 38 | 3 | .200 ALTIN |  |  |  |  |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |               | fz (mm/z) |       |      |       |       |       |       |       |       |      |
|----------|---------------|-----------|-------|------|-------|-------|-------|-------|-------|-------|------|
| Material |               | Ap        | Ae    | Vc   | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20 |
| P.1      | ≤ 600 N/mm²   | 1,5xD     | 0,5xD | 114  | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  |
| P.2      | ≤ 850 N/mm²   | 1,5xD     | 0,5xD | 99   | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  |
| P.4      | ≤ 900 N/mm²   | 1,5xD     | 0,5xD | 76,5 | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  |
| M.2      | 750–850 N/mm² | 1,5xD     | 0,5xD | 37,5 | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  |
| K.1      | ≤ 820 N/mm²   | 1,5xD     | 0,5xD | 88,5 | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  |

# End mills

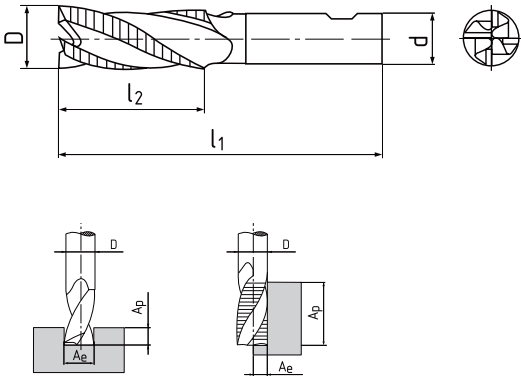
NR, 1 tooth cut over centre



**CZ** Frézy válcové čelní | NR, 1 břit přes střed

**DE** Schaftfräser | NR, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | NR, с центрорежущим зубом



**124517**

**125517**



| D<br>k 12 | d<br>h 6 | I1<br>124517 | I1<br>125517 | I2<br>124517 | I2<br>125517 | Z | 124517     | 125517     |
|-----------|----------|--------------|--------------|--------------|--------------|---|------------|------------|
| 6         | 6        | 57           | 68           | 13           | 24           | 4 | .060 ALTIN | .060 ALTIN |
| 8         | 10       | 69           | 88           | 19           | 38           | 4 | .080 ALTIN | .080 ALTIN |
| 10        | 10       | 72           | 95           | 22           | 45           | 4 | .100 ALTIN | .100 ALTIN |
| 12        | 12       | 83           | 110          | 26           | 53           | 4 | .120 ALTIN | .120 ALTIN |
| 14        | 12       | 83           | 110          | 26           | 53           | 4 | .140 ALTIN | .140 ALTIN |
| 16        | 16       | 92           | 123          | 32           | 63           | 4 | .160 ALTIN | .160 ALTIN |
| 18        | 16       | 92           | 123          | 32           | 63           | 4 | .180 ALTIN | .180 ALTIN |
| 20        | 20       | 104          | 141          | 38           | 75           | 4 | .200 ALTIN | .200 ALTIN |
| 22        | 20       | 104          |              | 38           |              | 5 | .220 ALTIN |            |
| 25        | 25       | 121          | 166          | 45           | 90           | 5 | .250 ALTIN | .250 ALTIN |
| 28        | 25       | 121          |              | 45           |              | 5 | .280 ALTIN |            |
| 30        | 25       | 121          |              | 45           |              | 5 | .300 ALTIN |            |
| 32        | 32       | 133          | 186          | 53           | 106          | 6 | .320 ALTIN | .320 ALTIN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |               | fz (mm/z) |       |      |       |       |       |       |       |       |      |      |      |
|------------|---------------|-----------|-------|------|-------|-------|-------|-------|-------|-------|------|------|------|
| Material   |               | Ap        | Ae    | Vc   | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20 | Ø 25 | Ø 30 |
| <b>P.1</b> | ≤ 600 N/mm²   | 1,5xD     | 0,5xD | 114  | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11 | 0,12 |
| <b>P.2</b> | ≤ 850 N/mm²   | 1,5xD     | 0,5xD | 99   | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11 | 0,12 |
| <b>P.4</b> | ≤ 900 N/mm²   | 1,5xD     | 0,5xD | 76,5 | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11 | 0,12 |
| <b>M.2</b> | 750–850 N/mm² | 1,5xD     | 0,5xD | 37,5 | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11 | 0,12 |
| <b>K.1</b> | ≤ 820 N/mm²   | 1,5xD     | 0,5xD | 88,5 | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11 | 0,12 |

# End mills

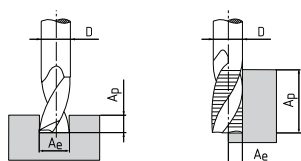
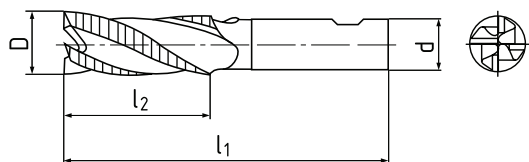
NR, 1 tooth cut over centre



**CZ** Frézy válcové čelní | NR, 1 břit přes střed

**DE** Schaftfräser | NR, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | NR, с центрорежущим зубом



**124518**

**125518**



| D<br>k 12 | d<br>h 6 | I1<br>124518 | I1<br>125518 | I2<br>124518 | I2<br>125518 | Z | 124518 | 124518       | 125518 | 125518       |
|-----------|----------|--------------|--------------|--------------|--------------|---|--------|--------------|--------|--------------|
| 6         | 6        | 57           | 68           | 13           | 24           | 4 | .060   | .060 TIALN   | .060   | .060 TIALN   |
| 7         | 10       | 66           | 80           | 16           | 30           | 4 | .070   | .070 TIALN   | .070   | .070 TIALN   |
| 8         | 10       | 69           | 88           | 19           | 38           | 4 | .080   | .080 TIALN   | .080   | .080 TIALN   |
| 9         | 10       | 69           | 88           | 19           | 38           | 4 | .090   | .090 TIALN   | .090   | .090 TIALN   |
| 10        | 10       | 72           | 95           | 22           | 45           | 4 | .100   | .100 TIALN   | .100   | .100 TIALN   |
| 11        | 12       | 79           | 102          | 22           | 45           | 4 | .110   | .110 TIALN   | .110   | .110 TIALN   |
| 12        | 12       | 83           | 110          | 26           | 53           | 4 | .120   | .120 TIALN   | .120   | .120 TIALN   |
| 13        | 12       | 83           |              | 26           |              | 4 | .130   | .130 TIALN   |        |              |
| 14        | 12       | 83           | 110          | 26           | 53           | 4 | .140   | .140 TIALN   | .140   | .140 TIALN   |
| 15        | 12       | 83           | 110          | 26           | 53           | 4 | .150   | .150 TIALN   | .150   | .150 TIALN   |
| 16        | 16       | 92           | 123          | 32           | 63           | 4 | .160   | .160 TIALN   | .160   | .160 TIALN   |
| 17        | 16       | 92           |              | 32           |              | 4 | .170   | .170 TIALN   |        |              |
| 18        | 16       | 92           | 123          | 32           | 63           | 4 | .180   | .180 TIALN   | .180   | .180 TIALN   |
| 19        | 16       | 92           |              | 32           |              | 4 | .190   | .190 TIALN   |        |              |
| 20        | 20       | 104          | 141          | 38           | 75           | 4 | .200   | .200 TIALN   | .200   | .200 TIALN   |
| 21        | 20       | 104          |              | 38           |              | 4 | .210   | .210 TIALN   |        |              |
| 22        | 20       | 104          | 141          | 38           | 75           | 5 | .220   | .220 TIALN   | .220   | .220 TIALN   |
| 24        | 25       | 121          | 166          | 45           | 90           | 5 | .240   | .240 TIALN   | .240   | .240 TIALN   |
| 25        | 25       | 121          | 166          | 45           | 90           | 5 | .250   | .250 TIALN   | .250   | .250 TIALN   |
| 26        | 25       | 121          | 166          | 45           | 90           | 5 | .260   | .260 TIALN   | .260   | .260 TIALN   |
| 28        | 25       | 121          | 166          | 45           | 90           | 5 | .280   | .280 TIALN   | .280   | .280 TIALN   |
| 30        | 25       | 121          | 166          | 45           | 90           | 5 | .300   | .300 TIALN   | .300   | .300 TIALN   |
| 32        | 32       | 133          | 186          | 53           | 106          | 6 | .320   | .320 TIALN   | .320   | .320 TIALN   |
| 36        | 32       | 133          | 186          | 53           | 106          | 6 | .360   | .360 TIALN   | .360   | .360 TIALN   |
| 40*       | 32       | 143          | 205          | 63           | 125          | 6 | .40032 | .40032 TIALN | .40032 | .40032 TIALN |

\*) \* DIN 844

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |               | fz (mm/z) |       |    |      |       |       |      |      |      |      |      |       |      |
|----------|---------------|-----------|-------|----|------|-------|-------|------|------|------|------|------|-------|------|
| Material |               | Ap        | Ae    | Vc | Ø 6  | Ø 8   | Ø 10  | Ø 12 | Ø 16 | Ø 18 | Ø 20 | Ø 25 | Ø 30  | Ø 40 |
| P.1      | ≤ 600 N/mm²   | 1,5xD     | 0,5xD | 45 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,115 | 0,14 |
| P.2      | ≤ 850 N/mm²   | 1,5xD     | 0,5xD | 39 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,115 | 0,14 |
| P.4      | ≤ 900 N/mm²   | 1,5xD     | 0,5xD | 30 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,115 | 0,14 |
| M.2      | 750–850 N/mm² | 1,5xD     | 0,5xD | 15 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,115 | 0,14 |
| K.1      | ≤ 820 N/mm²   | 1,5xD     | 0,5xD | 35 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,115 | 0,14 |

TiAlN: Vc + 50 %

# End mills

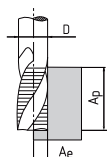
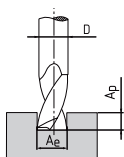
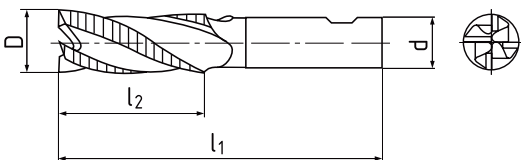
NR-F, 1 tooth cut over centre



**CZ** Frézy válcové čelní | NR-F, 1 břit přes střed

**DE** Schaftfräser | NR-F, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | NR-F, с центрорежущим зубом



**124518P**



**125518P**



| D<br>k 12 | d<br>h 6 | I1<br>124518P | I1<br>125518P | I2<br>124518P | I2<br>125518P | Z | 124518P | 125518P |
|-----------|----------|---------------|---------------|---------------|---------------|---|---------|---------|
| 6         | 6        | 57            | 68            | 13            | 24            | 4 | .060    | .060    |
| 7         | 10       | 66            |               | 16            |               | 4 | .070    |         |
| 8         | 10       | 69            | 88            | 19            | 38            | 4 | .080    | .080    |
| 9         | 10       | 69            | 88            | 19            | 38            | 4 | .090    | .090    |
| 10        | 10       | 72            | 95            | 22            | 45            | 4 | .100    | .100    |
| 11        | 12       | 79            |               | 22            |               | 4 | .110    |         |
| 12        | 12       | 83            | 110           | 26            | 53            | 4 | .120    | .120    |
| 13        | 12       | 83            |               | 26            |               | 4 | .130    |         |
| 14        | 12       | 83            | 110           | 26            | 53            | 4 | .140    | .140    |
| 15        | 12       | 83            |               | 26            |               | 4 | .150    |         |
| 16        | 16       | 92            | 123           | 32            | 63            | 4 | .160    | .160    |
| 17        | 16       | 92            |               | 32            |               | 4 | .170    |         |
| 18        | 16       | 92            | 123           | 32            | 63            | 4 | .180    | .180    |
| 20        | 20       | 104           | 141           | 38            | 75            | 4 | .200    | .200    |
| 22        | 20       | 104           | 141           | 38            | 75            | 5 | .220    | .220    |
| 24        | 25       | 121           | 166           | 45            | 90            | 5 | .240    | .240    |
| 25        | 25       | 121           | 166           | 45            | 90            | 5 | .250    | .250    |
| 26        | 25       | 121           | 166           | 45            | 90            | 5 | .260    | .260    |
| 28        | 25       | 121           | 166           | 45            | 90            | 5 | .280    | .280    |
| 30        | 25       | 121           | 166           | 45            | 90            | 5 | .300    | .300    |
| 32        | 32       | 133           | 186           | 53            | 106           | 6 | .320    | .320    |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |               | fz (mm/z) |       |    |      |       |       |      |      |      |      |      |      |
|----------|---------------|-----------|-------|----|------|-------|-------|------|------|------|------|------|------|
| Material |               | Ap        | Ae    | Vc | Ø 6  | Ø 8   | Ø 10  | Ø 12 | Ø 16 | Ø 18 | Ø 20 | Ø 25 | Ø 32 |
| P.1      | ≤ 600 N/mm²   | 1,5xD     | 0,5xD | 45 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |
| P.2      | ≤ 850 N/mm²   | 1,5xD     | 0,5xD | 39 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |
| P.4      | ≤ 900 N/mm²   | 1,5xD     | 0,5xD | 30 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |
| P.5      | ≤ 1100 N/mm²  | 1,5xD     | 0,5xD | 24 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |
| M.2      | 750–850 N/mm² | 1,5xD     | 0,5xD | 15 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |
| K.1      | ≤ 820 N/mm²   | 1,5xD     | 0,5xD | 35 | 0,02 | 0,025 | 0,035 | 0,04 | 0,07 | 0,08 | 0,09 | 0,1  | 0,12 |

# End mills

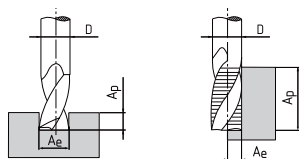
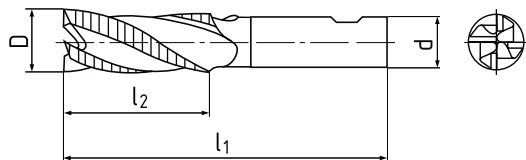
HR, 1 tooth cut over centre



**CZ** Frézy válcové čelní | HR, 1 břit přes střed

**DE** Schaftfräser | HR, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | HR, с центрорежущим зубом



**128517**

**129517**



| D<br>k 12 | d<br>h 6 | I1<br>128517 | I1<br>129517 | I2<br>128517 | I2<br>129517 | Z | 128517     | 129517     |
|-----------|----------|--------------|--------------|--------------|--------------|---|------------|------------|
| 6         | 6        | 57           | 68           | 13           | 24           | 4 | .060 ALTiN | .060 ALTiN |
| 7         | 10       | 66           |              | 16           |              | 4 | .070 ALTiN |            |
| 8         | 10       | 69           | 88           | 19           | 38           | 4 | .080 ALTiN | .080 ALTiN |
| 9         | 10       | 69           |              | 19           |              | 4 | .090 ALTiN |            |
| 10        | 10       | 72           | 95           | 22           | 45           | 4 | .100 ALTiN | .100 ALTiN |
| 11        | 12       | 79           |              | 22           |              | 4 | .110 ALTiN |            |
| 12        | 12       | 83           | 110          | 26           | 53           | 4 | .120 ALTiN | .120 ALTiN |
| 14        | 12       | 83           | 110          | 26           | 53           | 4 | .140 ALTiN | .140 ALTiN |
| 16        | 16       | 92           | 123          | 32           | 63           | 4 | .160 ALTiN | .160 ALTiN |
| 18        | 16       | 92           | 123          | 32           | 63           | 4 | .180 ALTiN | .180 ALTiN |
| 20        | 20       | 104          | 141          | 38           | 75           | 4 | .200 ALTiN | .200 ALTiN |
| 22        | 20       | 104          | 141          | 38           | 75           | 5 | .220 ALTiN | .220 ALTiN |
| 25        | 25       | 121          |              | 45           |              | 5 | .250 ALTiN |            |
| 30        | 25       | 121          |              | 45           |              | 5 | .300 ALTiN |            |
| 32        | 32       | 133          |              | 53           |              | 6 | .320 ALTiN |            |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |              | fz (mm/z) |       |      |       |       |       |       |       |       |      |       |       |
|----------|--------------|-----------|-------|------|-------|-------|-------|-------|-------|-------|------|-------|-------|
| Material |              | Ap        | Ae    | Vc   | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20 | Ø 25  | Ø 32  |
| P.3      | ≤ 1100 N/mm² | 1,5xD     | 0,5xD | 61,5 | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11  | 0,132 |
| P.5      | ≤ 1100 N/mm² | 1,5xD     | 0,5xD | 61,5 | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11  | 0,132 |
| P.6      | > 1100 N/mm² | 1,5xD     | 0,5xD | 51   | 0,015 | 0,02  | 0,027 | 0,031 | 0,034 | 0,062 | 0,07 | 0,077 | 0,092 |
| K.2      | > 800 N/mm²  | 1,5xD     | 0,5xD | 66   | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11  | 0,132 |
| S.1      | ≤ 1500 N/mm² | 1,5xD     | 0,5xD | 31,5 | 0,015 | 0,02  | 0,027 | 0,031 | 0,034 | 0,062 | 0,07 | 0,077 | 0,092 |
| S.2      | ≤ 1250 N/mm² | 1,5xD     | 0,5xD | 30   | 0,015 | 0,02  | 0,027 | 0,031 | 0,034 | 0,062 | 0,07 | 0,077 | 0,092 |

# End mills

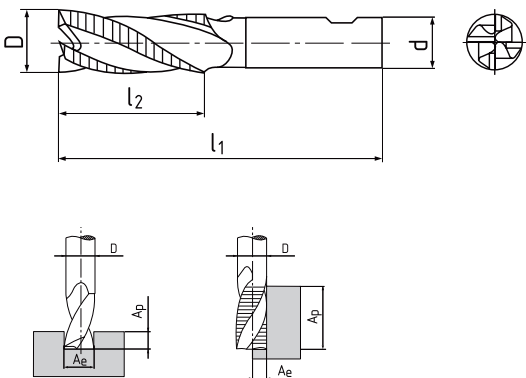
short, HR, 1 tooth cut over centre



**CZ** Frézy válcové čelní | krátké, HR, 1 břit přes střed

**DE** Schaftfräser | Kurz, HR, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | короткие, HR, с центрорежущим зубом



**128517X**



| D<br>k 12 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 128517X    |
|-----------|----------|----------------|----------------|---|------------|
| 9         | 10       | 69             | 19             | 5 | .090 ALTIN |
| 10        | 10       | 72             | 22             | 5 | .100 ALTIN |
| 11        | 12       | 79             | 22             | 5 | .110 ALTIN |
| 12        | 12       | 83             | 26             | 5 | .120 ALTIN |
| 13        | 12       | 83             | 26             | 5 | .130 ALTIN |
| 14        | 12       | 83             | 26             | 5 | .140 ALTIN |
| 15        | 12       | 83             | 26             | 5 | .150 ALTIN |
| 16        | 16       | 92             | 32             | 5 | .160 ALTIN |
| 18        | 16       | 92             | 32             | 5 | .180 ALTIN |
| 20        | 20       | 104            | 38             | 5 | .200 ALTIN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |                          | f <sub>z</sub> (mm/z) |                |                |       |       |       |       |      |
|------------|--------------------------|-----------------------|----------------|----------------|-------|-------|-------|-------|------|
| Material   |                          | A <sub>p</sub>        | A <sub>e</sub> | V <sub>c</sub> | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20 |
| <b>P.3</b> | ≤ 1100 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 61,5           | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  |
| <b>P.5</b> | ≤ 1100 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 61,5           | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  |
| <b>P.6</b> | > 1100 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 51             | 0,027 | 0,031 | 0,054 | 0,062 | 0,07 |
| <b>K.2</b> | > 800 N/mm <sup>2</sup>  | 1,5xD                 | 0,5xD          | 66             | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  |
| <b>S.1</b> | ≤ 1500 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 31,5           | 0,027 | 0,031 | 0,054 | 0,062 | 0,07 |
| <b>S.2</b> | ≤ 1250 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 30             | 0,027 | 0,031 | 0,054 | 0,062 | 0,07 |

# End mills

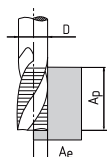
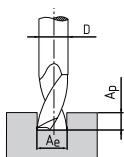
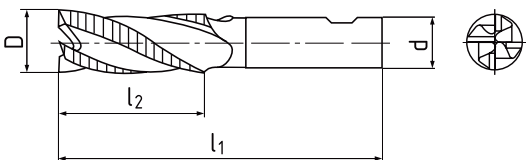
short, HR-F, 1 tooth cut over centre



**CZ** Frézy válcové čelní | krátké, HR-F, 1 břit přes střed

**DE** Schaftfräser | Kurz, HR-F, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | короткие, HR-F, с центрорежущим зубом



**128517P**



| D<br>k 12 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 128517P    |
|-----------|----------|----------------|----------------|---|------------|
| 6         | 6        | 57             | 13             | 4 | .060 ALTIN |
| 8         | 10       | 69             | 19             | 4 | .080 ALTIN |
| 9         | 10       | 69             | 19             | 4 | .090 ALTIN |
| 10        | 10       | 72             | 22             | 4 | .100 ALTIN |
| 11        | 12       | 79             | 22             | 4 | .110 ALTIN |
| 12        | 12       | 83             | 26             | 4 | .120 ALTIN |
| 13        | 12       | 83             | 26             | 4 | .130 ALTIN |
| 14        | 12       | 83             | 26             | 4 | .140 ALTIN |
| 15        | 12       | 83             | 26             | 4 | .150 ALTIN |
| 16        | 16       | 92             | 32             | 4 | .160 ALTIN |
| 17        | 16       | 92             | 32             | 4 | .170 ALTIN |
| 18        | 16       | 92             | 32             | 4 | .180 ALTIN |
| 20        | 20       | 104            | 38             | 4 | .200 ALTIN |
| 22        | 20       | 104            | 38             | 5 | .220 ALTIN |
| 25        | 25       | 121            | 45             | 5 | .250 ALTIN |
| 28        | 25       | 121            | 45             | 5 | .280 ALTIN |
| 30        | 25       | 121            | 45             | 5 | .300 ALTIN |
| 32        | 32       | 133            | 53             | 6 | .320 ALTIN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |                          | f <sub>z</sub> (mm/z) |                |                |       |       |       |       |       |       |      |       |       |
|----------|--------------------------|-----------------------|----------------|----------------|-------|-------|-------|-------|-------|-------|------|-------|-------|
| Material |                          | A <sub>p</sub>        | A <sub>e</sub> | V <sub>c</sub> | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20 | Ø 25  | Ø 32  |
| P.3      | ≤ 1100 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 61,5           | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11  | 0,132 |
| P.5      | ≤ 1100 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 61,5           | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11  | 0,132 |
| P.6      | > 1100 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 51             | 0,015 | 0,02  | 0,027 | 0,031 | 0,034 | 0,062 | 0,07 | 0,077 | 0,092 |
| K.2      | > 800 N/mm <sup>2</sup>  | 1,5xD                 | 0,5xD          | 66             | 0,022 | 0,028 | 0,039 | 0,044 | 0,077 | 0,088 | 0,1  | 0,11  | 0,132 |
| S.1      | ≤ 1500 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 31,5           | 0,015 | 0,02  | 0,027 | 0,031 | 0,034 | 0,062 | 0,07 | 0,077 | 0,092 |
| S.2      | ≤ 1250 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 30             | 0,015 | 0,02  | 0,027 | 0,031 | 0,034 | 0,062 | 0,07 | 0,077 | 0,092 |

# End mills

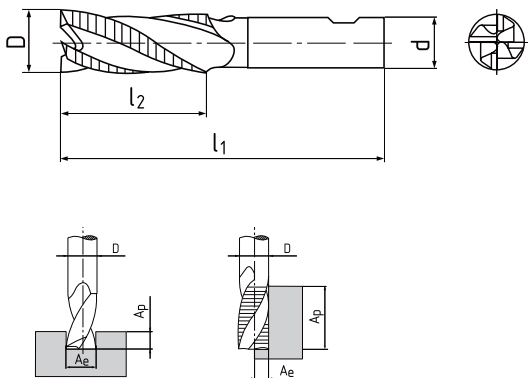
extrashort, HR, 1 tooth cut over centre



**CZ** Frézy válcové čelní | extrakrátké, HR, 1 břit přes střed

**DE** Schaftfräser | Extra Kurz, HR, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | екстра короткие, HR, с центрорежущим зубом



**128518S**



| D<br>k 12 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 128518S | 128518S    |
|-----------|----------|----------------|----------------|---|---------|------------|
| 6         | 6        | 52             | 8              | 4 | .060    | .060 TIALN |
| 8         | 10       | 61             | 11             | 4 | .080    | .080 TIALN |
| 10        | 10       | 63             | 13             | 4 | .100    | .100 TIALN |
| 12        | 12       | 73             | 16             | 4 | .120    | .120 TIALN |
| 14        | 12       | 73             | 16             | 4 | .140    | .140 TIALN |
| 16        | 16       | 79             | 19             | 4 | .160    | .160 TIALN |
| 18        | 16       | 79             | 19             | 4 | .180    | .180 TIALN |
| 20        | 20       | 88             | 22             | 4 | .200    | .200 TIALN |
| 25        | 25       | 102            | 26             | 5 | .250    | .250 TIALN |
| 30        | 25       | 102            | 26             | 5 | .300    | .300 TIALN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |                          | f <sub>z</sub> (mm/z) |                |                |       |       |       |       |       |       |       |      |       |
|------------|--------------------------|-----------------------|----------------|----------------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| Material   |                          | A <sub>p</sub>        | A <sub>e</sub> | V <sub>c</sub> | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25 | Ø 30  |
| <b>P.3</b> | ≤ 1100 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 24             | 0,02  | 0,025 | 0,035 | 0,04  | 0,07  | 0,08  | 0,09  | 0,1  | 0,12  |
| <b>P.5</b> | ≤ 1100 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 24             | 0,02  | 0,025 | 0,035 | 0,04  | 0,07  | 0,08  | 0,09  | 0,1  | 0,12  |
| <b>K.2</b> | > 800 N/mm <sup>2</sup>  | 1,5xD                 | 0,5xD          | 25             | 0,02  | 0,025 | 0,035 | 0,04  | 0,07  | 0,08  | 0,09  | 0,1  | 0,12  |
| <b>S.1</b> | ≤ 1500 N/mm <sup>2</sup> | 1,5xD                 | 0,5xD          | 12             | 0,014 | 0,018 | 0,025 | 0,028 | 0,049 | 0,056 | 0,063 | 0,07 | 0,084 |

TiAlN: V<sub>c</sub> + 50 %

# End mills

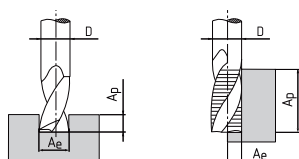
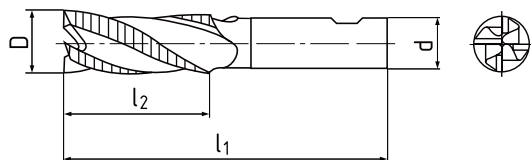
HR, 1 tooth cut over centre



**CZ** Frézy válcové čelní | HR, 1 břit přes střed

**DE** Schaftfräser | HR, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | HR, с центрорежущим зубом



**128518**

**129518**



| D<br>k 12 | d<br>h 6 | I1<br>128518 | I1<br>129518 | I2<br>128518 | I2<br>129518 | Z | 128518 | 128518     | 129518 | 129518     |
|-----------|----------|--------------|--------------|--------------|--------------|---|--------|------------|--------|------------|
| 6         | 6        | 57           | 68           | 13           | 24           | 4 | .060   | .060 TIALN | .060   | .060 TIALN |
| 7         | 10       | 66           | 80           | 16           | 30           | 4 | .070   | .070 TIALN | .070   | .070 TIALN |
| 8         | 10       | 69           | 88           | 19           | 38           | 4 | .080   | .080 TIALN | .080   | .080 TIALN |
| 9         | 10       | 69           |              | 19           |              | 4 | .090   | .090 TIALN |        |            |
| 10        | 10       | 72           | 95           | 22           | 45           | 4 | .100   | .100 TIALN | .100   | .100 TIALN |
| 11        | 12       | 79           | 102          | 22           | 45           | 4 | .110   | .110 TIALN | .110   | .110 TIALN |
| 12        | 12       | 83           | 110          | 26           | 53           | 4 | .120   | .120 TIALN | .120   | .120 TIALN |
| 13        | 12       | 83           | 110          | 26           | 53           | 4 | .130   | .130 TIALN | .130   | .130 TIALN |
| 14        | 12       | 83           | 110          | 26           | 53           | 4 | .140   | .140 TIALN | .140   | .140 TIALN |
| 15        | 12       | 83           | 110          | 26           | 53           | 4 | .150   | .150 TIALN | .150   | .150 TIALN |
| 16        | 16       | 92           | 123          | 32           | 63           | 4 | .160   | .160 TIALN | .160   | .160 TIALN |
| 17        | 16       | 92           | 123          | 32           | 63           | 4 | .170   | .170 TIALN | .170   | .170 TIALN |
| 18        | 16       | 92           | 123          | 32           | 63           | 4 | .180   | .180 TIALN | .180   | .180 TIALN |
| 19        | 16       |              | 123          |              | 63           | 4 |        |            | .190   | .190 TIALN |
| 20        | 20       | 104          | 141          | 38           | 75           | 4 | .200   | .200 TIALN | .200   | .200 TIALN |
| 22        | 20       | 104          | 141          | 38           | 75           | 5 | .220   | .220 TIALN | .220   | .220 TIALN |
| 24        | 25       | 121          | 166          | 45           | 90           | 5 | .240   | .240 TIALN | .240   | .240 TIALN |
| 25        | 25       | 121          | 166          | 45           | 90           | 5 | .250   | .250 TIALN | .250   | .250 TIALN |
| 26        | 25       | 121          | 166          | 45           | 90           | 5 | .260   | .260 TIALN | .260   | .260 TIALN |
| 28        | 25       | 121          | 166          | 45           | 90           | 5 | .280   | .280 TIALN | .280   | .280 TIALN |
| 30        | 25       | 121          | 166          | 45           | 90           | 5 | .300   | .300 TIALN | .300   | .300 TIALN |
| 32        | 32       | 133          | 186          | 53           | 106          | 6 | .320   | .320 TIALN | .320   | .320 TIALN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |              | fz (mm/z) |       |    |       |       |       |       |       |       |       |      |       |
|----------|--------------|-----------|-------|----|-------|-------|-------|-------|-------|-------|-------|------|-------|
| Material |              | Ap        | Ae    | Vc | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25 | Ø 30  |
| P.3      | ≤ 1100 N/mm² | 1,5xD     | 0,5xD | 24 | 0,02  | 0,025 | 0,035 | 0,04  | 0,07  | 0,08  | 0,09  | 0,1  | 0,12  |
| P.5      | ≤ 1100 N/mm² | 1,5xD     | 0,5xD | 24 | 0,02  | 0,025 | 0,035 | 0,04  | 0,07  | 0,08  | 0,09  | 0,1  | 0,12  |
| K.2      | > 800 N/mm²  | 1,5xD     | 0,5xD | 25 | 0,02  | 0,025 | 0,035 | 0,04  | 0,07  | 0,08  | 0,09  | 0,1  | 0,12  |
| S.1      | ≤ 1500 N/mm² | 1,5xD     | 0,5xD | 12 | 0,014 | 0,018 | 0,025 | 0,028 | 0,049 | 0,056 | 0,063 | 0,07 | 0,084 |

TiAlN: Vc + 50 %

# End mills

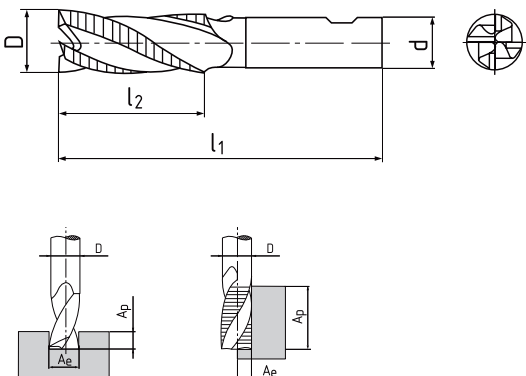
HR-F, 1 tooth cut over centre



**CZ** Frézy válcové čelní | HR-F, 1 břit přes střed

**DE** Schaftfräser | HR-F, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | HR-F, с центрорезающим зубом



**128518P**

**129518P**



| D<br>k 12 | d<br>h 6 | I1<br>128518P | I1<br>129518P | I2<br>128518P | I2<br>129518P | Z | 128518P | 129518P |
|-----------|----------|---------------|---------------|---------------|---------------|---|---------|---------|
| 6         | 6        | 57            | 68            | 13            | 24            | 4 | .060    | .060    |
| 7         | 10       | 66            |               | 16            |               | 4 | .070    |         |
| 8         | 10       | 69            | 88            | 19            | 38            | 4 | .080    | .080    |
| 9         | 10       | 69            |               | 19            |               | 4 | .090    |         |
| 10        | 10       | 72            | 95            | 22            | 45            | 4 | .100    | .100    |
| 11        | 12       | 79            | 102           | 22            | 45            | 4 | .110    |         |
| 12        | 12       | 83            | 110           | 26            | 53            | 4 | .120    | .120    |
| 13        | 12       | 83            |               | 26            |               | 4 | .130    |         |
| 14        | 12       | 83            | 110           | 26            | 53            | 4 | .140    | .140    |
| 15        | 12       | 83            |               | 26            |               | 4 | .150    |         |
| 16        | 16       | 92            | 123           | 32            | 63            | 4 | .160    | .160    |
| 17        | 16       | 92            |               | 32            |               | 4 | .170    |         |
| 18        | 16       | 92            | 123           | 32            | 63            | 4 | .180    | .180    |
| 20        | 20       | 104           | 141           | 38            | 75            | 4 | .200    | .200    |
| 22        | 20       | 104           | 141           | 38            | 75            | 5 | .220    | .220    |
| 24        | 25       | 121           | 166           | 45            | 90            | 5 | .240    | .240    |
| 25        | 25       | 121           | 166           | 45            | 90            | 5 | .250    | .250    |
| 26        | 25       | 121           | 166           | 45            | 90            | 5 | .260    | .260    |
| 28        | 25       | 121           | 166           | 45            | 90            | 5 | .280    | .280    |
| 30        | 25       | 121           | 166           | 45            | 90            | 5 | .300    | .300    |
| 32        | 32       | 133           | 186           | 53            | 106           | 6 | .320    | .320    |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |              | fz (mm/z) |       |    |       |       |       |       |       |       |       |      |       |
|------------|--------------|-----------|-------|----|-------|-------|-------|-------|-------|-------|-------|------|-------|
| Material   |              | Ap        | Ae    | Vc | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25 | Ø 32  |
| <b>P.3</b> | ≤ 1100 N/mm² | 1,5xD     | 0,5xD | 24 | 0,02  | 0,025 | 0,035 | 0,04  | 0,07  | 0,08  | 0,09  | 0,1  | 0,12  |
| <b>P.5</b> | ≤ 1100 N/mm² | 1,5xD     | 0,5xD | 24 | 0,02  | 0,025 | 0,035 | 0,04  | 0,07  | 0,08  | 0,09  | 0,1  | 0,12  |
| <b>P.6</b> | > 1100 N/mm² | 1,5xD     | 0,5xD | 20 | 0,014 | 0,018 | 0,025 | 0,028 | 0,049 | 0,056 | 0,063 | 0,07 | 0,084 |
| <b>K.2</b> | > 800 N/mm²  | 1,5xD     | 0,5xD | 25 | 0,02  | 0,025 | 0,035 | 0,04  | 0,07  | 0,08  | 0,09  | 0,1  | 0,12  |
| <b>S.1</b> | ≤ 1500 N/mm² | 1,5xD     | 0,5xD | 12 | 0,014 | 0,018 | 0,025 | 0,028 | 0,049 | 0,056 | 0,063 | 0,07 | 0,084 |

TiAlN: Vc + 50 %

# End mills

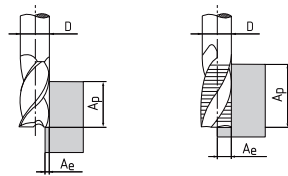
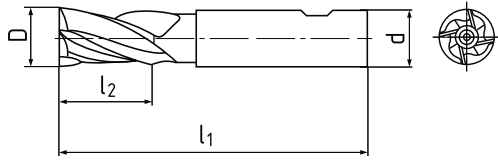
extralong



**CZ** Frézy válcové čelní | extradlouhé

**DE** Schaftfräser | Extra lang

**RU** Фрезы концевые с цилиндрическим хвостовиком | экстрa длинные



**125215E**



**121215E**



| D<br>k 10* | d<br>h 6 | l1  | l2  | Z<br>125215E | Z<br>121215E | 125215E | 121215E |
|------------|----------|-----|-----|--------------|--------------|---------|---------|
| 10         | 10       | 110 | 60  | 4            | 4            | .100    | .100    |
| 12         | 12       | 137 | 80  | 4            | 4            | .120    | .120    |
| 14         | 12       | 137 | 80  | 4            | 4            | .140    | .140    |
| 16         | 16       | 160 | 100 | 4            | 4            | .160    | .160    |
| 18         | 16       | 160 | 100 | 4            | 5            | .180    | .180    |
| 20         | 20       | 191 | 125 | 4            | 5            | .200    | .200    |
| 22         | 20       | 191 | 125 | 5            | 5            | .220    | .220    |
| 25         | 25       | 216 | 140 | 5            | 6            | .250    | .250    |
| 28         | 25       | 216 | 140 | 5            | 6            | .280    | .280    |
| 30         | 25       | 216 | 140 | 5            | 6            | .300    | .300    |
| 32         | 32       | 260 | 180 | 6            | 6            | .320    | .320    |

\*) 125215E = k 12

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|                |                 | fz (mm/z) |       |      |       |       |       |       |       |       |
|----------------|-----------------|-----------|-------|------|-------|-------|-------|-------|-------|-------|
| Material       | Ap              | Ae        | Vc    | Ø 10 | Ø 12  | Ø 16  | Ø 20  | Ø 25  | Ø 32  |       |
| <b>125215E</b> |                 |           |       |      |       |       |       |       |       |       |
| P.1            | ≤ 600 N/mm²     | 4xD       | 0,2xD | 28   | 0,06  | 0,067 | 0,081 | 0,11  | 0,15  | 0,161 |
| P.2            | ≤ 850 N/mm²     | 4xD       | 0,2xD | 23   | 0,06  | 0,067 | 0,081 | 0,11  | 0,15  | 0,161 |
| P.3            | ≤ 1100 N/mm²    | 4xD       | 0,2xD | 29   | 0,06  | 0,067 | 0,081 | 0,11  | 0,15  | 0,161 |
| P.4            | ≤ 900 N/mm²     | 4xD       | 0,2xD | 17   | 0,06  | 0,067 | 0,081 | 0,11  | 0,15  | 0,161 |
| P.5            | ≤ 1100 N/mm²    | 4xD       | 0,2xD | 12   | 0,06  | 0,067 | 0,081 | 0,11  | 0,15  | 0,161 |
| M.1            | ≤ 750 N/mm²     | 4xD       | 0,2xD | 17   | 0,06  | 0,067 | 0,081 | 0,11  | 0,15  | 0,161 |
| M.2            | 750 - 850 N/mm² | 4xD       | 0,2xD | 15   | 0,06  | 0,067 | 0,081 | 0,11  | 0,15  | 0,161 |
| M.3            | > 850 N/mm²     | 4xD       | 0,2xD | 13   | 0,06  | 0,067 | 0,081 | 0,11  | 0,15  | 0,161 |
| K.1            | ≤ 820 N/mm²     | 4xD       | 0,2xD | 28   | 0,06  | 0,067 | 0,081 | 0,11  | 0,15  | 0,161 |
| N.4            | ≤ 800 N/mm²     | 4xD       | 0,2xD | 32   | 0,06  | 0,067 | 0,081 | 0,11  | 0,15  | 0,161 |
| S.2            | ≤ 1250 N/mm²    | 4xD       | 0,2xD | 11   | 0,042 | 0,047 | 0,057 | 0,077 | 0,105 | 0,113 |
| <b>121215E</b> |                 |           |       |      |       |       |       |       |       |       |
| P.1            | ≤ 600 N/mm²     | 4xD       | 0,2xD | 28   | 0,046 | 0,054 | 0,063 | 0,081 | 0,11  | 0,13  |
| P.2            | ≤ 850 N/mm²     | 4xD       | 0,2xD | 23   | 0,046 | 0,054 | 0,063 | 0,081 | 0,11  | 0,13  |
| P.3            | ≤ 1100 N/mm²    | 4xD       | 0,2xD | 29   | 0,046 | 0,054 | 0,063 | 0,081 | 0,11  | 0,13  |
| P.4            | ≤ 900 N/mm²     | 4xD       | 0,2xD | 17   | 0,046 | 0,054 | 0,063 | 0,081 | 0,11  | 0,13  |
| P.5            | ≤ 1100 N/mm²    | 4xD       | 0,2xD | 12   | 0,046 | 0,054 | 0,063 | 0,081 | 0,11  | 0,13  |
| M.1            | ≤ 750 N/mm²     | 4xD       | 0,2xD | 17   | 0,046 | 0,054 | 0,063 | 0,081 | 0,11  | 0,13  |
| M.2            | 750 - 850 N/mm² | 4xD       | 0,2xD | 15   | 0,046 | 0,054 | 0,063 | 0,081 | 0,11  | 0,13  |
| M.3            | > 850 N/mm²     | 4xD       | 0,2xD | 13   | 0,046 | 0,054 | 0,063 | 0,081 | 0,11  | 0,13  |
| K.1            | ≤ 820 N/mm²     | 4xD       | 0,2xD | 28   | 0,046 | 0,054 | 0,063 | 0,081 | 0,11  | 0,13  |
| N.4            | ≤ 800 N/mm²     | 4xD       | 0,2xD | 30   | 0,046 | 0,054 | 0,063 | 0,081 | 0,11  | 0,13  |
| S.2            | ≤ 1250 N/mm²    | 4xD       | 0,2xD | 11   | 0,032 | 0,038 | 0,044 | 0,056 | 0,077 | 0,091 |

# End mills

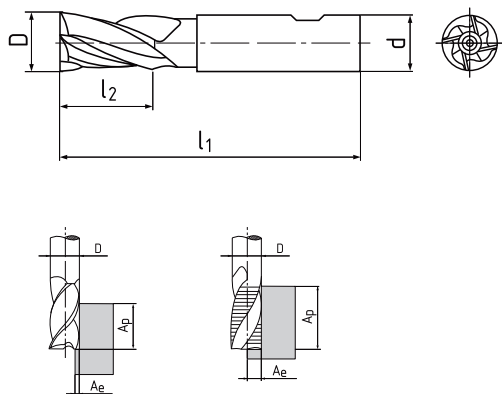
extra short, NR, N



**CZ** Frézy válcové čelní | extra krátké, NR, N

**DE** Schaftfräser | Extra kurz, NR, N

**RU** Фрезы концевые с цилиндрическим хвостовиком | екстра короткие, NR, N



**124218K**

**120218K**



| D<br>k 12* | d<br>h 6 | l1  | l2 | Z | 124218K | 120218K |
|------------|----------|-----|----|---|---------|---------|
| 16         | 10       | 60  | 15 | 4 |         | .160015 |
| 20         | 12       | 65  | 15 | 4 |         | .200015 |
| 25         | 16       | 75  | 20 | 5 |         | .250020 |
| 30         | 20       | 90  | 30 | 6 | .300030 | .300030 |
| 32         | 20       | 90  | 30 | 6 |         | .320030 |
| 35         | 20       | 90  | 30 | 6 | .350030 | .350030 |
| 40         | 25       | 95  | 32 | 8 | .400032 | .400032 |
| 50         | 32       | 100 | 36 | 8 | .500036 | .500036 |

\*) 120218K = k 10

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|                |               | fz (mm/z) |       |        |       |       |      |      |
|----------------|---------------|-----------|-------|--------|-------|-------|------|------|
| Material       | Ap            | Ae        | Vc    | Ø 30   | Ø 35  | Ø 40  | Ø 50 |      |
| <b>124218K</b> |               |           |       |        |       |       |      |      |
| P.1            | ≤ 600 N/mm²   | 1x l2     | 0,5xD | 45     | 0,115 | 0,13  | 0,14 | 0,18 |
| P.2            | ≤ 850 N/mm²   | 1x l2     | 0,5xD | 39     | 0,115 | 0,13  | 0,14 | 0,18 |
| P.3            | ≤ 1100 N/mm²  | 1x l2     | 0,5xD | 24     | 0,115 | 0,13  | 0,14 | 0,18 |
| P.4            | ≤ 900 N/mm²   | 1x l2     | 0,5xD | 30     | 0,115 | 0,13  | 0,14 | 0,18 |
| M.2            | 750-850 N/mm² | 1x l2     | 0,5xD | 15     | 0,115 | 0,13  | 0,14 | 0,18 |
| N.4            | ≤ 800 N/mm²   | 1x l2     | 0,5xD | 80-120 | 0,115 | 0,13  | 0,14 | 0,18 |
| <b>120218K</b> |               |           |       |        |       |       |      |      |
| P.1            | ≤ 600 N/mm²   | 1x l2     | 0,5xD | 45     | 0,085 | 0,098 | 0,11 | 0,13 |
| P.2            | ≤ 850 N/mm²   | 1x l2     | 0,5xD | 39     | 0,085 | 0,098 | 0,11 | 0,13 |
| P.3            | ≤ 1100 N/mm²  | 1x l2     | 0,5xD | 24     | 0,085 | 0,098 | 0,11 | 0,13 |
| P.4            | ≤ 900 N/mm²   | 1x l2     | 0,5xD | 30     | 0,085 | 0,098 | 0,11 | 0,13 |
| M.2            | 750-850 N/mm² | 1x l2     | 0,5xD | 15     | 0,085 | 0,098 | 0,11 | 0,13 |
| N.4            | > 800 N/mm²   | 1x l2     | 0,5xD | 80-120 | 0,085 | 0,098 | 0,11 | 0,13 |

# End mills

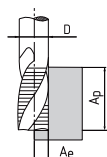
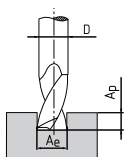
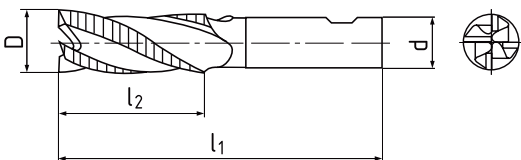
short, 1 tooth over center



**CZ** Frézy válcové čelní | krátké, 1 břit přes střed

**DE** Schaftfräser | Kurz, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | с центрорежущим зубом



**148617**



| D<br>k 12 | d<br>h 6 | l1  | l2 | Z | 148617     |
|-----------|----------|-----|----|---|------------|
| 4         | 6        | 55  | 11 | 3 | .040 ALTiN |
| 5         | 6        | 57  | 13 | 4 | .050 ALTiN |
| 6         | 6        | 57  | 13 | 4 | .060 ALTiN |
| 8         | 10       | 69  | 19 | 4 | .080 ALTiN |
| 10        | 10       | 72  | 22 | 4 | .100 ALTiN |
| 12        | 12       | 83  | 26 | 4 | .120 ALTiN |
| 16        | 16       | 92  | 32 | 5 | .160 ALTiN |
| 20        | 20       | 104 | 38 | 6 | .200 ALTiN |
| 25        | 25       | 121 | 45 | 6 | .250 ALTiN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |             | fz (mm/z) |       |    |       |       |       |       |       |       |
|------------|-------------|-----------|-------|----|-------|-------|-------|-------|-------|-------|
| Material   |             | Ap        | Ae    | Vc | Ø 6   | Ø 10  | Ø 12  | Ø 16  | Ø 20  | Ø 25  |
| <b>P.1</b> | ≤ 600N/mm²  | 1,5xD     | 0,5xD | 78 | 0,035 | 0,051 | 0,06  | 0,095 | 0,13  | 0,147 |
| <b>P.3</b> | ≤ 1100N/mm² | 1,5xD     | 0,5xD | 51 | 0,035 | 0,051 | 0,06  | 0,095 | 0,13  | 0,147 |
| <b>P.6</b> | > 1100N/mm² | 1,5xD     | 0,5xD | 35 | 0,025 | 0,036 | 0,042 | 0,067 | 0,091 | 0,104 |
| <b>M.3</b> | > 850 N/mm² | 1,5xD     | 0,5xD | 37 | 0,035 | 0,051 | 0,06  | 0,095 | 0,13  | 0,147 |
| <b>S.1</b> | ≤ 1500N/mm² | 1,5xD     | 0,5xD | 23 | 0,025 | 0,036 | 0,042 | 0,067 | 0,091 | 0,104 |
| <b>S.2</b> | ≤ 1250N/mm² | 1,5xD     | 0,5xD | 23 | 0,025 | 0,036 | 0,042 | 0,067 | 0,091 | 0,104 |

# End mills

with corner radius



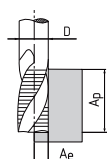
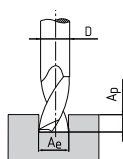
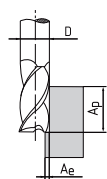
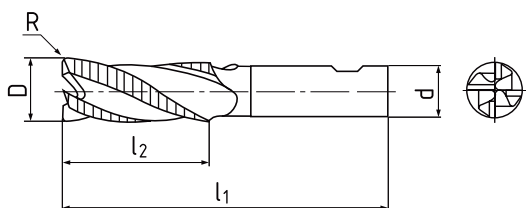
148517R

120517R

**CZ** Frézy válcové čelní | s rohovým radiusem

**DE** Schaftfräser | mit dem Eckenradius

**RU** Фрезы концевые с цилиндрическим хвостовиком | с радиусом



**148517R**



**120517R**



| D<br>k 12 | d<br>h 6 | l1  | l2 | R | Z | 148517R       | 120517R       |
|-----------|----------|-----|----|---|---|---------------|---------------|
| 6         | 6        | 57  | 16 | 1 | 4 | .060010 ALTiN | .060010 ALTiN |
| 6         | 6        | 57  | 16 | 2 | 4 | .060020 ALTiN | .060020 ALTiN |
| 10        | 10       | 72  | 22 | 1 | 4 | .100010 ALTiN | .100010 ALTiN |
| 10        | 10       | 72  | 22 | 2 | 4 | .100020 ALTiN | .100020 ALTiN |
| 12        | 12       | 83  | 25 | 1 | 4 | .120010 ALTiN | .120010 ALTiN |
| 12        | 12       | 83  | 25 | 2 | 4 | .120020 ALTiN | .120020 ALTiN |
| 16        | 16       | 92  | 32 | 2 | 4 | .160020 ALTiN | .160020 ALTiN |
| 16        | 16       | 92  | 32 | 4 | 4 | .160040 ALTiN | .160040 ALTiN |
| 20        | 20       | 104 | 38 | 2 | 4 | .200020 ALTiN | .200020 ALTiN |
| 20        | 20       | 104 | 38 | 4 | 4 | .200040 ALTiN | .200040 ALTiN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |              |                |                |                | fz (mm/z) |       |       |       |       |       |  |
|----------|--------------|----------------|----------------|----------------|-----------|-------|-------|-------|-------|-------|--|
| Material |              | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 6       | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 20  |  |
| 148517R  |              |                |                |                |           |       |       |       |       |       |  |
| P.1      | ≤ 600 N/mm²  | 1,5xD          | 0,5xD          | 78             | 0,035     | 0,042 | 0,051 | 0,06  | 0,08  | 0,1   |  |
| P.3      | ≤ 1100 N/mm² | 1,5xD          | 0,5xD          | 51             | 0,035     | 0,042 | 0,051 | 0,06  | 0,08  | 0,1   |  |
| P.6      | > 1100 N/mm² | 1,5xD          | 0,5xD          | 20             | 0,025     | 0,029 | 0,036 | 0,042 | 0,056 | 0,07  |  |
| M.3      | > 850 N/mm²  | 1,5xD          | 0,5xD          | 37             | 0,035     | 0,042 | 0,051 | 0,06  | 0,095 | 0,13  |  |
| N.1      | ≤ 400 N/mm²  | 1,5xD          | 0,5xD          | 130            | 0,046     | 0,055 | 0,066 | 0,078 | 0,104 | 0,13  |  |
| N.4      | ≤ 800 N/mm²  | 1,5xD          | 0,5xD          | 70             | 0,035     | 0,042 | 0,051 | 0,06  | 0,095 | 0,13  |  |
| S.1      | ≤ 1500 N/mm² | 1,5xD          | 0,5xD          | 23             | 0,035     | 0,042 | 0,051 | 0,06  | 0,095 | 0,13  |  |
| S.2      | ≤ 1250 N/mm² | 1,5xD          | 0,5xD          | 23             | 0,025     | 0,029 | 0,036 | 0,042 | 0,056 | 0,07  |  |
| 120517R  |              |                |                |                |           |       |       |       |       |       |  |
| P.1      | ≤ 600 N/mm²  | 1xD            | 0,1xD          | 78             | 0,03      | 0,036 | 0,043 | 0,051 | 0,068 | 0,085 |  |
| P.3      | ≤ 1100 N/mm² | 1xD            | 0,1xD          | 51             | 0,03      | 0,036 | 0,043 | 0,051 | 0,068 | 0,085 |  |
| P.6      | > 1100 N/mm² | 1xD            | 0,1xD          | 20             | 0,021     | 0,025 | 0,031 | 0,036 | 0,048 | 0,06  |  |
| M.3      | > 850 N/mm²  | 1xD            | 0,1xD          | 37             | 0,03      | 0,036 | 0,043 | 0,051 | 0,081 | 0,111 |  |
| N.1      | ≤ 400 N/mm²  | 1xD            | 0,1xD          | 130            | 0,039     | 0,047 | 0,056 | 0,066 | 0,088 | 0,111 |  |
| N.4      | ≤ 800 N/mm²  | 1xD            | 0,1xD          | 70             | 0,03      | 0,036 | 0,043 | 0,051 | 0,081 | 0,111 |  |
| S.1      | ≤ 1500 N/mm² | 1xD            | 0,1xD          | 23             | 0,03      | 0,036 | 0,043 | 0,051 | 0,081 | 0,111 |  |
| S.2      | ≤ 1250 N/mm² | 1xD            | 0,1xD          | 23             | 0,021     | 0,025 | 0,031 | 0,036 | 0,048 | 0,06  |  |

# End mills

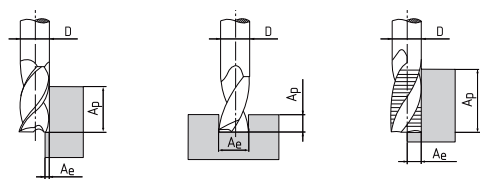
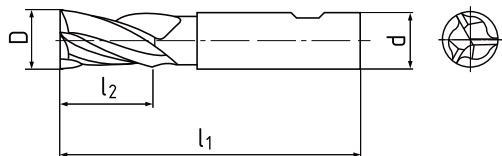
short, 1 tooth cut over centre



**CZ** Frézy válcové čelní | krátké, 1 břit přes střed

**DE** Schaftfräser | Kurz, 1 Schneide über Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | короткие, с центрорежущим зубом



**120417**



| D<br>k 10 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 120417     |
|-----------|----------|----------------|----------------|---|------------|
| 2         | 6        | 51             | 7              | 3 | .020 ALTiN |
| 3         | 6        | 52             | 8              | 3 | .030 ALTiN |
| 4         | 6        | 55             | 11             | 3 | .040 ALTiN |
| 5         | 6        | 57             | 13             | 3 | .050 ALTiN |
| 6         | 6        | 57             | 13             | 3 | .060 ALTiN |
| 7         | 10       | 66             | 16             | 3 | .070 ALTiN |
| 8         | 10       | 69             | 19             | 3 | .080 ALTiN |
| 10        | 10       | 72             | 22             | 3 | .100 ALTiN |
| 12        | 12       | 83             | 26             | 3 | .120 ALTiN |
| 14        | 12       | 83             | 26             | 3 | .140 ALTiN |
| 16        | 16       | 92             | 32             | 3 | .160 ALTiN |
| 18        | 16       | 92             | 32             | 3 | .180 ALTiN |
| 20        | 20       | 104            | 38             | 3 | .200 ALTiN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |                           | fz (mm/z)      |                |                |        |        |        |        |        |        |        |
|------------|---------------------------|----------------|----------------|----------------|--------|--------|--------|--------|--------|--------|--------|
| Material   |                           | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 6    | Ø 8    | Ø 10   | Ø 12   | Ø 16   | Ø 18   | Ø 20   |
| <b>P.2</b> | ≤ 850 N/mm <sup>2</sup>   | 1xD            | 0,1xD          | 99             | 0,017  | 0,023  | 0,031  | 0,037  | 0,048  | 0,056  | 0,063  |
| <b>P.3</b> | ≤ 1100 N/mm <sup>2</sup>  | 1xD            | 0,1xD          | 61,5           | 0,017  | 0,023  | 0,031  | 0,037  | 0,048  | 0,056  | 0,063  |
| <b>P.4</b> | ≤ 900 N/mm <sup>2</sup>   | 1xD            | 0,1xD          | 76,5           | 0,017  | 0,023  | 0,031  | 0,037  | 0,048  | 0,056  | 0,063  |
| <b>P.5</b> | > 1100 N/mm <sup>2</sup>  | 1xD            | 0,1xD          | 61,5           | 0,017  | 0,023  | 0,031  | 0,037  | 0,048  | 0,056  | 0,063  |
| <b>M.2</b> | 750–850 N/mm <sup>2</sup> | 1xD            | 0,1xD          | 37,5           | 0,115  | 0,023  | 0,031  | 0,037  | 0,048  | 0,056  | 0,063  |
| <b>K.1</b> | ≤ 820 N/mm <sup>2</sup>   | 1xD            | 0,1xD          | 88,5           | 0,017  | 0,023  | 0,031  | 0,037  | 0,048  | 0,056  | 0,063  |
| <b>N.2</b> | ≤ 600 N/mm <sup>2</sup>   | 1xD            | 0,1xD          | 360–675        | 0,0221 | 0,0299 | 0,0403 | 0,0481 | 0,0624 | 0,0728 | 0,0819 |
| <b>S.1</b> | ≤ 1500 N/mm <sup>2</sup>  | 1xD            | 0,1xD          | 31,5           | 0,0119 | 0,0161 | 0,0217 | 0,0259 | 0,0336 | 0,0392 | 0,0441 |
| <b>S.2</b> | ≤ 1250 N/mm <sup>2</sup>  | 1xD            | 0,1xD          | 30             | 0,0119 | 0,0161 | 0,0217 | 0,0259 | 0,0336 | 0,0392 | 0,0441 |

# End mills

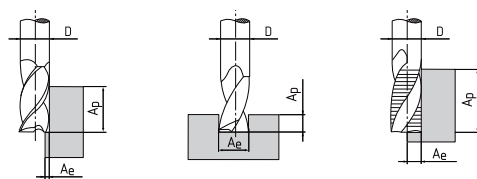
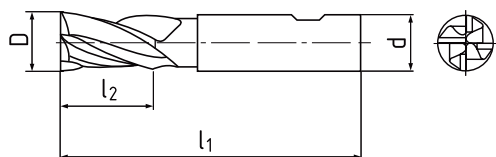
1 tooth cut over centre



**CZ** Frézy válcové čelní | 1 břit přes střed

**DE** Schaftfräser | 1 Schneide über die die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | с центрорежущим зубом



**120517**



**121517**



| D<br>k 10 | d<br>h 6 | I1<br>120517 | I1<br>121517 | I2<br>120517 | I2<br>121517 | Z | 120517      | 121517     |
|-----------|----------|--------------|--------------|--------------|--------------|---|-------------|------------|
| 2         | 6        | 51           |              | 7            |              | 4 | .020 ALTIN  |            |
| 3         | 6        | 52           | 56           | 8            | 12           | 4 | .030 ALTIN  | .030 ALTIN |
| 4         | 6        | 55           |              | 11           |              | 4 | .040 ALTIN  |            |
| 5         | 6        | 57           |              | 13           |              | 4 | .050 ALTIN  |            |
| 6         | 6        | 57           | 68           | 13           | 24           | 4 | .060 ALTIN  | .060 ALTIN |
| 7         | 10       | 66           |              | 16           |              | 4 | .070 ALTIN* |            |
| 8         | 10       | 69           | 88           | 19           | 38           | 4 | .080 ALTIN  | .080 ALTIN |
| 9         | 10       | 69           |              | 19           |              | 4 | .090 ALTIN* |            |
| 10        | 10       | 72           | 95           | 22           | 45           | 4 | .100 ALTIN  | .100 ALTIN |
| 12        | 12       | 83           | 110          | 26           | 53           | 4 | .120 ALTIN  | .120 ALTIN |
| 14        | 12       | 83           | 110          | 26           | 53           | 4 | .140 ALTIN  | .140 ALTIN |
| 16        | 16       | 92           | 123          | 32           | 63           | 4 | .160 ALTIN  | .160 ALTIN |
| 18        | 16       | 92           | 123          | 32           | 63           | 4 | .180 ALTIN  | .180 ALTIN |
| 20        | 20       | 104          | 141          | 38           | 75           | 4 | .200 ALTIN  | .200 ALTIN |
| 25        | 25       | 121          |              | 45           |              | 5 | .250 ALTIN  |            |
| 30        | 25       | 121          |              | 45           |              | 5 | .300 ALTIN  |            |
| 32        | 32       |              | 186          |              | 106          | 6 |             | .320 ALTIN |

\*) On demand / На поptávku / auf Anfrage / По запросу

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |               | fz (mm/z) |       |         |       |       |       |       |       |       |       |       |      |
|------------|---------------|-----------|-------|---------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| Material   |               | Ap        | Ae    | Vc      | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25  | Ø 32 |
| <b>P.2</b> | ≤ 850 N/mm²   | 1xD       | 0,1xD | 99      | 0,017 | 0,023 | 0,031 | 0,037 | 0,048 | 0,056 | 0,063 | 0,085 | 0,1  |
| <b>P.3</b> | ≤ 1100 N/mm²  | 1xD       | 0,1xD | 61,5    | 0,017 | 0,023 | 0,031 | 0,037 | 0,048 | 0,056 | 0,063 | 0,085 | 0,1  |
| <b>P.4</b> | ≤ 900 N/mm²   | 1xD       | 0,1xD | 76,5    | 0,017 | 0,023 | 0,031 | 0,037 | 0,048 | 0,056 | 0,063 | 0,085 | 0,1  |
| <b>P.5</b> | > 1100 N/mm²  | 1xD       | 0,1xD | 61,5    | 0,017 | 0,023 | 0,031 | 0,037 | 0,048 | 0,056 | 0,063 | 0,085 | 0,1  |
| <b>M.2</b> | 750–850 N/mm² | 1xD       | 0,1xD | 37,5    | 0,017 | 0,023 | 0,031 | 0,037 | 0,048 | 0,056 | 0,063 | 0,085 | 0,1  |
| <b>K.1</b> | ≤ 820 N/mm²   | 1xD       | 0,1xD | 88,5    | 0,017 | 0,023 | 0,031 | 0,037 | 0,048 | 0,056 | 0,063 | 0,085 | 0,1  |
| <b>N.2</b> | ≤ 600 N/mm²   | 1xD       | 0,1xD | 240–450 | 0,022 | 0,03  | 0,04  | 0,048 | 0,062 | 0,073 | 0,082 | 0,11  | 0,13 |
| <b>S.1</b> | ≤ 1500 N/mm²  | 1xD       | 0,1xD | 31,5    | 0,012 | 0,016 | 0,022 | 0,026 | 0,034 | 0,04  | 0,044 | 0,052 | 0,07 |
| <b>S.2</b> | ≤ 1250 N/mm²  | 1xD       | 0,1xD | 30      | 0,012 | 0,016 | 0,022 | 0,026 | 0,034 | 0,04  | 0,044 | 0,052 | 0,07 |

# End mills

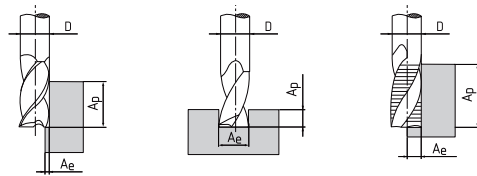
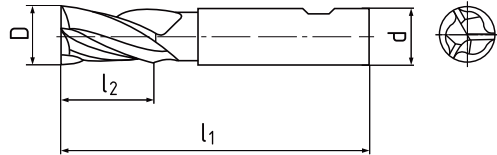
short, 1 tooth cut over centre



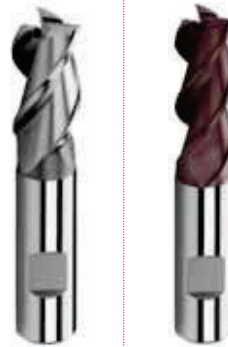
**CZ** Frézy válcové čelní | krátké, 1 břit přes střed

**DE** Schaftfräser | Kurz, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | короткие, с центрорежущим зубом



**140418**



| D<br>k 10 | d<br>h 6 | l1  | l2 | Z | 140418 | 140418     |
|-----------|----------|-----|----|---|--------|------------|
| 2         | 6        | 51  | 7  | 3 | .020   | .020 TIALN |
| 2,5       | 6        | 52  | 8  | 3 | .025   | .025 TIALN |
| 3         | 6        | 52  | 8  | 3 | .030   | .030 TIALN |
| 3,5       | 6        | 54  | 10 | 3 | .035   | .035 TIALN |
| 4         | 6        | 55  | 11 | 3 | .040   | .040 TIALN |
| 4,5       | 6        | 55  | 11 | 3 | .045   | .045 TIALN |
| 5         | 6        | 57  | 13 | 3 | .050   | .050 TIALN |
| 6         | 6        | 57  | 13 | 3 | .060   | .060 TIALN |
| 7         | 10       | 66  | 16 | 3 | .070   | .070 TIALN |
| 8         | 10       | 69  | 19 | 3 | .080   | .080 TIALN |
| 9         | 10       | 69  | 19 | 3 | .090   | .090 TIALN |
| 10        | 10       | 72  | 22 | 3 | .100   | .100 TIALN |
| 11        | 12       | 79  | 22 | 3 | .110   | .110 TIALN |
| 12        | 12       | 83  | 26 | 3 | .120   | .120 TIALN |
| 13        | 12       | 83  | 26 | 3 | .130   | .130 TIALN |
| 14        | 12       | 83  | 26 | 3 | .140   | .140 TIALN |
| 15        | 12       | 83  | 26 | 3 | .150   | .150 TIALN |
| 16        | 16       | 92  | 32 | 3 | .160   | .160 TIALN |
| 17        | 16       | 92  | 32 | 3 | .170   | .170 TIALN |
| 18        | 16       | 92  | 32 | 3 | .180   | .180 TIALN |
| 19        | 16       | 92  | 32 | 3 | .190   | .190 TIALN |
| 20        | 20       | 104 | 38 | 3 | .200   | .200 TIALN |
| 22        | 20       | 104 | 38 | 3 | .220   | .220 TIALN |
| 25        | 25       | 121 | 45 | 3 | .250   | .250 TIALN |
| 28        | 25       | 121 | 45 | 3 | .280   | .280 TIALN |
| 32        | 32       | 133 | 53 | 3 | .320   | .320 TIALN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |              |                |                | fz (mm/z)      |       |       |       |       |       |       |       |       |      |       |
|----------|--------------|----------------|----------------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|------|-------|
| Material |              | A <sub>p</sub> | A <sub>e</sub> | V <sub>C</sub> | Ø 3   | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25 | Ø 32  |
| P.1      | ≤ 600 N/mm²  | 1xD            | 0,1xD          | 45             | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,1  | 0,12  |
| P.2      | ≤ 850 N/mm²  | 1xD            | 0,1xD          | 39             | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,1  | 0,12  |
| P.3      | ≤ 1100 N/mm² | 1xD            | 0,1xD          | 24             | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,1  | 0,12  |
| P.4      | ≤ 900 N/mm²  | 1xD            | 0,1xD          | 30             | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,1  | 0,12  |
| P.5      | ≤ 1100 N/mm² | 1xD            | 0,1xD          | 24             | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,1  | 0,12  |
| K.1      | ≤ 820 N/mm²  | 1xD            | 0,1xD          | 35             | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,1  | 0,12  |
| N.4      | ≤ 800 N/mm²  | 1xD            | 0,1xD          | 80-120         | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,1  | 0,12  |
| S.1      | ≤ 1500 N/mm² | 1xD            | 0,1xD          | 12             | 0,004 | 0,011 | 0,015 | 0,02  | 0,024 | 0,031 | 0,036 | 0,04  | 0,07 | 0,084 |

TiAlN: Vc + 50 %

# End mills

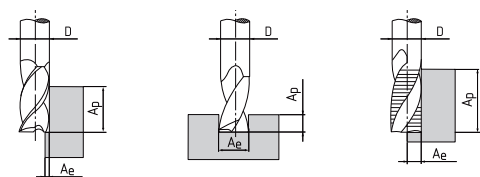
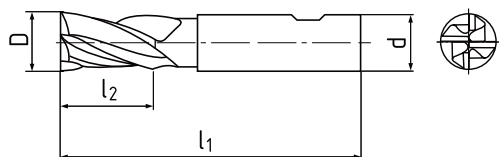
with variable helix angle



**CZ** Frézy válcové čelní | s proměnnou šroubovici

**DE** Schaftfräser | mit ungleichen Spannwinkel

**RU** Фрезы цилиндрические торцевые | с переменной спиралью



**140617X**



| D<br>k 10 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 140617X    |
|-----------|----------|----------------|----------------|---|------------|
| 6         | 6        | 57             | 13             | 4 | .060 ALTIN |
| 8         | 10       | 69             | 19             | 4 | .080 ALTIN |
| 10        | 10       | 72             | 22             | 4 | .100 ALTIN |
| 12        | 12       | 83             | 26             | 4 | .120 ALTIN |
| 16        | 16       | 92             | 32             | 4 | .160 ALTIN |
| 20        | 20       | 104            | 38             | 4 | .200 ALTIN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |                           | fz (mm/z)      |                |                |       |       |       |       |       |       |
|------------|---------------------------|----------------|----------------|----------------|-------|-------|-------|-------|-------|-------|
| Material   |                           | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 20  |
| <b>P.1</b> | ≤ 600 N/mm <sup>2</sup>   | 1,5xD          | 0,15xD         | 65             | 0,02  | 0,027 | 0,038 | 0,044 | 0,054 | 0,065 |
| <b>P.2</b> | ≤ 850 N/mm <sup>2</sup>   | 1,5xD          | 0,15xD         | 65             | 0,02  | 0,027 | 0,038 | 0,044 | 0,054 | 0,065 |
| <b>P.3</b> | ≤ 1100 N/mm <sup>2</sup>  | 1,5xD          | 0,15xD         | 55             | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,053 |
| <b>P.4</b> | ≤ 900 N/mm <sup>2</sup>   | 1,5xD          | 0,15xD         | 55             | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,053 |
| <b>P.5</b> | ≤ 1100 N/mm <sup>2</sup>  | 1,5xD          | 0,15xD         | 55             | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,053 |
| <b>P.6</b> | > 1100 N/mm <sup>2</sup>  | 1,5xD          | 0,15xD         | 55             | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,053 |
| <b>M.1</b> | ≤ 750 N/mm <sup>2</sup>   | 1,5xD          | 0,15xD         | 50             | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,054 |
| <b>M.2</b> | 750–850 N/mm <sup>2</sup> | 1,5xD          | 0,15xD         | 40             | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,054 |
| <b>M.3</b> | > 850 N/mm <sup>2</sup>   | 1,5xD          | 0,15xD         | 40             | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,054 |
| <b>K.2</b> | > 800 N/mm <sup>2</sup>   | 1,5xD          | 0,15xD         | 55             | 0,023 | 0,03  | 0,041 | 0,049 | 0,06  | 0,071 |

# End mills

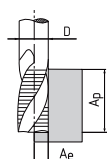
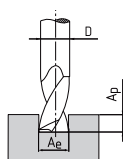
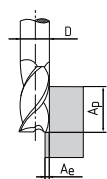
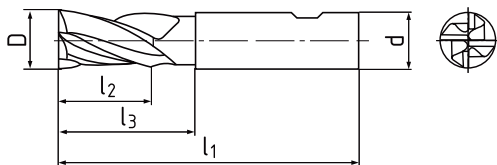
for stainless steel



**CZ** Frézy válcové čelní | na narez

**DE** Schaftfräser | für Inox

**RU** Фрезы цилиндрические торцевые | по нержавеющей



**150617S**



| D<br>k 10 | d<br>h 6 | I1  | I2 | I3 | Z | 150617S    | 150617S    |
|-----------|----------|-----|----|----|---|------------|------------|
| 6         | 6        | 57  | 7  | 21 | 4 | .060 ALTiN | .060 ALCrN |
| 8         | 8        | 63  | 9  | 27 | 4 | .080 ALTiN | .080 ALCrN |
| 10        | 10       | 72  | 11 | 32 | 4 | .100 ALTiN | .100 ALCrN |
| 12        | 12       | 83  | 13 | 38 | 4 | .120 ALTiN | .120 ALCrN |
| 16        | 16       | 92  | 17 | 44 | 4 | .160 ALTiN | .160 ALCrN |
| 20        | 20       | 104 | 21 | 54 | 4 | .200 ALTiN | .200 ALCrN |
| 25        | 25       | 121 | 26 | 65 | 4 | .250 ALTiN | .250 ALCrN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |               | fz (mm/z) |       |    |       |       |       |       |       |       |       |
|------------|---------------|-----------|-------|----|-------|-------|-------|-------|-------|-------|-------|
| Material   |               | Ap        | Ae    | Vc | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 20  | Ø 25  |
| <b>P.1</b> | ≤ 600 N/mm²   | 1xD       | 0,1xD | 78 | 0,02  | 0,027 | 0,038 | 0,044 | 0,054 | 0,065 | 0,078 |
| <b>P.2</b> | ≤ 850 N/mm²   | 1xD       | 0,1xD | 78 | 0,02  | 0,027 | 0,038 | 0,044 | 0,054 | 0,065 | 0,078 |
| <b>P.3</b> | ≤ 1100 N/mm²  | 1xD       | 0,1xD | 66 | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,053 | 0,066 |
| <b>P.4</b> | ≤ 900 N/mm²   | 1xD       | 0,1xD | 66 | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,053 | 0,066 |
| <b>P.5</b> | ≤ 1100 N/mm²  | 1xD       | 0,1xD | 66 | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,053 | 0,066 |
| <b>P.6</b> | > 1100 N/mm²  | 1xD       | 0,1xD | 66 | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,053 | 0,066 |
| <b>M.1</b> | ≤ 750 N/mm²   | 1xD       | 0,1xD | 60 | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,054 | 0,068 |
| <b>M.2</b> | 750–850 N/mm² | 1xD       | 0,1xD | 48 | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,054 | 0,068 |
| <b>M.3</b> | > 850 N/mm²   | 1xD       | 0,1xD | 48 | 0,018 | 0,024 | 0,03  | 0,036 | 0,042 | 0,054 | 0,068 |



# End mills

short, 1 tooth cut over centre

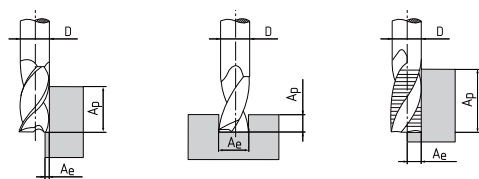
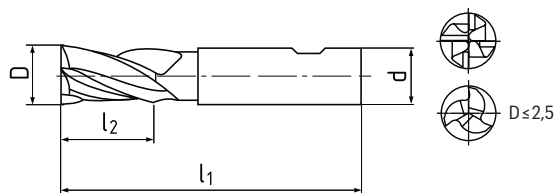


D≤2,5

**CZ** Frézy válcové čelní | krátké, 1 břit přes střed

**DE** Schaftfräser | Kurz, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | короткие, с центрорежущим зубом



**120508**

**120518**



| D<br>k 10 | d<br>h 6 | l1 | l2 | Z | 120508 | 120518 | 120518     |
|-----------|----------|----|----|---|--------|--------|------------|
| 2         | 6        | 51 | 7  | 3 | .020   | .020   | .020 TIALN |
| 2,5       | 6        | 52 | 8  | 3 | .025   | .025   | .025 TIALN |
| 3         | 6        | 52 | 8  | 4 | .030   | .030   | .030 TIALN |
| 3,5       | 6        | 54 | 10 | 4 | .035   | .035   | .035 TIALN |
| 4         | 6        | 55 | 11 | 4 | .040   | .040   | .040 TIALN |
| 4,5       | 6        | 55 | 11 | 4 | .045   | .045   | .045 TIALN |
| 5         | 6        | 57 | 13 | 4 | .050   | .050   | .050 TIALN |
| 5,5       | 6        | 57 | 13 | 4 | .055   | .055   | .055 TIALN |
| 6         | 6        | 57 | 13 | 4 | .060   | .060   | .060 TIALN |
| 6,5       | 10       | 66 | 16 | 4 | .065   | .065   | .065 TIALN |
| 7         | 10       | 66 | 16 | 4 | .070   | .070   | .070 TIALN |
| 7,5       | 10       | 66 | 16 | 4 | .075   | .075   | .075 TIALN |
| 8         | 10       | 69 | 19 | 4 | .080   | .080   | .080 TIALN |
| 8,5       | 10       | 69 | 19 | 4 | .085   | .085   | .085 TIALN |
| 9         | 10       | 69 | 19 | 4 | .090   | .090   | .090 TIALN |
| 9,5       | 10       | 69 | 19 | 4 | .095   | .095   | .095 TIALN |
| 10        | 10       | 72 | 22 | 4 | .100   | .100   | .100 TIALN |
| 11        | 12       | 79 | 22 | 4 | .110   | .110   | .110 TIALN |
| 12        | 12       | 83 | 26 | 4 | .120   | .120   | .120 TIALN |
| 13        | 12       | 83 | 26 | 4 | .130   | .130   | .130 TIALN |

Also in the set / Také v sadě / Auch im Set / Также в комплекте (69)

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |               | fz (mm/z) |       |         |       |       |       |       |       |       |
|----------|---------------|-----------|-------|---------|-------|-------|-------|-------|-------|-------|
| Material | Ap            | Ae        | Vc    | Ø 3     | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  |       |
| P.1      | ≤ 600 N/mm²   | 1xD       | 0,1xD | 45      | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| P.2      | ≤ 850 N/mm²   | 1xD       | 0,1xD | 39      | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| P.3      | ≤ 1100 N/mm²  | 1xD       | 0,1xD | 24      | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| P.4      | ≤ 900 N/mm²   | 1xD       | 0,1xD | 30      | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| P.6      | > 1100 N/mm²  | 1xD       | 0,1xD | 20      | 0,004 | 0,011 | 0,015 | 0,02  | 0,024 | 0,031 |
| M.2      | 750–850 N/mm² | 1xD       | 0,1xD | 15      | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| K.2      | > 800 N/mm²   | 1xD       | 0,1xD | 35      | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| N.2      | ≤ 600 N/mm²   | 1xD       | 0,1xD | 160-300 | 0,008 | 0,02  | 0,027 | 0,036 | 0,044 | 0,06  |
| S.1      | ≤ 1500 N/mm²  | 1xD       | 0,1xD | 12      | 0,004 | 0,011 | 0,015 | 0,02  | 0,024 | 0,031 |

TiAlN: Vc + 50 %

# End mills

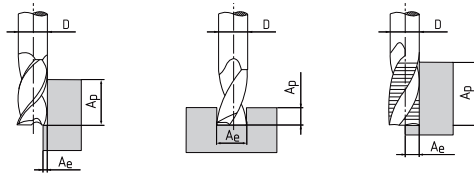
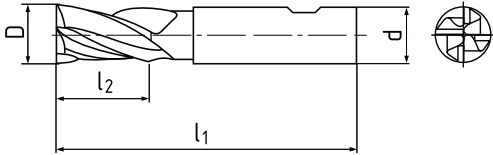
short, 1 tooth cut over centre



**CZ** Frézy válcové čelní | krátké, 1 břit přes střed

**DE** Schaftfräser | Kurz, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | короткие, с центрорежущим зубом



**120508**

**120518**



| D<br>k 10 | d<br>h 6 | l1  | l2 | Z | 120508 | 120518 | 120518       |
|-----------|----------|-----|----|---|--------|--------|--------------|
| 14        | 12       | 83  | 26 | 4 | .140   | .140   | .140 TIALN   |
| 15        | 12       | 83  | 26 | 4 | .150   | .150   | .150 TIALN   |
| 16        | 16       | 92  | 32 | 4 | .160   | .160   | .160 TIALN   |
| 17        | 16       | 92  | 32 | 4 | .170   | .170   | .170 TIALN   |
| 18        | 16       | 92  | 32 | 4 | .180   | .180   | .180 TIALN   |
| 20        | 20       | 104 | 38 | 4 | .200   | .200   | .200 TIALN   |
| 21        | 20       | 104 | 38 | 5 | .210** | .210** | .210 TIALN** |
| 22        | 20       | 104 | 38 | 5 | .220   | .220   | .220 TIALN   |
| 24        | 25       | 121 | 45 | 5 | .240** | .240   | .240 TIALN   |
| 25        | 25       | 121 | 45 | 5 | .250   | .250   | .250 TIALN   |
| 26        | 25       | 121 | 45 | 5 | .260   | .260   | .260 TIALN   |
| 27        | 25       | 121 | 45 | 5 | .270** | .270** | .270 TIALN** |
| 28        | 25       | 121 | 45 | 5 | .280   | .280   | .280 TIALN   |
| 30        | 25       | 121 | 45 | 5 | .300   | .300   | .300 TIALN   |
| 32        | 32       | 133 | 53 | 6 | .320   | .320   | .320 TIALN   |
| 34        | 32       | 133 | 53 | 6 | .340** | .340** | .340 TIALN** |
| 35        | 32       | 133 | 53 | 6 |        | .350   | .350 TIALN   |
| 36        | 32       | 133 | 53 | 6 |        | .360   | .360 TIALN   |
| 40*       | 32       | 143 | 63 | 6 |        | .40032 | .40032 TIALN |

\*) ≠ DIN 844

\*\*) On demand / Na požádání / auf Anfrage / По запросу

Also in the set / Také v sadě / Auch im Set / Также в комплекте (69)

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |                           |                |                |                |  | fz (mm/z) |       |       |       |       |       |
|----------|---------------------------|----------------|----------------|----------------|--|-----------|-------|-------|-------|-------|-------|
| Material |                           | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> |  | Ø 16      | Ø 18  | Ø 20  | Ø 25  | Ø 32  | Ø 40  |
| P.1      | ≤ 600 N/mm <sup>2</sup>   | 1xD            | 0,1xD          | 45             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 | 0,11  |
| P.2      | ≤ 850 N/mm <sup>2</sup>   | 1xD            | 0,1xD          | 39             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 | 0,11  |
| P.3      | ≤ 1100 N/mm <sup>2</sup>  | 1xD            | 0,1xD          | 24             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 | 0,11  |
| P.4      | ≤ 900 N/mm <sup>2</sup>   | 1xD            | 0,1xD          | 30             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 | 0,11  |
| P.6      | > 1100 N/mm <sup>2</sup>  | 1xD            | 0,1xD          | 20             |  | 0,031     | 0,036 | 0,04  | 0,05  | 0,064 | 0,077 |
| M.2      | 750–850 N/mm <sup>2</sup> | 1xD            | 0,1xD          | 15             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 | 0,11  |
| K.2      | > 800 N/mm <sup>2</sup>   | 1xD            | 0,1xD          | 35             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 | 0,11  |
| N.2      | ≤ 600 N/mm <sup>2</sup>   | 1xD            | 0,1xD          | 160-300        |  | 0,06      | 0,066 | 0,074 | 0,092 | 0,118 | 0,143 |
| S.1      | ≤ 1500 N/mm <sup>2</sup>  | 1xD            | 0,1xD          | 12             |  | 0,031     | 0,036 | 0,04  | 0,05  | 0,064 | 0,077 |

TiAlN: Vc + 50 %

# End mills

long, 1 tooth cut over centre

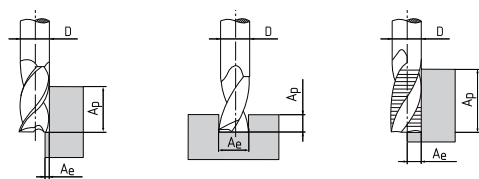
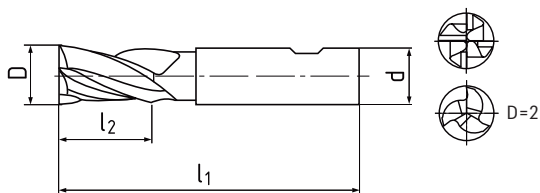


D=2

**CZ** Frézy válcové čelní | dlouhé, 1 břit přes střed

**DE** Schaftfräser | Lang, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | длинные, с центрорежущим зубом



**121518**



| D<br>k 10 | d<br>h 6 | l1  | l2 | Z | 121518 | 121518     |
|-----------|----------|-----|----|---|--------|------------|
| 2         | 6        | 54  | 10 | 3 | .020   | .020 TIALN |
| 3         | 6        | 56  | 12 | 4 | .030   | .030 TIALN |
| 3,5       | 6        | 59  | 15 | 4 | .035   | .035 TIALN |
| 4         | 6        | 63  | 19 | 4 | .040   | .040 TIALN |
| 4,5       | 6        | 63  | 19 | 4 | .045   | .045 TIALN |
| 5         | 6        | 68  | 24 | 4 | .050   | .050 TIALN |
| 5,5       | 6        | 68  | 24 | 4 | .055   | .055 TIALN |
| 6         | 6        | 68  | 24 | 4 | .060   | .060 TIALN |
| 7         | 10       | 80  | 30 | 4 | .070   | .070 TIALN |
| 8         | 10       | 88  | 38 | 4 | .080   | .080 TIALN |
| 9         | 10       | 88  | 38 | 4 | .090   | .090 TIALN |
| 10        | 10       | 95  | 45 | 4 | .100   | .100 TIALN |
| 11        | 12       | 102 | 45 | 4 | .110   | .110 TIALN |
| 12        | 12       | 110 | 53 | 4 | .120   | .120 TIALN |
| 13        | 12       | 110 | 53 | 4 | .130   | .130 TIALN |
| 14        | 12       | 110 | 53 | 4 | .140   | .140 TIALN |
| 15        | 12       | 110 | 53 | 4 | .150   | .150 TIALN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |                 |     |       |         |  | fz (mm/z) |       |       |       |       |       |
|------------|-----------------|-----|-------|---------|--|-----------|-------|-------|-------|-------|-------|
| Material   |                 | Ap  | Ae    | Vc      |  | Ø 3       | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  |
| <b>P.1</b> | ≤ 600 N/mm²     | 1xD | 0,1xD | 45      |  | 0,006     | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| <b>P.2</b> | ≤ 850 N/mm²     | 1xD | 0,1xD | 39      |  | 0,006     | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| <b>P.3</b> | ≤ 1100 N/mm²    | 1xD | 0,1xD | 24      |  | 0,006     | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| <b>P.4</b> | ≤ 900 N/mm²     | 1xD | 0,1xD | 30      |  | 0,006     | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| <b>P.6</b> | > 1100 N/mm²    | 1xD | 0,1xD | 20      |  | 0,004     | 0,011 | 0,015 | 0,02  | 0,024 | 0,031 |
| <b>M.2</b> | 750 - 850 N/mm² | 1xD | 0,1xD | 15      |  | 0,006     | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| <b>K.1</b> | ≤ 820 N/mm²     | 1xD | 0,1xD | 35      |  | 0,006     | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 |
| <b>N.2</b> | ≤ 600 N/mm²     | 1xD | 0,1xD | 160-300 |  | 0,008     | 0,02  | 0,027 | 0,036 | 0,044 | 0,057 |
| <b>S.1</b> | ≤ 1500 N/mm²    | 1xD | 0,1xD | 12      |  | 0,004     | 0,011 | 0,015 | 0,02  | 0,024 | 0,031 |

TiAlN: Vc + 50 %

# End mills

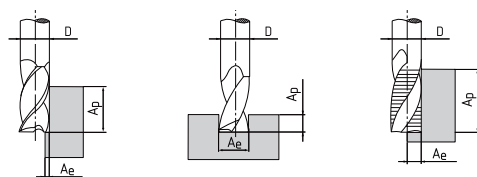
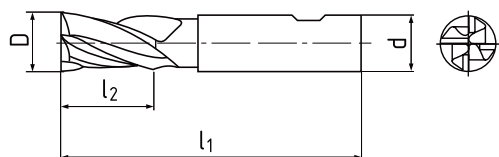
long, 1 tooth cut over centre



**CZ** Frézy válcové čelní | dlouhé, 1 břit přes střed

**DE** Schaftfräser | Lang, 1 Schneide über die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | длинные, с центрорежущим зубом



**121518**



| D<br>k 10 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 121518 | 121518       |
|-----------|----------|----------------|----------------|---|--------|--------------|
| 16        | 16       | 123            | 63             | 4 | .160   | .160 TIALN   |
| 18        | 16       | 123            | 63             | 4 | .180   | .180 TIALN   |
| 19        | 16       | 123            | 63             | 4 | .190** | .190 TIALN** |
| 20        | 20       | 141            | 75             | 4 | .200   | .200 TIALN   |
| 22        | 20       | 141            | 75             | 5 | .220   | .220 TIALN   |
| 24        | 25       | 166            | 90             | 5 | .240   | .240 TIALN   |
| 25        | 25       | 166            | 90             | 5 | .250   | .250 TIALN   |
| 26        | 25       | 166            | 90             | 5 | .260   | .260 TIALN   |
| 28        | 25       | 166            | 90             | 5 | .280   | .280 TIALN   |
| 30        | 25       | 166            | 90             | 5 | .300   | .300 TIALN   |
| 32        | 32       | 186            | 106            | 6 | .320   | .320 TIALN   |
| 36        | 32       | 186            | 106            | 6 | .360   | .360 TIALN   |
| 40*       | 32       | 205            | 125            | 6 | .40032 | .40032 TIALN |

\*) \* DIN 844

\*\*) On demand / Na požádání / auf Anfrage / По запросу

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |                             |                |                |                |  | fz (mm/z) |       |       |       |       |       |
|------------|-----------------------------|----------------|----------------|----------------|--|-----------|-------|-------|-------|-------|-------|
| Material   |                             | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> |  | Ø 16      | Ø 18  | Ø 20  | Ø 25  | Ø 32  | Ø 40  |
| <b>P.1</b> | ≤ 600 N/mm <sup>2</sup>     | 1xD            | 0,1xD          | 45             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,085 | 0,11  |
| <b>P.2</b> | ≤ 850 N/mm <sup>2</sup>     | 1xD            | 0,1xD          | 39             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,085 | 0,11  |
| <b>P.3</b> | ≤ 1100 N/mm <sup>2</sup>    | 1xD            | 0,1xD          | 24             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,085 | 0,11  |
| <b>P.4</b> | ≤ 900 N/mm <sup>2</sup>     | 1xD            | 0,1xD          | 30             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,085 | 0,11  |
| <b>P.6</b> | > 1100 N/mm <sup>2</sup>    | 1xD            | 0,1xD          | 20             |  | 0,031     | 0,036 | 0,04  | 0,05  | 0,06  | 0,077 |
| <b>M.2</b> | 750 - 850 N/mm <sup>2</sup> | 1xD            | 0,1xD          | 15             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,085 | 0,11  |
| <b>K.1</b> | ≤ 820 N/mm <sup>2</sup>     | 1xD            | 0,1xD          | 35             |  | 0,044     | 0,051 | 0,057 | 0,071 | 0,085 | 0,11  |
| <b>N.2</b> | ≤ 600 N/mm <sup>2</sup>     | 1xD            | 0,1xD          | 160-300        |  | 0,057     | 0,066 | 0,074 | 0,092 | 0,111 | 0,143 |
| <b>S.1</b> | ≤ 1500 N/mm <sup>2</sup>    | 1xD            | 0,1xD          | 12             |  | 0,031     | 0,036 | 0,04  | 0,05  | 0,06  | 0,077 |

TiAlN: Vc + 50 %

# End mills

short



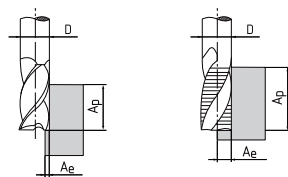
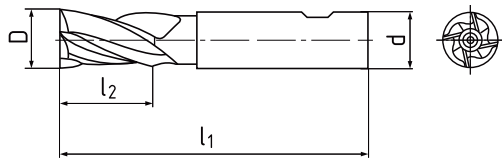
D ≤ 20

D > 20

**CZ** Frézy válcové čelní | krátké

**DE** Schaftfräser | Kurz

**RU** Фрезы концевые с цилиндрическим хвостовиком | короткие



**140208**

**140218**



| D<br>k 10 | d<br>h 6 | l1  | l2 | Z | 140208 | 140218 |
|-----------|----------|-----|----|---|--------|--------|
| 6         | 6        | 57  | 13 | 4 | .060   | .060   |
| 7         | 10       | 66  | 16 | 4 | .070   | .070   |
| 8         | 10       | 69  | 19 | 4 | .080   | .080   |
| 9         | 10       | 69  | 19 | 4 | .090   | .090   |
| 10        | 10       | 72  | 22 | 4 | .100   | .100   |
| 11        | 12       | 79  | 22 | 4 | .110   | .110   |
| 12        | 12       | 83  | 26 | 4 | .120   | .120   |
| 13        | 12       | 83  | 26 | 4 | .130   | .130   |
| 14        | 12       | 83  | 26 | 4 | .140   | .140   |
| 15        | 12       | 83  | 26 | 4 | .150   | .150   |
| 16        | 16       | 92  | 32 | 4 | .160   | .160   |
| 17        | 16       | 92  | 32 | 4 |        | .170   |
| 18        | 16       | 92  | 32 | 4 | .180   | .180   |
| 19        | 16       | 92  | 32 | 4 |        | .190   |
| 20        | 20       | 104 | 38 | 4 | .200   | .200   |
| 21        | 20       | 104 | 38 | 5 |        | .210   |
| 22        | 20       | 104 | 38 | 5 |        | .220   |
| 24        | 25       | 121 | 45 | 5 |        | .240   |
| 25        | 25       | 121 | 45 | 5 |        | .250   |
| 28        | 25       | 121 | 45 | 5 |        | .280   |
| 30        | 25       | 121 | 45 | 6 |        | .300   |
| 32        | 32       | 133 | 53 | 6 |        | .320   |
| 36        | 32       | 133 | 53 | 6 |        | .360   |
| 40*       | 32       | 143 | 63 | 6 |        | .40032 |

\*) \* DIN 844

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |              | fz (mm/z) |       |    |       |       |       |       |       |       |       |       |       |      |
|----------|--------------|-----------|-------|----|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| Material |              | Ap        | Ae    | Vc | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25  | Ø 32  | Ø 40 |
| P.1      | ≤ 600 N/mm²  | 1xD       | 0,1xD | 45 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 | 0,085 | 0,11 |
| P.2      | ≤ 850 N/mm²  | 1xD       | 0,1xD | 39 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 | 0,085 | 0,11 |
| P.3      | ≤ 1100 N/mm² | 1xD       | 0,1xD | 24 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 | 0,085 | 0,11 |
| P.4      | ≤ 900 N/mm²  | 1xD       | 0,1xD | 30 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 | 0,085 | 0,11 |
| P.5      | ≤ 1100 N/mm² | 1xD       | 0,1xD | 24 | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 | 0,085 | 0,11 |

# End mills

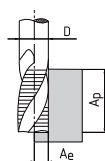
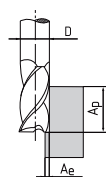
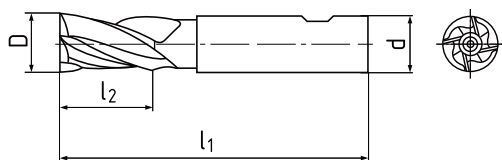
long



**CZ** Frézy válcové čelní | dlouhé

**DE** Schaftfräser | Lang

**RU** Фрезы концевые с цилиндрическим хвостовиком | длинные



**141208**



**141218**



| D<br>k 10 | d<br>h 6 | l1  | l2  | Z | 141208 | 141218 |
|-----------|----------|-----|-----|---|--------|--------|
| 6         | 6        | 68  | 24  | 4 | .060   | .060   |
| 7         | 10       | 80  | 30  | 4 | .070   | .070   |
| 8         | 10       | 88  | 38  | 4 | .080   | .080   |
| 9         | 10       | 88  | 38  | 4 | .090   | .090   |
| 10        | 10       | 95  | 45  | 4 | .100   | .100   |
| 11        | 12       | 102 | 45  | 4 | .110   | .110   |
| 12        | 12       | 110 | 53  | 4 | .120   | .120   |
| 13        | 12       | 110 | 53  | 4 | .130   | .130   |
| 14        | 12       | 110 | 53  | 4 | .140   | .140   |
| 15        | 12       | 110 | 53  | 4 | .150   | .150   |
| 16        | 16       | 123 | 63  | 4 | .160   | .160   |
| 17        | 16       | 123 | 63  | 4 |        | .170   |
| 18        | 16       | 123 | 63  | 4 | .180   | .180   |
| 20        | 20       | 141 | 75  | 4 | .200   | .200   |
| 22        | 20       | 141 | 75  | 5 |        | .220   |
| 25        | 25       | 166 | 90  | 5 |        | .250   |
| 28        | 25       | 166 | 90  | 5 |        | .280   |
| 30        | 25       | 166 | 90  | 6 |        | .300   |
| 32        | 32       | 186 | 106 | 6 |        | .320   |
| 36        | 32       | 186 | 106 | 6 |        | .360   |
| 40*       | 32       | 205 | 125 | 6 |        | .40032 |

\*) ≠ DIN 844

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |            | fz (mm/z)      |                |                |     |       |       |       |       |       |       |       |       |       |      |
|----------|------------|----------------|----------------|----------------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| Material |            | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 6 | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25  | Ø 32  | Ø 40  |      |
|          | <b>P.1</b> | ≤ 600 N/mm²    | 1xD            | 0,1xD          | 45  | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 | 0,085 | 0,11 |
|          | <b>P.2</b> | ≤ 850 N/mm²    | 1xD            | 0,1xD          | 39  | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 | 0,085 | 0,11 |
|          | <b>P.3</b> | ≤ 1100 N/mm²   | 1xD            | 0,1xD          | 24  | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 | 0,085 | 0,11 |
|          | <b>P.4</b> | ≤ 900 N/mm²    | 1xD            | 0,1xD          | 30  | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 | 0,085 | 0,11 |
|          | <b>P.5</b> | ≤ 1100 N/mm²   | 1xD            | 0,1xD          | 24  | 0,015 | 0,021 | 0,028 | 0,034 | 0,044 | 0,051 | 0,057 | 0,071 | 0,085 | 0,11 |

# End mills

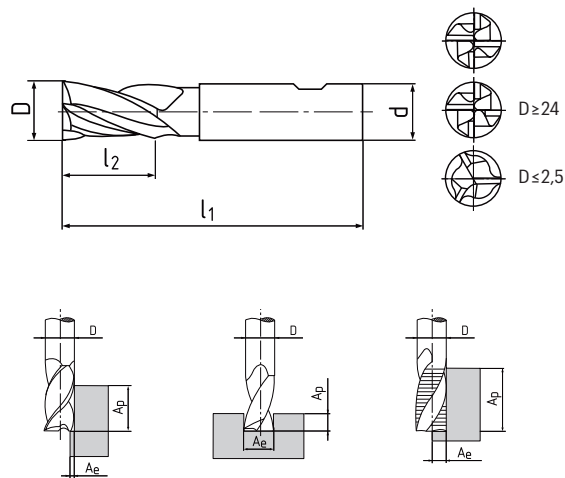
2 teeth cut to centre



**CZ** Frézy válcové čelní | 2 břity do středu

**DE** Schaftfräser | 2 Schneide bis die Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | с центрорежущим зубом



**140618**

**141618**



| D<br>k 10 | d<br>h 6 | I1<br>140618 | I1<br>141618 | I2<br>140618 | I2<br>141618 | Z | 140618 | 140618     | 141618 | 141618     |
|-----------|----------|--------------|--------------|--------------|--------------|---|--------|------------|--------|------------|
| 2         | 6        | 51           | 54           | 7            | 10           | 3 | .020   | .020 TIALN | .020   |            |
| 2,5       | 6        | 52           | 56           | 8            | 12           | 3 | .025   | .025 TIALN | .025   |            |
| 3         | 6        | 52           | 56           | 8            | 12           | 4 | .030   | .030 TIALN | .030   |            |
| 3,5       | 6        | 54           | 59           | 10           | 15           | 4 | .035   | .035 TIALN | .035   |            |
| 4         | 6        | 55           | 63           | 11           | 19           | 4 | .040   | .040 TIALN | .040   |            |
| 4,5       | 6        | 55           | 63           | 11           | 19           | 4 | .045   | .045 TIALN | .045   |            |
| 5         | 6        | 57           | 68           | 13           | 24           | 4 | .050   | .050 TIALN | .050   |            |
| 5,5       | 6        | 57           | 58           | 13           | 24           | 4 | .055   | .055 TIALN | .055   |            |
| 6         | 6        | 57           | 68           | 13           | 24           | 4 | .060   | .060 TIALN | .060   | .060 TIALN |
| 6,5       | 10       | 66           | 80           | 16           | 30           | 4 | .065   | .065 TIALN | .065   |            |
| 7         | 10       | 66           | 80           | 16           | 30           | 4 | .070   | .070 TIALN | .070   |            |
| 7,5       | 10       | 66           | 80           | 16           | 30           | 4 | .075   | .075 TIALN | .075   |            |
| 8         | 10       | 69           | 88           | 19           | 38           | 4 | .080   | .080 TIALN | .080   | .080 TIALN |
| 8,5       | 10       | 69           | 88           | 19           | 38           | 4 | .085   | .085 TIALN | .085   |            |
| 9         | 10       | 69           | 88           | 19           | 38           | 4 | .090   | .090 TIALN | .090   |            |
| 9,5       | 10       | 69           | 88           | 19           | 38           | 4 | .095   | .095 TIALN | .095   |            |
| 10        | 10       | 72           | 95           | 22           | 45           | 4 | .100   | .100 TIALN | .100   | .100 TIALN |
| 11        | 12       | 79           | 102          | 22           | 45           | 4 | .110   | .110 TIALN | .110   |            |
| 12        | 12       | 83           | 110          | 26           | 53           | 4 | .120   | .120 TIALN | .120   | .120 TIALN |
| 13        | 12       | 83           | 110          | 26           | 53           | 4 | .130   | .130 TIALN | .130   |            |
| 14        | 12       | 83           | 110          | 26           | 53           | 4 | .140   | .140 TIALN | .140   | .140 TIALN |

Also in the set / Také v sadě / Auch im Set / Также в комплекте (70)

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |              | fz (mm/z) |       |        |       |       |       |       |       |
|----------|--------------|-----------|-------|--------|-------|-------|-------|-------|-------|
| Material |              | Ap        | Ae    | Vc     | Ø 3   | Ø 6   | Ø 8   | Ø 10  | Ø 12  |
| P.1      | ≤ 600 N/mm²  | 1xD       | 0,1xD | 45     | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 |
| P.2      | ≤ 850 N/mm²  | 1xD       | 0,1xD | 39     | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 |
| P.3      | ≤ 1100 N/mm² | 1xD       | 0,1xD | 24     | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 |
| P.4      | ≤ 900 N/mm²  | 1xD       | 0,1xD | 30     | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 |
| P.5      | ≤ 1100 N/mm² | 1xD       | 0,1xD | 24     | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 |
| K.1      | ≤ 820 N/mm²  | 1xD       | 0,1xD | 35     | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 |
| N.4      | ≤ 800 N/mm²  | 1xD       | 0,1xD | 80-120 | 0,006 | 0,015 | 0,021 | 0,028 | 0,034 |
| S.1      | ≤ 1500 N/mm² | 1xD       | 0,1xD | 12     | 0,004 | 0,011 | 0,015 | 0,02  | 0,024 |

141618: fz -20 %, TiAlN: vc + 50 %

# End mills

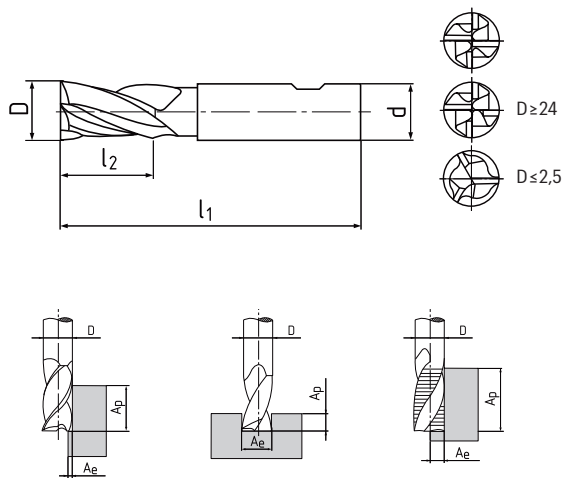
2 teeth cut to centre



**CZ** Frézy válcové čelní | 2 břity do středu

**DE** Schaftfräser | 2 Schneide bis Mitte

**RU** Фрезы концевые с цилиндрическим хвостовиком | с центрорежущим зубом



**140618**

**141618**



| D<br>k 10 | d<br>h 6 | I1<br>140618 | I1<br>141618 | I2<br>140618 | I2<br>141618 | Z | 140618 | 140618     | 141618 | 141618     |
|-----------|----------|--------------|--------------|--------------|--------------|---|--------|------------|--------|------------|
| 15        | 12       | 83           | 110          | 26           | 53           | 4 | .150   | .150 TIALN | .150   |            |
| 16        | 16       | 92           | 123          | 32           | 63           | 4 | .160   | .160 TIALN | .160   | .160 TIALN |
| 17        | 16       | 92           | 123          | 32           | 63           | 4 | .170   | .170 TIALN | .170   |            |
| 18        | 16       | 92           | 123          | 32           | 63           | 4 | .180   | .180 TIALN | .180   | .180 TIALN |
| 19        | 16       | 92           | 123          | 32           | 63           | 4 | .190   | .190 TIALN | .190   |            |
| 20        | 20       | 104          | 141          | 38           | 75           | 4 | .200   | .200 TIALN | .200   | .200 TIALN |
| 22        | 20       | 104          | 141          | 38           | 75           | 4 | .220   | .220 TIALN | .220   | .220 TIALN |
| 24        | 25       | 121          | 166          | 45           | 90           | 5 | .240   | .240 TIALN | .240   | .240 TIALN |
| 25        | 25       | 121          | 166          | 45           | 90           | 5 | .250   | .250 TIALN | .250   | .250 TIALN |
| 28        | 25       | 121          | 166          | 45           | 90           | 5 | .280   | .280 TIALN | .280   |            |
| 30        | 25       | 121          | 166          | 45           | 90           | 5 | .300   | .300 TIALN | .300   |            |
| 32        | 32       | 133          | 186          | 53           | 106          | 6 | .320   | .320 TIALN | .320   |            |

Also in the set / Také v sadě / Auch im Set / Также в комплекте (70)

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |              |     |       |        | fz (mm/z) |       |       |       |       |
|------------|--------------|-----|-------|--------|-----------|-------|-------|-------|-------|
| Material   |              | Ap  | Ae    | Vc     | Ø 16      | Ø 18  | Ø 20  | Ø 25  | Ø 32  |
| <b>P.1</b> | ≤ 600 N/mm²  | 1xD | 0,1xD | 45     | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 |
| <b>P.2</b> | ≤ 850 N/mm²  | 1xD | 0,1xD | 39     | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 |
| <b>P.3</b> | ≤ 1100 N/mm² | 1xD | 0,1xD | 24     | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 |
| <b>P.4</b> | ≤ 900 N/mm²  | 1xD | 0,1xD | 30     | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 |
| <b>P.5</b> | ≤ 1100 N/mm² | 1xD | 0,1xD | 24     | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 |
| <b>K.1</b> | ≤ 820 N/mm²  | 1xD | 0,1xD | 35     | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 |
| <b>N.4</b> | ≤ 800 N/mm²  | 1xD | 0,1xD | 80-120 | 0,044     | 0,051 | 0,057 | 0,071 | 0,091 |
| <b>S.1</b> | ≤ 1500 N/mm² | 1xD | 0,1xD | 12     | 0,031     | 0,036 | 0,04  | 0,05  | 0,064 |

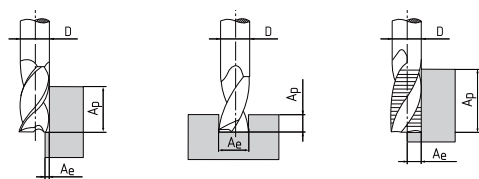
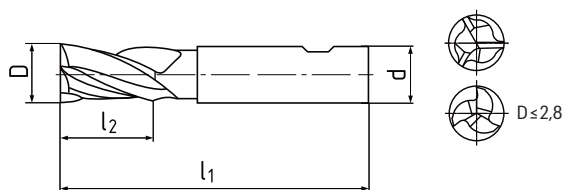
141618: fz -20 %, TiAlN: vc + 50 %

# Mini end mills



D ≤ 2,8

**CZ** Minifrézy  
**DE** Minifräser  
**RU** Минифрезы



**160418**

**161418**



| D<br>e 8 | d<br>h 6 | I1<br>160418 | I1<br>161418 | I2<br>160418 | I2<br>161418 | Z | 160418 | 160418     | 161418 | 161418     |
|----------|----------|--------------|--------------|--------------|--------------|---|--------|------------|--------|------------|
| 1        | 6        | 34           |              | 2            |              | 3 | .010   |            |        |            |
| 1,5      | 6        | 34           | 36           | 3            | 5            | 3 | .015   | .015 TIALN | .015   |            |
| 1,8      | 6        | 34           |              | 3            |              | 3 | .018   |            |        |            |
| 2        | 6        | 35           | 38           | 4            | 7            | 3 | .020   | .020 TIALN | .020   | .020 TIALN |
| 2,3      | 6        | 35           |              | 4            |              | 3 | .023   |            |        |            |
| 2,5      | 6        | 36           | 39           | 5            | 8            | 3 | .025   | .025 TIALN | .025   |            |
| 2,8      | 6        | 36           |              | 5            |              | 3 | .028   |            |        |            |
| 3        | 6        | 36           | 39           | 5            | 8            | 3 | .030   | .030 TIALN | .030   | .030 TIALN |
| 3,3      | 6        | 37           |              | 6            |              | 3 | .033   |            |        |            |
| 3,5      | 6        | 37           | 41           | 6            | 10           | 3 | .035   | .035 TIALN | .035   |            |
| 3,8      | 6        | 38           |              | 7            |              | 3 | .038   |            |        |            |
| 4        | 6        | 38           | 42           | 7            | 11           | 3 | .040   | .040 TIALN | .040   | .040 TIALN |
| 4,3      | 6        | 38           |              | 7            |              | 3 | .043   |            |        |            |
| 4,5      | 6        | 38           | 42           | 7            | 11           | 3 | .045   | .045 TIALN | .045   |            |
| 4,8      | 6        | 39           |              | 8            |              | 3 | .048   |            |        |            |
| 5        | 6        | 39           | 44           | 8            | 13           | 3 | .050   | .050 TIALN | .050   | .050 TIALN |
| 5,3      | 6        | 39           |              | 8            |              | 3 | .053   |            |        |            |
| 5,5      | 6        | 39           | 44           | 8            | 13           | 3 | .055   | .055 TIALN | .055   |            |
| 5,75     | 6        | 39           |              | 8            |              | 3 | .0575  |            |        |            |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |               | fz (mm/z) |       |    |       |       |       |
|------------|---------------|-----------|-------|----|-------|-------|-------|
| Material   |               | Ap        | Ae    | Vc | Ø 3   | Ø 4   | Ø 5   |
| <b>P.1</b> | ≤ 600 N/mm²   | 1xD       | 0,1xD | 45 | 0,011 | 0,014 | 0,018 |
| <b>P.2</b> | ≤ 850 N/mm²   | 1xD       | 0,1xD | 39 | 0,01  | 0,013 | 0,017 |
| <b>P.3</b> | ≤ 1100 N/mm²  | 1xD       | 0,1xD | 24 | 0,008 | 0,011 | 0,014 |
| <b>P.4</b> | ≤ 900 N/mm²   | 1xD       | 0,1xD | 30 | 0,008 | 0,011 | 0,014 |
| <b>P.5</b> | ≤ 1100 N/mm²  | 1xD       | 0,1xD | 24 | 0,008 | 0,011 | 0,014 |
| <b>P.6</b> | < 1100 N/mm²  | 1xD       | 0,1xD | 20 | 0,008 | 0,011 | 0,014 |
| <b>M.2</b> | 750–850 N/mm² | 1xD       | 0,1xD | 15 | 0,009 | 0,012 | 0,015 |
| <b>K.1</b> | ≤ 820 N/mm²   | 1xD       | 0,1xD | 35 | 0,011 | 0,014 | 0,018 |
| <b>K.2</b> | > 800 N/mm²   | 1xD       | 0,1xD | 25 | 0,01  | 0,013 | 0,017 |

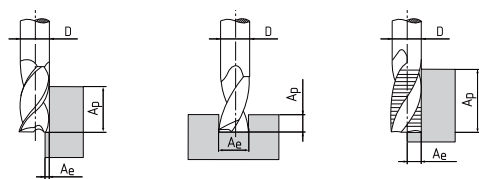
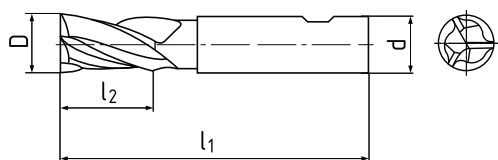
TiAlN: Vc + 50 %

# Mini end mills



D ≤ 2,8

**CZ** Minifrézy  
**DE** Minifräser  
**RU** Минифрезы



**160418**

**161418**



| D<br>e 8 | d<br>h 6 | I1<br>160418 | I1<br>161418 | I2<br>160418 | I2<br>161418 | Z | 160418 | 160418     | 161418 | 161418     |
|----------|----------|--------------|--------------|--------------|--------------|---|--------|------------|--------|------------|
| 6        | 6        | 39           | 44           | 8            | 13           | 3 | .060   | .060 TIALN | .060   | .060 TIALN |
| 6,5      | 8        | 42           | 48           | 10           | 16           | 3 | .065   | .065 TIALN | .065   |            |
| 7        | 8        | 42           | 48           | 10           | 16           | 3 | .070   | .070 TIALN | .070   | .070 TIALN |
| 7,5      | 8        | 42           | 48           | 10           | 16           | 3 | .075   | .075 TIALN | .075   |            |
| 8        | 8        | 43           | 51           | 11           | 19           | 3 | .080   | .080 TIALN | .080   | .080 TIALN |
| 8,5      | 10       | 48           | 56           | 11           | 19           | 3 | .085   | .085 TIALN | .085   |            |
| 9        | 10       | 48           | 56           | 11           | 19           | 3 | .090   | .090 TIALN | .090   | .090 TIALN |
| 9,5      | 10       | 48           | 56           | 11           | 19           | 3 | .095   | .095 TIALN | .095   |            |
| 10       | 10       | 50           | 59           | 13           | 22           | 3 | .100   | .100 TIALN | .100   | .100 TIALN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |               | fz (mm/z) |       |    |       |       |       |
|------------|---------------|-----------|-------|----|-------|-------|-------|
| Material   |               | Ap        | Ae    | Vc | Ø 6   | Ø 8   | Ø 10  |
| <b>P.1</b> | ≤ 600 N/mm²   | 1xD       | 0,1xD | 45 | 0,022 | 0,029 | 0,036 |
| <b>P.2</b> | ≤ 850 N/mm²   | 1xD       | 0,1xD | 39 | 0,02  | 0,026 | 0,033 |
| <b>P.3</b> | ≤ 1100 N/mm²  | 1xD       | 0,1xD | 24 | 0,016 | 0,022 | 0,027 |
| <b>P.4</b> | ≤ 900 N/mm²   | 1xD       | 0,1xD | 30 | 0,016 | 0,022 | 0,027 |
| <b>P.5</b> | ≤ 1100 N/mm²  | 1xD       | 0,1xD | 24 | 0,016 | 0,022 | 0,027 |
| <b>P.6</b> | < 1100 N/mm²  | 1xD       | 0,1xD | 20 | 0,016 | 0,022 | 0,027 |
| <b>M.2</b> | 750–850 N/mm² | 1xD       | 0,1xD | 15 | 0,018 | 0,024 | 0,030 |
| <b>K.1</b> | ≤ 820 N/mm²   | 1xD       | 0,1xD | 35 | 0,022 | 0,029 | 0,036 |
| <b>K.2</b> | > 800 N/mm²   | 1xD       | 0,1xD | 25 | 0,02  | 0,026 | 0,033 |

TiAlN: Vc + 50 %

# Slot drills

short, centre cutting, 2 – fluted, 3 – fluted

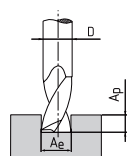
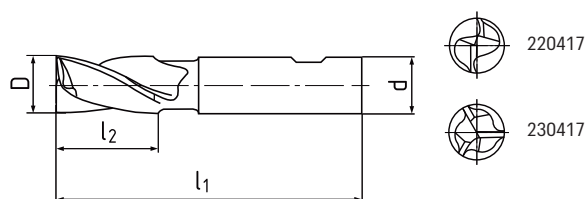


220417 230417

**CZ** Frézy pro drážky per | krátké, nesouměrné, dvouzubé, třízubé

**DE** Langlochfräser | Kurz, mit Zentrumschnitt, zweischneider, dreischneider

**RU** Фрезы шпоночные | короткие, несимметричные, двузубые, трехзубые



**220417**

**230417**



| D<br>e 8 | d<br>h 6 | l1  | l2 | Z<br>220417 | Z<br>230417 | 220417     | 230417     |
|----------|----------|-----|----|-------------|-------------|------------|------------|
| 2        | 6        | 48  | 4  | 2           |             | .020 ALTiN |            |
| 3        | 6        | 49  | 5  | 2           |             | .030 ALTiN |            |
| 4        | 6        | 51  | 7  | 2           |             | .040 ALTiN |            |
| 5        | 6        | 52  | 8  | 2           |             | .050 ALTiN |            |
| 6        | 6        | 52  | 8  | 2           | 3           | .060 ALTiN | .060 ALTiN |
| 7        | 10       | 60  | 10 | 2           |             | .070 ALTiN |            |
| 8        | 10       | 61  | 11 | 2           | 3           | .080 ALTiN | .080 ALTiN |
| 9        | 10       | 61  | 11 | 2           |             | .090 ALTiN |            |
| 10       | 10       | 63  | 13 | 2           | 3           | .100 ALTiN | .100 ALTiN |
| 12       | 12       | 73  | 16 | 2           | 3           | .120 ALTiN | .120 ALTiN |
| 14       | 12       | 73  | 16 | 2           | 3           | .140 ALTiN | .140 ALTiN |
| 16       | 16       | 79  | 19 | 2           | 3           | .160 ALTiN | .160 ALTiN |
| 18       | 16       | 79  | 19 | 2           | 3           | .180 ALTiN | .180 ALTiN |
| 20       | 20       | 88  | 22 | 2           | 3           | .200 ALTiN | .200 ALTiN |
| 22       | 20       | 88  | 22 | 2           |             | .220 ALTiN |            |
| 25       | 25       | 102 | 26 | 2           |             | .250 ALTiN |            |
| 28       | 25       | 102 | 26 | 2           |             | .280 ALTiN |            |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |               |                |                | fz (mm/z)      |       |       |       |       |       |       |       |       |      |
|----------|---------------|----------------|----------------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|------|
| Material |               | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 3   | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25 |
| P.1      | ≤ 600 N/mm²   | 0,5xD          | 1xD            | 114            | 0,01  | 0,024 | 0,032 | 0,04  | 0,048 | 0,064 | 0,072 | 0,08  | 0,1  |
| P.2      | ≤ 850 N/mm²   | 0,5xD          | 1xD            | 99             | 0,01  | 0,024 | 0,032 | 0,04  | 0,048 | 0,064 | 0,072 | 0,08  | 0,1  |
| P.3      | ≤ 1100 N/mm²  | 0,5xD          | 1xD            | 62             | 0,01  | 0,024 | 0,032 | 0,04  | 0,048 | 0,064 | 0,072 | 0,08  | 0,1  |
| P.4      | ≤ 900 N/mm²   | 0,5xD          | 1xD            | 77             | 0,01  | 0,024 | 0,032 | 0,04  | 0,048 | 0,064 | 0,072 | 0,08  | 0,1  |
| P.5      | ≤ 1100 N/mm²  | 0,5xD          | 1xD            | 62             | 0,01  | 0,024 | 0,032 | 0,04  | 0,048 | 0,064 | 0,072 | 0,08  | 0,1  |
| P.6      | < 1100 N/mm²  | 0,5xD          | 1xD            | 51             | 0,007 | 0,017 | 0,022 | 0,028 | 0,034 | 0,045 | 0,05  | 0,056 | 0,07 |
| M.2      | 750–850 N/mm² | 0,5xD          | 1xD            | 38             | 0,01  | 0,024 | 0,032 | 0,04  | 0,048 | 0,064 | 0,072 | 0,08  | 0,1  |
| K.1      | ≤ 820 N/mm²   | 0,5xD          | 1xD            | 89             | 0,01  | 0,024 | 0,032 | 0,04  | 0,048 | 0,064 | 0,072 | 0,08  | 0,1  |
| K.2      | > 800 N/mm²   | 0,5xD          | 1xD            | 66             | 0,01  | 0,024 | 0,032 | 0,04  | 0,048 | 0,064 | 0,072 | 0,08  | 0,1  |

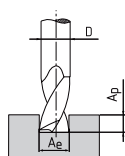
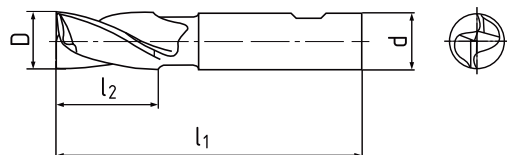
230417: fz = -33 %

# Slot drills

short, centre cutting, 2 – fluted



- CZ** Frézy pro drážky per | krátké, nesouměrné, dvouzubé  
**DE** Langlochfräser | Kurz, mit Zentrumschnitt, zweischneider  
**RU** Фрезы шпоночные | короткие, несимметричные, двузубые



220408

220418



| D<br>e 8 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 220408 | 220408      | 220418 | 220418      |
|----------|----------|----------------|----------------|---|--------|-------------|--------|-------------|
| 1        | 6        | 47             | 2,5            | 2 | .010   | .010 TIALN  | .010   | .010 TIALN  |
| 1,5      | 6        | 47             | 3              | 2 | .015   | .015 TIALN  | .015   | .015 TIALN  |
| 2        | 6        | 48             | 4              | 2 | .020   | .020 TIALN  | .020   | .020 TIALN  |
| 2,5      | 6        | 49             | 5              | 2 | .025   | .025 TIALN  | .025   | .025 TIALN  |
| 2,8      | 6        | 49             | 5              | 2 | .028   | .028 TIALN  | .028   | .028 TIALN  |
| 3        | 6        | 49             | 5              | 2 | .030   | .030 TIALN  | .030   | .030 TIALN  |
| 3,5      | 6        | 50             | 6              | 2 | .035   | .035 TIALN  | .035   | .035 TIALN  |
| 3,8      | 6        | 51             | 7              | 2 | .038   | .038 TIALN  | .038   | .038 TIALN  |
| 4        | 6        | 51             | 7              | 2 | .040   | .040 TIALN  | .040   | .040 TIALN  |
| 4,5      | 6        | 51             | 7              | 2 | .045   | .045 TIALN  | .045   | .045 TIALN  |
| 4,8      | 6        | 52             | 8              | 2 | .048   | .048 TIALN  | .048   | .048 TIALN  |
| 5        | 6        | 52             | 8              | 2 | .050   | .050 TIALN  | .050   | .050 TIALN  |
| 5,5      | 6        | 52             | 8              | 2 | .055   | .055 TIALN  | .055   | .055 TIALN  |
| 5,75     | 6        | 52             | 8              | 2 | .0575  | .0575 TIALN | .0575  | .0575 TIALN |
| 6        | 6        | 52             | 8              | 2 | .060   | .060 TIALN  | .060   | .060 TIALN  |
| 6,5      | 10       | 60             | 10             | 2 | .065   | .065 TIALN  | .065   | .065 TIALN  |
| 7        | 10       | 60             | 10             | 2 | .070   | .070 TIALN  | .070   | .070 TIALN  |
| 7,5      | 10       | 60             | 10             | 2 | .075   | .075 TIALN  | .075   | .075 TIALN  |
| 7,75     | 10       | 61             | 11             | 2 | .0775  | .0775 TIALN | .0775  | .0775 TIALN |
| 8        | 10       | 61             | 11             | 2 | .080   | .080 TIALN  | .080   | .080 TIALN  |
| 8,5      | 10       | 61             | 11             | 2 | .085   | .085 TIALN  | .085   | .085 TIALN  |
| 9        | 10       | 61             | 11             | 2 | .090   | .090 TIALN  | .090   | .090 TIALN  |

Also in the set / Také v sadě / Auch im Set / Также в комплекте (71)

## Cutting conditions | Řezné podmínky | Schnittbedingungen | Условия резания

|          |               |       |     |    | fz (mm/z) |       |       |       |
|----------|---------------|-------|-----|----|-----------|-------|-------|-------|
| Material | Ap            | Ae    | Vc  |    | Ø 3       | Ø 6   | Ø 8   | Ø 10  |
| P.1      | ≤ 600 N/mm²   | 0,5xD | 1xD | 45 | 0,009     | 0,022 | 0,029 | 0,036 |
| P.2      | ≤ 850 N/mm²   | 0,5xD | 1xD | 39 | 0,009     | 0,022 | 0,029 | 0,036 |
| P.3      | ≤ 1100 N/mm²  | 0,5xD | 1xD | 24 | 0,009     | 0,022 | 0,029 | 0,036 |
| P.4      | ≤ 900 N/mm²   | 0,5xD | 1xD | 30 | 0,009     | 0,022 | 0,029 | 0,036 |
| P.5      | ≤ 1100 N/mm²  | 0,5xD | 1xD | 24 | 0,009     | 0,022 | 0,029 | 0,036 |
| M.2      | 750–850 N/mm² | 0,5xD | 1xD | 15 | 0,009     | 0,022 | 0,029 | 0,036 |
| K.1      | ≤ 820 N/mm²   | 0,5xD | 1xD | 35 | 0,009     | 0,022 | 0,029 | 0,036 |
| K.2      | > 800 N/mm²   | 0,5xD | 1xD | 25 | 0,009     | 0,022 | 0,029 | 0,036 |

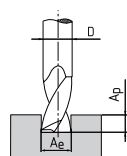
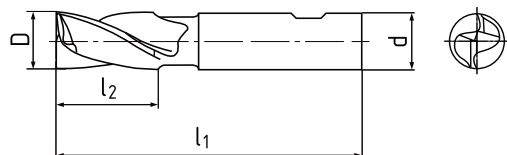
TiAlN: Vc + 50 %

# Slot drills

short, centre cutting, 2 – fluted



- CZ** Frézy pro drážky per | krátké, nesouměrné, dvouzubé  
**DE** Langlochfräser | Kurz, mit Zentrumschnitt, zweischneider  
**RU** Фрезы шпоночные | короткие, несимметричные, двузубые



**220408**

**220418**



| D<br>e 8 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 220408 | 220408     | 220418 | 220418     |
|----------|----------|----------------|----------------|---|--------|------------|--------|------------|
| 9,5      | 10       | 61             | 11             | 2 | .095   | .095 TIALN | .095   | .095 TIALN |
| 9,7      | 10       | 63             | 13             | 2 | .097   | .097 TIALN | .097   | .097 TIALN |
| 10       | 10       | 63             | 13             | 2 | .100   | .100 TIALN | .100   | .100 TIALN |
| 10,5     | 12       | 70             | 13             | 2 | .105   | .105 TIALN | .105   | .105 TIALN |
| 11       | 12       | 70             | 13             | 2 | .110   | .110 TIALN | .110   | .110 TIALN |
| 11,5     | 12       | 70             | 13             | 2 | .115   | .115 TIALN | .115   | .115 TIALN |
| 12       | 12       | 73             | 16             | 2 | .120   | .120 TIALN | .120   | .120 TIALN |
| 12,5     | 12       | 73             | 16             | 2 | .125   | .125 TIALN | .125   | .125 TIALN |
| 13       | 12       | 73             | 16             | 2 | .130   | .130 TIALN | .130   | .130 TIALN |
| 13,5     | 12       | 73             | 16             | 2 | .135   | .135 TIALN | .135   | .135 TIALN |
| 14       | 12       | 73             | 16             | 2 | .140   | .140 TIALN | .140   | .140 TIALN |
| 14,5     | 12       | 73             | 16             | 2 | .145   | .145 TIALN | .145   | .145 TIALN |
| 15       | 12       | 73             | 16             | 2 | .150   | .150 TIALN | .150   | .150 TIALN |
| 15,5     | 16       | 79             | 19             | 2 | .155   | .155 TIALN | .155   | .155 TIALN |
| 16       | 16       | 79             | 19             | 2 | .160   | .160 TIALN | .160   | .160 TIALN |
| 16,5     | 16       | 79             | 19             | 2 | .165   | .165 TIALN | .165   | .165 TIALN |
| 17       | 16       | 79             | 19             | 2 | .170   | .170 TIALN | .170   | .170 TIALN |
| 17,5     | 16       | 79             | 19             | 2 | .175   | .175 TIALN | .175   | .175 TIALN |
| 18       | 16       | 79             | 19             | 2 | .180   | .180 TIALN | .180   | .180 TIALN |
| 18,5     | 16       | 79             | 19             | 2 | .185   | .185 TIALN | .185   | .185 TIALN |
| 19       | 16       | 79             | 19             | 2 | .190   | .190 TIALN | .190   | .190 TIALN |
| 19,5     | 20       | 88             | 22             | 2 | .195   | .195 TIALN | .195   | .195 TIALN |
| 20       | 20       | 88             | 22             | 2 | .200   | .200 TIALN | .200   | .200 TIALN |

Also in the set / Také v sadě / Auch im Set / Также в комплекте (71)

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |               |                |                |                | fz (mm/z) |       |       |       |       |       |
|----------|---------------|----------------|----------------|----------------|-----------|-------|-------|-------|-------|-------|
| Material |               | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 10      | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25  |
| P.1      | ≤ 600 N/mm²   | 0,5xD          | 1xD            | 45             | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 |
| P.2      | ≤ 850 N/mm²   | 0,5xD          | 1xD            | 39             | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 |
| P.3      | ≤ 1100 N/mm²  | 0,5xD          | 1xD            | 24             | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 |
| P.4      | ≤ 900 N/mm²   | 0,5xD          | 1xD            | 30             | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 |
| P.5      | ≤ 1100 N/mm²  | 0,5xD          | 1xD            | 24             | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 |
| M.2      | 750–850 N/mm² | 0,5xD          | 1xD            | 15             | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 |
| K.1      | ≤ 820 N/mm²   | 0,5xD          | 1xD            | 35             | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 |
| K.2      | > 800 N/mm²   | 0,5xD          | 1xD            | 25             | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 |

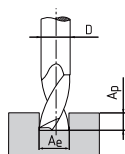
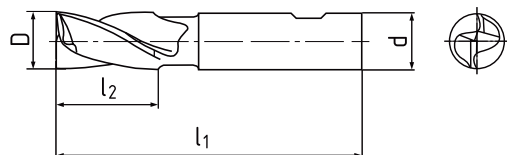
TiAlN: V<sub>c</sub> + 50 %

# Slot drills

short, centre cutting, 2 – fluted



- CZ** Frézy pro drážky per | krátké, nesouměrné, dvouzubé  
**DE** Langlochfräser | Kurz, mit Zentrumschnitt, zweischneider  
**RU** Фрезы шпоночные | короткие, несимметричные, двузубые



**220408**

**220418**



| D<br>e 8 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 220408 | 220408       | 220418 | 220418       |
|----------|----------|----------------|----------------|---|--------|--------------|--------|--------------|
| 21       | 20       | 88             | 22             | 2 | .210   | .210 TIALN   | .210   | .210 TIALN   |
| 22       | 20       | 88             | 22             | 2 | .220   | .220 TIALN   | .220   | .220 TIALN   |
| 24       | 25       | 102            | 26             | 2 |        |              | .240   | .240 TIALN   |
| 25       | 25       | 102            | 26             | 2 | .250   | .250 TIALN   | .250   | .250 TIALN   |
| 25*      | 20       | 96             | 26             | 2 | .25020 | .25020 TIALN | .25020 | .25020 TIALN |
| 26       | 25       | 102            | 26             | 2 | .260   | .260 TIALN   | .260   | .260 TIALN   |
| 28       | 25       | 102            | 26             | 2 | .280   | .280 TIALN   | .280   | .280 TIALN   |
| 28*      | 20       | 96             | 26             | 2 | .28020 | .28020 TIALN | .28020 | .28020 TIALN |
| 30       | 25       | 102            | 26             | 2 | .300   | .300 TIALN   | .300   | .300 TIALN   |
| 32       | 32       | 112            | 32             | 2 |        |              | .320   | .320 TIALN   |
| 36       | 32       | 112            | 32             | 2 |        |              | .360   | .360 TIALN   |
| 40*      | 32       | 118            | 38             | 2 |        |              | .40032 | .40032 TIALN |

\*) ≠ DIN 327

Also in the set / Také v sadě / Auch im Set / Также в комплекте (71)

## Cutting conditions | Řezné podmínky | Schnittbedingungen | Условия резания

|            |                           |                |                |                | fz (mm/z) |       |       |       |      |
|------------|---------------------------|----------------|----------------|----------------|-----------|-------|-------|-------|------|
| Material   |                           | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 18      | Ø 20  | Ø 25  | Ø 32  | Ø 40 |
| <b>P.1</b> | ≤ 600 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 45             | 0,065     | 0,073 | 0,091 | 0,116 | 0,13 |
| <b>P.2</b> | ≤ 850 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 39             | 0,065     | 0,073 | 0,091 | 0,116 | 0,13 |
| <b>P.3</b> | ≤ 1100 N/mm <sup>2</sup>  | 0,5xD          | 1xD            | 24             | 0,065     | 0,073 | 0,091 | 0,116 | 0,13 |
| <b>P.4</b> | ≤ 900 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 30             | 0,065     | 0,073 | 0,091 | 0,116 | 0,13 |
| <b>P.5</b> | ≤ 1100 N/mm <sup>2</sup>  | 0,5xD          | 1xD            | 24             | 0,065     | 0,073 | 0,091 | 0,116 | 0,13 |
| <b>M.2</b> | 750–850 N/mm <sup>2</sup> | 0,5xD          | 1xD            | 15             | 0,065     | 0,073 | 0,091 | 0,116 | 0,13 |
| <b>K.1</b> | ≤ 820 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 35             | 0,065     | 0,073 | 0,091 | 0,116 | 0,13 |
| <b>K.2</b> | > 800 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 25             | 0,065     | 0,073 | 0,091 | 0,116 | 0,13 |

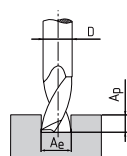
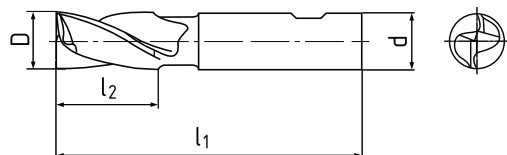
TiAlN: V<sub>c</sub> + 50 %

# Slot drills

long, centre cutting, 2 – fluted



**CZ** Frézy pro drážky per | dlouhé, nesouměrné, dvouzubé  
**DE** Langlochfräser | Lang, mit Zentrumschnitt, zweischneider  
**RU** Фрезы шпоночные | длинные, несимметричные, двузубые



**221408**



**221418**



| D<br>e 8 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 221408 | 221418 | 221418     |
|----------|----------|----------------|----------------|---|--------|--------|------------|
| 2        | 6        | 54             | 7              | 2 | .020   | .020   | .020 TIALN |
| 3        | 6        | 56             | 8              | 2 | .030   | .030   | .030 TIALN |
| 3,5      | 6        | 59             | 10             | 2 |        | .035   | .035 TIALN |
| 4        | 6        | 63             | 11             | 2 | .040   | .040   | .040 TIALN |
| 4,5      | 6        | 63             | 11             | 2 |        | .045   | .045 TIALN |
| 5        | 6        | 68             | 13             | 2 | .050   | .050   | .050 TIALN |
| 5,5      | 6        | 68             | 13             | 2 |        | .055   | .055 TIALN |
| 6        | 6        | 68             | 13             | 2 | .060   | .060   | .060 TIALN |
| 6,5      | 10       | 80             | 16             | 2 |        | .065   | .065 TIALN |
| 7        | 10       | 80             | 16             | 2 | .070   | .070   | .070 TIALN |
| 8        | 10       | 88             | 19             | 2 | .080   | .080   | .080 TIALN |
| 8,5      | 10       | 88             | 19             | 2 |        | .085   | .085 TIALN |
| 9        | 10       | 88             | 19             | 2 | .090   | .090   | .090 TIALN |
| 10       | 10       | 95             | 22             | 2 | .100   | .100   | .100 TIALN |
| 11       | 12       | 102            | 22             | 2 | .110   | .110   | .110 TIALN |
| 12       | 12       | 110            | 26             | 2 | .120   | .120   | .120 TIALN |
| 13       | 12       | 110            | 26             | 2 | .130   | .130   | .130 TIALN |
| 14       | 12       | 110            | 26             | 2 | .140   | .140   | .140 TIALN |
| 15       | 12       | 110            | 26             | 2 | .150   | .150   | .150 TIALN |
| 16       | 16       | 123            | 32             | 2 | .160   | .160   | .160 TIALN |
| 18       | 16       | 123            | 32             | 2 | .180   | .180   | .180 TIALN |
| 20       | 20       | 141            | 38             | 2 | .200   | .200   | .200 TIALN |

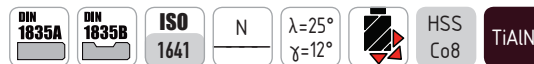
**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |                           |                |                |                |       | f <sub>z</sub> (mm/z) |       |       |       |       |       |       |
|----------|---------------------------|----------------|----------------|----------------|-------|-----------------------|-------|-------|-------|-------|-------|-------|
| Material |                           | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 3   | Ø 6                   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  |
| P.1      | ≤ 600 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 45             | 0,009 | 0,022                 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| P.2      | ≤ 850 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 39             | 0,009 | 0,022                 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| P.3      | ≤ 1100 N/mm <sup>2</sup>  | 0,5xD          | 1xD            | 24             | 0,009 | 0,022                 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| P.4      | ≤ 900 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 30             | 0,009 | 0,022                 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| P.5      | ≤ 1100 N/mm <sup>2</sup>  | 0,5xD          | 1xD            | 24             | 0,009 | 0,022                 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| M.2      | 750–850 N/mm <sup>2</sup> | 0,5xD          | 1xD            | 15             | 0,009 | 0,022                 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| K.1      | ≤ 820 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 35             | 0,009 | 0,022                 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| K.2      | > 800 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 25             | 0,009 | 0,022                 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| N.2      | ≤ 600 N/mm <sup>2</sup>   | 0,5xD          | 1xD            | 160–300        | 0,012 | 0,029                 | 0,038 | 0,047 | 0,057 | 0,075 | 0,085 | 0,095 |

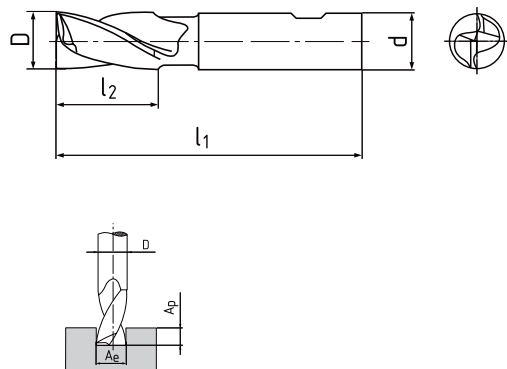
TiAlN: V<sub>c</sub> + 50 %

# Slot drills

long, centre cutting, 2 – fluted



**CZ** Frézy pro drážky per | dlouhé, nesouměrné, dvouzubé  
**DE** Langlochfräser | Lang, mit Zentrumschnitt, zweischneider  
**RU** Фрезы шпоночные | длинные, несимметричные, двузубые



**221408**

**221418**



| D<br>e 8 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 221408 | 221418 | 221418       |
|----------|----------|----------------|----------------|---|--------|--------|--------------|
| 22       | 20       | 141            | 38             | 2 | .220   | .220   | .220 TIALN   |
| 24       | 25       | 166            | 45             | 2 | .240   | .240   | .240 TIALN   |
| 25       | 25       | 166            | 45             | 2 | .250   | .250   | .250 TIALN   |
| 26       | 25       | 166            | 45             | 2 | .260   | .260   | .260 TIALN   |
| 28       | 25       | 166            | 45             | 2 | .280   | .280   | .280 TIALN   |
| 30       | 25       | 166            | 45             | 2 | .300   | .300   | .300 TIALN   |
| 32       | 32       | 186            | 53             | 2 |        | .320   | .320 TIALN   |
| 36       | 32       | 186            | 53             | 2 |        | .360   | .360 TIALN   |
| 40*      | 32       | 196            | 63             | 2 |        | .40032 | .40032 TIALN |

\*) = ISO 1641

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|                          |       |     |         |  | fz (mm/z) |       |       |       |       |       |       |       |       |
|--------------------------|-------|-----|---------|--|-----------|-------|-------|-------|-------|-------|-------|-------|-------|
| Material                 | Ap    | Ae  | Vc      |  | Ø 10      | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25  | Ø 32  | Ø 36  | Ø 40  |
| <b>P.1</b> ≤ 600 N/mm²   | 0,5xD | 1xD | 45      |  | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 | 0,13  | 0,14  |
| <b>P.2</b> ≤ 850 N/mm²   | 0,5xD | 1xD | 39      |  | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 | 0,13  | 0,14  |
| <b>P.3</b> ≤ 1100 N/mm²  | 0,5xD | 1xD | 24      |  | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 | 0,13  | 0,14  |
| <b>P.4</b> ≤ 900 N/mm²   | 0,5xD | 1xD | 30      |  | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 | 0,13  | 0,14  |
| <b>P.5</b> ≤ 1100 N/mm²  | 0,5xD | 1xD | 24      |  | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 | 0,13  | 0,14  |
| <b>M.2</b> 750–850 N/mm² | 0,5xD | 1xD | 15      |  | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 | 0,13  | 0,14  |
| <b>K.1</b> ≤ 820 N/mm²   | 0,5xD | 1xD | 35      |  | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 | 0,13  | 0,14  |
| <b>K.2</b> > 800 N/mm²   | 0,5xD | 1xD | 25      |  | 0,036     | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 | 0,13  | 0,14  |
| <b>N.2</b> ≤ 600 N/mm²   | 0,5xD | 1xD | 160–300 |  | 0,047     | 0,057 | 0,075 | 0,085 | 0,095 | 0,118 | 0,151 | 0,169 | 0,182 |

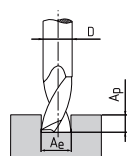
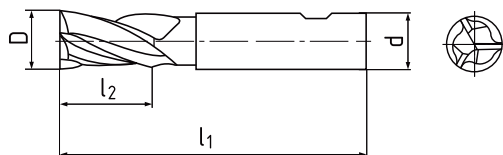
TiAlN: Vc + 50 %

# Slot drills

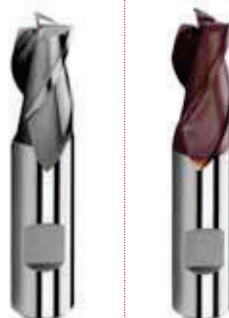
short, centre cutting, 3 – fluted



- CZ** Frézy pro drážky per | krátké, nesouměrné, třízubé  
**DE** Langlochfräser | Kurz, dreischneider mit Zentrumschnitt  
**RU** Фрезы шпоночные | короткие, трехзубые, несимметричные



**230418**



| D<br>e 8 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 230418 | 230418     |
|----------|----------|----------------|----------------|---|--------|------------|
| 3        | 6        | 49             | 5              | 3 | .030   | .030 TIALN |
| 3,5      | 6        | 50             | 6              | 3 | .035   | .035 TIALN |
| 4        | 6        | 51             | 7              | 3 | .040   | .040 TIALN |
| 4,5      | 6        | 51             | 7              | 3 | .045   | .045 TIALN |
| 5        | 6        | 52             | 8              | 3 | .050   | .050 TIALN |
| 5,5      | 6        | 52             | 8              | 3 | .055   | .055 TIALN |
| 6        | 6        | 52             | 8              | 3 | .060   | .060 TIALN |
| 6,5      | 10       | 60             | 10             | 3 | .065   | .065 TIALN |
| 7        | 10       | 60             | 10             | 3 | .070   | .070 TIALN |
| 7,5      | 10       | 60             | 10             | 3 | .075   | .075 TIALN |
| 8        | 10       | 61             | 11             | 3 | .080   | .080 TIALN |
| 9        | 10       | 61             | 11             | 3 | .090   | .090 TIALN |
| 9,5      | 10       | 61             | 11             | 3 | .095   | .095 TIALN |
| 10       | 10       | 63             | 13             | 3 | .100   | .100 TIALN |
| 11       | 12       | 70             | 13             | 3 | .110   | .110 TIALN |
| 12       | 12       | 73             | 16             | 3 | .120   | .120 TIALN |
| 13       | 12       | 73             | 16             | 3 | .130   | .130 TIALN |
| 14       | 12       | 73             | 16             | 3 | .140   | .140 TIALN |
| 15       | 12       | 73             | 16             | 3 | .150   | .150 TIALN |
| 16       | 16       | 79             | 19             | 3 | .160   | .160 TIALN |
| 18       | 16       | 79             | 19             | 3 | .180   | .180 TIALN |

Also in the set / Také v sadě / Auch im Set / Также в комплекте (72)

## Cutting conditions | Řezné podmínky | Schnittbedingungen | Условия резания

|          |                             | fz (mm/z)      |                |                |       |       |       |       |       |       |       |
|----------|-----------------------------|----------------|----------------|----------------|-------|-------|-------|-------|-------|-------|-------|
| Material |                             | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 3   | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  |
| P.1      | ≤ 600 N/mm <sup>2</sup>     | 0,5xD          | 1xD            | 45             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 |
| P.2      | ≤ 850 N/mm <sup>2</sup>     | 0,5xD          | 1xD            | 39             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 |
| P.3      | ≤ 1100 N/mm <sup>2</sup>    | 0,5xD          | 1xD            | 24             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 |
| P.4      | ≤ 900 N/mm <sup>2</sup>     | 0,5xD          | 1xD            | 30             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 |
| M.2      | 750 - 850 N/mm <sup>2</sup> | 0,5xD          | 1xD            | 15             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 |
| K.1      | ≤ 820 N/mm <sup>2</sup>     | 0,5xD          | 1xD            | 35             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 |
| K.2      | > 800 N/mm <sup>2</sup>     | 0,5xD          | 1xD            | 25             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 |
| N.2      | ≤ 600 N/mm <sup>2</sup>     | 0,5xD          | 1xD            | 160-300        | 0,012 | 0,029 | 0,038 | 0,047 | 0,057 | 0,075 | 0,085 |
| N.4      | ≤ 800 N/mm <sup>2</sup>     | 0,5xD          | 1xD            | 80-120         | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 |
| S.2      | ≤ 1250 N/mm <sup>2</sup>    | 0,5xD          | 1xD            | 12             | 0,006 | 0,015 | 0,02  | 0,025 | 0,031 | 0,041 | 0,046 |

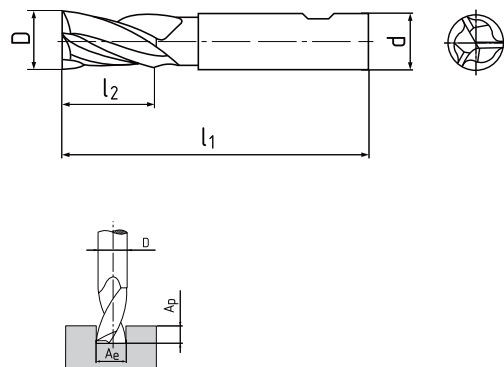
TiAlN: Vc + 50 %

# Slot drills

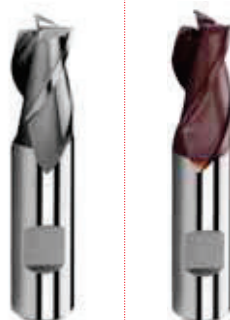
short, centre cutting, 3 – fluted



- CZ** Frézy pro drážky per | krátké, nesouměrné, třízubé  
**DE** Langlochfräser | Kurz, dreischneider mit Zentrumschnitt  
**RU** Фрезы шпоночные | короткие, трехзубые, несимметричные



**230418**



| D<br>e 8 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 230418 | 230418     |
|----------|----------|----------------|----------------|---|--------|------------|
| 20       | 20       | 88             | 22             | 3 | .200   | .200 TIALN |
| 22       | 20       | 88             | 22             | 3 | .220   | .220 TIALN |
| 25       | 25       | 102            | 26             | 3 | .250   | .250 TIALN |
| 28       | 25       | 102            | 26             | 3 | .280   | .280 TIALN |
| 30       | 25       | 102            | 26             | 3 | .300   | .300 TIALN |
| 32       | 32       | 112            | 32             | 3 | .320   | .320 TIALN |

Also in the set / Také v sadě / Auch im Set / Также в комплекте (72)

## Cutting conditions | Řezné podmínky | Schnittbedingungen | Условия резания

|            |                             | f <sub>z</sub> (mm/z) |                |                |       |       |       |       |       |       |       |
|------------|-----------------------------|-----------------------|----------------|----------------|-------|-------|-------|-------|-------|-------|-------|
| Material   |                             | A <sub>p</sub>        | A <sub>e</sub> | V <sub>c</sub> | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  | Ø 25  | Ø 32  |
| <b>P.1</b> | ≤ 600 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 45             | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 |
| <b>P.2</b> | ≤ 850 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 39             | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 |
| <b>P.3</b> | ≤ 1100 N/mm <sup>2</sup>    | 0,5xD                 | 1xD            | 24             | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 |
| <b>P.4</b> | ≤ 900 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 30             | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 |
| <b>M.2</b> | 750 - 850 N/mm <sup>2</sup> | 0,5xD                 | 1xD            | 15             | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 |
| <b>K.1</b> | ≤ 820 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 35             | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 |
| <b>K.2</b> | > 800 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 25             | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 |
| <b>N.2</b> | ≤ 600 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 160-300        | 0,047 | 0,057 | 0,075 | 0,085 | 0,095 | 0,118 | 0,151 |
| <b>N.4</b> | ≤ 800 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 80-120         | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 | 0,091 | 0,116 |
| <b>S.2</b> | ≤ 1250 N/mm <sup>2</sup>    | 0,5xD                 | 1xD            | 12             | 0,025 | 0,031 | 0,041 | 0,046 | 0,051 | 0,064 | 0,081 |

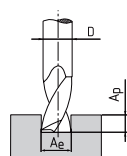
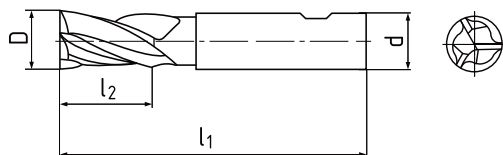
TiAlN: V<sub>c</sub> + 50 %

# Slot drills

short, centre cutting, 3 – fluted



**CZ** Frézy pro drážky per | krátké, nesouměrné, třízubé  
**DE** Langlochfräser | Kurz, dreischneider mit Zentrumschnitt  
**RU** Фрезы шпоночные | короткие, трехзубые, несимметричные



## 230418H



| D<br>e 8 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 230418H |
|----------|----------|----------------|----------------|---|---------|
| 11,7     | 12       | 70             | 13             | 3 | .117    |
| 13,7     | 12       | 73             | 16             | 3 | .137    |
| 15,7     | 16       | 79             | 19             | 3 | .157    |
| 17,7     | 16       | 79             | 19             | 3 | .177    |
| 19,7     | 20       | 88             | 22             | 3 | .197    |
| 21,7     | 20       | 88             | 22             | 3 | .217    |
| 24,7     | 25       | 102            | 26             | 3 | .247    |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|                |                 |       |     |         |       | fz (mm/z) |       |       |       |
|----------------|-----------------|-------|-----|---------|-------|-----------|-------|-------|-------|
| Material       | Ap              | Ae    | Vc  | Ø 12    | Ø 16  | Ø 18      | Ø 20  | Ø 25  |       |
| <b>230418H</b> |                 |       |     |         |       |           |       |       |       |
| P.1            | ≤ 600 N/mm²     | 0,5xD | 1xD | 45      | 0,044 | 0,058     | 0,065 | 0,073 | 0,091 |
| P.2            | ≤ 850 N/mm²     | 0,5xD | 1xD | 39      | 0,044 | 0,058     | 0,065 | 0,073 | 0,091 |
| P.3            | ≤ 1100 N/mm²    | 0,5xD | 1xD | 24      | 0,044 | 0,058     | 0,065 | 0,073 | 0,091 |
| P.4            | ≤ 900 N/mm²     | 0,5xD | 1xD | 30      | 0,044 | 0,058     | 0,065 | 0,073 | 0,091 |
| M.2            | 750 - 850 N/mm² | 0,5xD | 1xD | 15      | 0,044 | 0,058     | 0,065 | 0,073 | 0,091 |
| K.1            | ≤ 820 N/mm²     | 0,5xD | 1xD | 35      | 0,044 | 0,058     | 0,065 | 0,073 | 0,091 |
| K.2            | > 800 N/mm²     | 0,5xD | 1xD | 25      | 0,044 | 0,058     | 0,065 | 0,073 | 0,091 |
| N.2            | ≤ 600 N/mm²     | 0,5xD | 1xD | 160-300 | 0,057 | 0,075     | 0,085 | 0,095 | 0,118 |
| N.4            | ≤ 800 N/mm²     | 0,5xD | 1xD | 80-120  | 0,044 | 0,058     | 0,065 | 0,073 | 0,091 |
| S.2            | ≤ 1250 N/mm²    | 0,5xD | 1xD | 12      | 0,031 | 0,041     | 0,046 | 0,051 | 0,064 |

|          |                 |                |                |                | fz (mm/z) |       |       |       |       |       |       |       |
|----------|-----------------|----------------|----------------|----------------|-----------|-------|-------|-------|-------|-------|-------|-------|
| Material |                 | A <sub>p</sub> | A <sub>e</sub> | V <sub>c</sub> | Ø 3       | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  |
| 231418   |                 |                |                |                |           |       |       |       |       |       |       |       |
| P.1      | ≤ 600 N/mm²     | 0,5xD          | 1xD            | 45             | 0,009     | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| P.2      | ≤ 850 N/mm²     | 0,5xD          | 1xD            | 39             | 0,009     | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| P.3      | ≤ 1100 N/mm²    | 0,5xD          | 1xD            | 24             | 0,009     | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| P.4      | ≤ 900 N/mm²     | 0,5xD          | 1xD            | 30             | 0,009     | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| M.2      | 750 - 850 N/mm² | 0,5xD          | 1xD            | 15             | 0,009     | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| K.1      | ≤ 820 N/mm²     | 0,5xD          | 1xD            | 35             | 0,009     | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| K.2      | > 800 N/mm²     | 0,5xD          | 1xD            | 25             | 0,009     | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,065 | 0,073 |
| S.2      | ≤ 1250 N/mm²    | 0,5xD          | 1xD            | 12             | 0,006     | 0,015 | 0,02  | 0,025 | 0,031 | 0,041 | 0,046 | 0,051 |

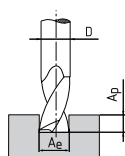
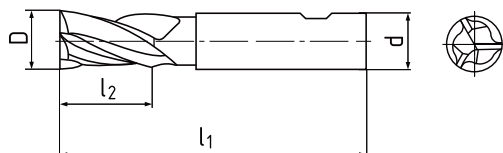
TiAlN: Vc + 50 %

# Slot drills

long, centre cutting, 3 – fluted



- CZ** Frézy pro drážky per | dlouhé, nesouměrné, třízubé  
**DE** Langlochfräser | Lang, dreischneider mit Zentrumschnitt  
**RU** Фрезы шпоночные | длинные, трехзубые, несимметричные



**231418**



| D<br>e 8 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 231418 | 231418       |
|----------|----------|----------------|----------------|---|--------|--------------|
| 1,8      | 6        | 51             | 7              | 3 | .018   | .018 TIALN   |
| 2        | 6        | 51             | 7              | 3 | .020   | .020 TIALN   |
| 2,8      | 6        | 52             | 8              | 3 | .028   | .028 TIALN   |
| 3        | 6        | 52             | 8              | 3 | .030   | .030 TIALN   |
| 4        | 6        | 55             | 11             | 3 | .040   | .040 TIALN   |
| 4,8      | 6        | 57             | 13             | 3 | .048   | .048 TIALN   |
| 5        | 6        | 57             | 13             | 3 | .050   | .050 TIALN   |
| 5,5      | 6        | 57             | 13             | 3 | .055   | .055 TIALN   |
| 6        | 6        | 57             | 13             | 3 | .060   | .060 TIALN   |
| 6,5      | 10       | 66             | 16             | 3 | .065   | .065 TIALN   |
| 6,75     | 10       | 66             | 16             | 3 | .0675* | .0675 TIALN* |
| 7        | 10       | 66             | 16             | 3 | .070   | .070 TIALN   |
| 7,5      | 10       | 66             | 16             | 3 | .075   | .075 TIALN   |
| 8        | 10       | 69             | 19             | 3 | .080   | .080 TIALN   |
| 8,5      | 10       | 69             | 19             | 3 | .085*  | .085 TIALN*  |
| 9        | 10       | 69             | 19             | 3 | .090   | .090 TIALN   |
| 9,5      | 10       | 69             | 19             | 3 | .095   | .095 TIALN   |
| 9,7      | 10       | 72             | 22             | 3 | .097*  | .097 TIALN*  |
| 10       | 10       | 72             | 22             | 3 | .100   | .100 TIALN   |
| 10,5     | 12       | 79             | 22             | 3 | .105*  | .105 TIALN*  |
| 11       | 12       | 79             | 22             | 3 | .110   | .110 TIALN   |
| 12       | 12       | 83             | 26             | 3 | .120   | .120 TIALN   |
| 13       | 12       | 83             | 26             | 3 | .130   | .130 TIALN   |
| 14       | 12       | 83             | 26             | 3 | .140   | .140 TIALN   |
| 15       | 12       | 83             | 26             | 3 | .150   | .150 TIALN   |
| 16       | 16       | 92             | 32             | 3 | .160   | .160 TIALN   |
| 17       | 16       | 92             | 32             | 3 | .170   | .170 TIALN   |
| 18       | 16       | 92             | 32             | 3 | .180   | .180 TIALN   |
| 20       | 20       | 104            | 38             | 3 | .200   | .200 TIALN   |
| 22       | 20       | 104            | 38             | 3 | .220   | .220 TIALN   |
| 24       | 25       | 121            | 45             | 3 | .240   | .240 TIALN   |
| 25       | 25       | 121            | 45             | 3 | .250   | .250 TIALN   |

\*) On demand / На поptávku / auf Anfrage / По запросу

# Slot drills

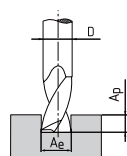
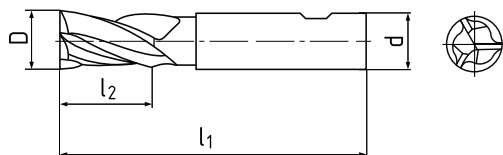
extra long, centre cutting, 3 – fluted



**CZ** Frézy pro drážky per | extra dlouhé, nesouměrné, třízubé

**DE** Langlochfräser | extra lang, dreischneider mit Zentrumschnitt

**RU** Фрезы шпоночные | экстремально длинные, трехзубые, несимметричные



**233418**



| D<br>e 8 | d<br>h 6 | l <sub>1</sub> | l <sub>2</sub> | Z | 233418 | 233418     |
|----------|----------|----------------|----------------|---|--------|------------|
| 2        | 6        | 54             | 10             | 3 | .020   | .020 TiAlN |
| 3        | 6        | 56             | 12             | 3 | .030   | .030 TiAlN |
| 4        | 6        | 63             | 19             | 3 | .040   | .040 TiAlN |
| 5        | 6        | 68             | 24             | 3 | .050   | .050 TiAlN |
| 6        | 6        | 68             | 24             | 3 | .060   | .060 TiAlN |
| 8        | 10       | 88             | 38             | 3 | .080   | .080 TiAlN |
| 9        | 10       | 88             | 38             | 3 | .090   | .090 TiAlN |
| 10       | 10       | 95             | 45             | 3 | .100   | .100 TiAlN |
| 12       | 12       | 110            | 53             | 3 | .120   | .120 TiAlN |
| 14       | 12       | 110            | 53             | 3 | .140   | .140 TiAlN |
| 16       | 16       | 123            | 63             | 3 | .160   | .160 TiAlN |
| 18       | 16       | 123            | 63             | 3 | .180   | .180 TiAlN |
| 20       | 20       | 141            | 75             | 3 | .200   | .200 TiAlN |
| 22       | 20       | 141            | 75             | 3 | .220   | .220 TiAlN |
| 25       | 25       | 166            | 90             | 3 | .250   | .250 TiAlN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |                             | f <sub>z</sub> (mm/z) |                |                |       |       |       |       |       |       |       |       |
|------------|-----------------------------|-----------------------|----------------|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Material   |                             | A <sub>p</sub>        | A <sub>e</sub> | V <sub>c</sub> | Ø 3   | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  |
| <b>P.1</b> | ≤ 600 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 45             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,068 | 0,073 |
| <b>P.2</b> | ≤ 850 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 39             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,068 | 0,073 |
| <b>P.3</b> | ≤ 1100 N/mm <sup>2</sup>    | 0,5xD                 | 1xD            | 24             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,068 | 0,073 |
| <b>P.4</b> | ≤ 900 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 30             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,068 | 0,073 |
| <b>M.2</b> | 750 - 850 N/mm <sup>2</sup> | 0,5xD                 | 1xD            | 15             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,068 | 0,073 |
| <b>K.1</b> | ≤ 820 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 35             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,068 | 0,073 |
| <b>K.2</b> | > 800 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 25             | 0,009 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,068 | 0,073 |
| <b>N.2</b> | ≤ 600 N/mm <sup>2</sup>     | 0,5xD                 | 1xD            | 160-300        | 0,012 | 0,029 | 0,038 | 0,047 | 0,057 | 0,075 | 0,085 | 0,095 |
| <b>S.2</b> | ≤ 1250 N/mm <sup>2</sup>    | 0,5xD                 | 1xD            | 12             | 0,006 | 0,015 | 0,02  | 0,025 | 0,031 | 0,041 | 0,046 | 0,051 |

TiAlN: V<sub>c</sub> + 50 %

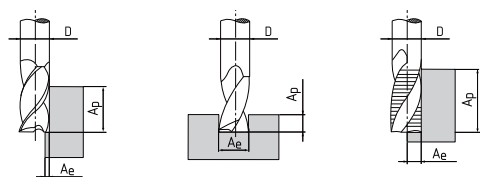
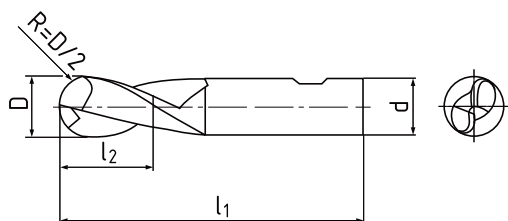


# Ball nose end mills

short, 2 – fluted



**CZ** Frézy kopírovací | krátké, dvouzubé  
**DE** Radiusfräser | Kurz, zweischneider  
**RU** Фрезы копирующие | короткие, двузубые



**510417**



| D<br>h 10 | d<br>h 6 | l1 | l2 | R   | Z | 510417     |
|-----------|----------|----|----|-----|---|------------|
| 4         | 6        | 51 | 7  | 2   | 2 | .040 ALTiN |
| 5         | 6        | 52 | 8  | 2,5 | 2 | .050 ALTiN |
| 6         | 6        | 52 | 8  | 3   | 2 | .060 ALTiN |
| 7         | 10       | 60 | 10 | 3,5 | 2 | .070 ALTiN |
| 8         | 10       | 61 | 11 | 4   | 2 | .080 ALTiN |
| 9         | 10       | 61 | 11 | 4,5 | 2 | .090 ALTiN |
| 10        | 10       | 63 | 13 | 5   | 2 | .100 ALTiN |
| 12        | 12       | 73 | 16 | 6   | 2 | .120 ALTiN |
| 14        | 12       | 73 | 16 | 7   | 2 | .140 ALTiN |
| 16        | 16       | 79 | 19 | 8   | 2 | .160 ALTiN |
| 18        | 16       | 79 | 19 | 9   | 2 | .180 ALTiN |
| 20        | 20       | 88 | 22 | 10  | 2 | .200 ALTiN |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|            |             | fz (mm/z) |        |     |       |       |       |       |       |       |       |       |
|------------|-------------|-----------|--------|-----|-------|-------|-------|-------|-------|-------|-------|-------|
| Material   |             | Ap        | Ae     | Vc  | Ø 4   | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 18  | Ø 20  |
| <b>P.1</b> | ≤ 600 N/mm² | 1xD       | 0,25xD | 114 | 0,019 | 0,024 | 0,032 | 0,040 | 0,048 | 0,064 | 0,072 | 0,080 |
| <b>P.2</b> | ≤ 850 N/mm² | 1xD       | 0,25xD | 99  | 0,019 | 0,024 | 0,032 | 0,040 | 0,048 | 0,064 | 0,072 | 0,080 |
| <b>P.4</b> | ≤ 900 N/mm² | 1xD       | 0,25xD | 77  | 0,019 | 0,024 | 0,032 | 0,040 | 0,048 | 0,064 | 0,072 | 0,080 |
| <b>K.1</b> | ≤ 820 N/mm² | 1xD       | 0,25xD | 89  | 0,019 | 0,024 | 0,032 | 0,040 | 0,048 | 0,064 | 0,072 | 0,080 |

# Ball nose end mills

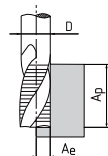
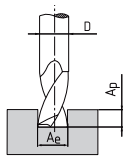
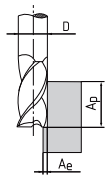
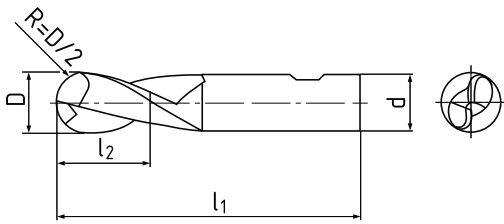
2 - fluted



**CZ** Frézy kopírovací | dvouzubé

**DE** Radiusfräser | zweischneider

**RU** Фрезы копирующие | двузубые



**510418**



**511418**



| D<br>h 10 | d<br>h 6 | I1<br>510418 | I1<br>511418 | I2<br>510418 | I2<br>511418 | R    | Z | 510418 | 511418 |
|-----------|----------|--------------|--------------|--------------|--------------|------|---|--------|--------|
| 2         | 6        | 48           | 54           | 4            | 7            | 1    | 2 | .020   | .020   |
| 3         | 6        | 49           | 56           | 5            | 8            | 1,5  | 2 | .030   | .030   |
| 4         | 6        | 51           | 63           | 7            | 11           | 2    | 2 | .040   | .040   |
| 5         | 6        | 52           | 68           | 8            | 13           | 2,5  | 2 | .050   | .050   |
| 6         | 6        | 52           | 68           | 8            | 13           | 3    | 2 | .060   | .060   |
| 7         | 10       | 60           | 80           | 10           | 16           | 3,5  | 2 | .070   | .070   |
| 8         | 10       | 61           | 88           | 11           | 19           | 4    | 2 | .080   | .080   |
| 9         | 10       | 61           | 88           | 11           | 19           | 4,5  | 2 | .090   | .090   |
| 10        | 10       | 63           | 95           | 13           | 22           | 5    | 2 | .100   | .100   |
| 11        | 12       | 70           | 102          | 13           | 22           | 5,5  | 2 | .110   | .110   |
| 12        | 12       | 73           | 110          | 16           | 26           | 6    | 2 | .120   | .120   |
| 13        | 12       | 73           | 110          | 16           | 26           | 6,5  | 2 | .130   | .130   |
| 14        | 12       | 73           | 110          | 16           | 26           | 7    | 2 | .140   | .140   |
| 15        | 12       | 73           | 110          | 16           | 26           | 7,5  | 2 | .150   | .150   |
| 16        | 16       | 79           | 123          | 19           | 32           | 8    | 2 | .160   | .160   |
| 18        | 16       | 79           | 123          | 19           | 32           | 9    | 2 | .180   | .180   |
| 20        | 20       | 88           | 141          | 22           | 38           | 10   | 2 | .200   | .200   |
| 22        | 20       | 88           | 141          | 22           | 38           | 11   | 2 | .220   | .220   |
| 24        | 25       | 102          | 166          | 26           | 45           | 12   | 2 | .240   | .240   |
| 25        | 25       | 102          | 166          | 26           | 45           | 12,5 | 2 | .250   | .250   |
| 28        | 25       | 102          | 166          | 26           | 45           | 14   | 2 | .280   | .280   |
| 30        | 25       | 102          | 166          | 26           | 45           | 15   | 2 | .300   | .300   |
| 32        | 32       | 112          | 186          | 32           | 53           | 16   | 2 | .320   | .320   |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |                 | fz (mm/z) |        |    |       |       |       |       |       |       |       |
|----------|-----------------|-----------|--------|----|-------|-------|-------|-------|-------|-------|-------|
| Material |                 | Ap        | Ae     | Vc | Ø 3   | Ø 6   | Ø 10  | Ø 16  | Ø 20  | Ø 25  | Ø 32  |
| P.2      | ≤ 850 N/mm²     | 1xD       | 0,25xD | 39 | 0,002 | 0,029 | 0,044 | 0,065 | 0,07  | 0,071 | 0,083 |
| P.3      | ≤ 1100 N/mm²    | 1xD       | 0,25xD | 24 | 0,002 | 0,029 | 0,044 | 0,065 | 0,07  | 0,071 | 0,083 |
| P.4      | ≤ 900 N/mm²     | 1xD       | 0,25xD | 30 | 0,002 | 0,029 | 0,044 | 0,065 | 0,07  | 0,071 | 0,083 |
| P.5      | ≤ 1100 N/mm²    | 1xD       | 0,25xD | 24 | 0,002 | 0,029 | 0,044 | 0,065 | 0,07  | 0,071 | 0,083 |
| P.6      | > 1100 N/mm²    | 1xD       | 0,25xD | 20 | 0,001 | 0,020 | 0,031 | 0,046 | 0,049 | 0,05  | 0,058 |
| M.2      | 750 - 850 N/mm² | 1xD       | 0,25xD | 15 | 0,002 | 0,029 | 0,044 | 0,065 | 0,07  | 0,071 | 0,083 |
| K.2      | > 800 N/mm²     | 1xD       | 0,25xD | 25 | 0,002 | 0,029 | 0,044 | 0,065 | 0,07  | 0,071 | 0,083 |
| S.1      | ≤ 1500 N/mm²    | 1xD       | 0,25xD | 12 | 0,001 | 0,02  | 0,031 | 0,046 | 0,049 | 0,05  | 0,058 |

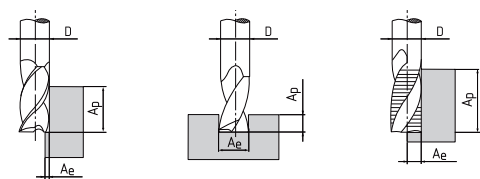
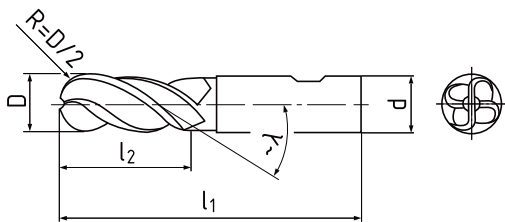
# Ball nose end mills



**CZ** Frézy kopírovací | s půlkruhovými břity

**DE** Radiusfräser | mit runder Stirn

**RU** Фрезы копирующие | с полукруглыми головками



**530718**



**531718**



| D<br>k 12 | d<br>h 6 | l1<br>530718 | l1<br>531718 | l2<br>530718 | l2<br>531718 | R   | ~λ  | Z | 530718 | 531718 |
|-----------|----------|--------------|--------------|--------------|--------------|-----|-----|---|--------|--------|
| 4         | 6        | 55           | 63           | 11           | 19           | 2   | 15° | 4 | .040   | .040   |
| 5         | 6        | 57           | 68           | 13           | 24           | 2,5 | 15° | 4 | .050   | .050   |
| 6         | 6        | 57           | 68           | 13           | 24           | 3   | 25° | 4 | .060   | .060   |
| 8         | 10       | 69           | 88           | 19           | 38           | 4   | 25° | 4 | .080   | .080   |
| 10        | 10       | 72           | 95           | 22           | 45           | 5   | 35° | 4 | .100   | .100   |
| 12        | 12       | 83           | 110          | 26           | 53           | 6   | 35° | 4 | .120   | .120   |
| 16        | 16       | 92           | 123          | 32           | 63           | 8   | 35° | 4 | .160   | .160   |
| 20        | 20       | 104          | 141          | 38           | 75           | 10  | 35° | 4 | .200   | .200   |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|                            |     | fz (mm/z) |        |       |       |       |       |       |       |       |  |
|----------------------------|-----|-----------|--------|-------|-------|-------|-------|-------|-------|-------|--|
| Material                   | Ap  | Ae        | Vc     | Ø 4   | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 20  |  |
| <b>P.1</b> ≤ 600 N/mm²     | 1xD | 0,25xD    | 45     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |  |
| <b>P.2</b> ≤ 850 N/mm²     | 1xD | 0,25xD    | 39     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |  |
| <b>P.3</b> ≤ 1100 N/mm²    | 1xD | 0,25xD    | 24     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |  |
| <b>P.4</b> ≤ 900 N/mm²     | 1xD | 0,25xD    | 30     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |  |
| <b>P.5</b> ≤ 1100 N/mm²    | 1xD | 0,25xD    | 24     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |  |
| <b>P.6</b> > 1100 N/mm²    | 1xD | 0,25xD    | 20     | 0,013 | 0,015 | 0,020 | 0,025 | 0,031 | 0,041 | 0,051 |  |
| <b>M.2</b> 750 - 850 N/mm² | 1xD | 0,25xD    | 15     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |  |
| <b>K.1</b> ≤ 820 N/mm²     | 1xD | 0,25xD    | 35     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |  |
| <b>K.2</b> > 800 N/mm²     | 1xD | 0,25xD    | 25     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |  |
| <b>N.4</b> ≤ 800 N/mm²     | 1xD | 0,25xD    | 80-120 | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |  |
| <b>S.1</b> ≤ 1500 N/mm²    | 1xD | 0,25xD    | 12     | 0,013 | 0,015 | 0,020 | 0,025 | 0,031 | 0,041 | 0,051 |  |

# Die sinking cutters

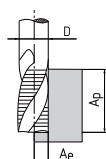
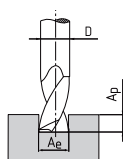
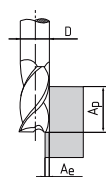
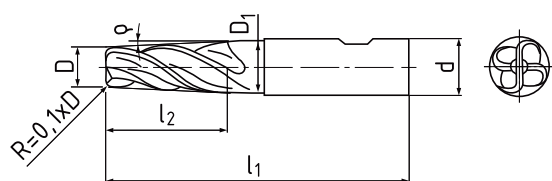
tapered, 4 – fluted



**CZ** Frézy kopírovací | kuželové, 4zubé

**DE** Gesenkfräser | konisch, vierschneider

**RU** Фрезы копирующие | конические, четырехзубые



**580718**



| D<br>js 14 | D1<br>~ | d<br>h 6 | l1  | l2 | ρ   | Z | 580718 |
|------------|---------|----------|-----|----|-----|---|--------|
| 5          | 5,7     | 10       | 73  | 20 | 1°  | 4 | .0105  |
| 8          | 9,1     | 12       | 95  | 32 | 1°  | 4 | .0108  |
| 12         | 13,7    | 16       | 118 | 50 | 1°  | 4 | .0112  |
| 20         | 22,8    | 20       | 155 | 80 | 1°  | 4 | .0120  |
| 5          | 6,4     | 10       | 74  | 20 | 2°  | 4 | .0205  |
| 8          | 10,2    | 12       | 95  | 32 | 2°  | 4 | .0208  |
| 12         | 15,5    | 16       | 118 | 50 | 2°  | 4 | .0212  |
| 20         | 25,6    | 25       | 160 | 80 | 2°  | 4 | .0220  |
| 5          | 7,1     | 10       | 74  | 20 | 3°  | 4 | .0305  |
| 8          | 11,4    | 12       | 95  | 32 | 3°  | 4 | .0308  |
| 12         | 17,2    | 20       | 120 | 50 | 3°  | 4 | .0312  |
| 20         | 28,4    | 25       | 160 | 80 | 3°  | 4 | .0320  |
| 5          | 8,5     | 10       | 74  | 20 | 5°  | 4 | .0505  |
| 8          | 13,6    | 16       | 98  | 32 | 5°  | 4 | .0508  |
| 12         | 20,7    | 20       | 120 | 50 | 5°  | 4 | .0512  |
| 20         | 34      | 32       | 165 | 80 | 5°  | 4 | .0520  |
| 5          | 9,9     | 12       | 80  | 20 | 7°  | 4 | .0705  |
| 8          | 15,9    | 16       | 98  | 32 | 7°  | 4 | .0708  |
| 12         | 24,3    | 25       | 130 | 50 | 7°  | 4 | .0712  |
| 20         | 39,6    | 32       | 165 | 80 | 7°  | 4 | .0720  |
| 5          | 12,1    | 12       | 80  | 20 | 10° | 4 | .1005  |
| 8          | 19,3    | 20       | 100 | 32 | 10° | 4 | .1008  |
| 12         | 29,6    | 25       | 130 | 50 | 10° | 4 | .1012  |
| 20         | 48,2    | 32       | 165 | 80 | 10° | 4 | .1020  |

**Cutting conditions** | Řezné podmínky | Schnittbedingungen | Условия резания

|          |              | fz (mm/z)          |        |        |       |       |       |       |       |       |       |
|----------|--------------|--------------------|--------|--------|-------|-------|-------|-------|-------|-------|-------|
| Material |              | Ap                 | Ae     | Vc     | Ø 4   | Ø 6   | Ø 8   | Ø 10  | Ø 12  | Ø 16  | Ø 20  |
| P.1      | ≤ 600 N/mm²  | 0,8xl <sub>2</sub> | 0,25xD | 45     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |
| P.2      | ≤ 850 N/mm²  | 0,8xl <sub>2</sub> | 0,25xD | 39     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |
| P.3      | ≤ 1100 N/mm² | 0,8xl <sub>2</sub> | 0,25xD | 24     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |
| P.4      | ≤ 900 N/mm²  | 0,8xl <sub>2</sub> | 0,25xD | 30     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |
| P.5      | ≤ 1100 N/mm² | 0,8xl <sub>2</sub> | 0,25xD | 24     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |
| P.6      | > 1100 N/mm² | 0,8xl <sub>2</sub> | 0,25xD | 20     | 0,013 | 0,015 | 0,020 | 0,025 | 0,031 | 0,041 | 0,051 |
| K.1      | ≤ 820 N/mm²  | 0,8xl <sub>2</sub> | 0,25xD | 35     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |
| K.2      | > 800 N/mm²  | 0,8xl <sub>2</sub> | 0,25xD | 25     | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |
| N.4      | ≤ 800 N/mm²  | 0,8xl <sub>2</sub> | 0,25xD | 80-120 | 0,018 | 0,022 | 0,029 | 0,036 | 0,044 | 0,058 | 0,073 |