

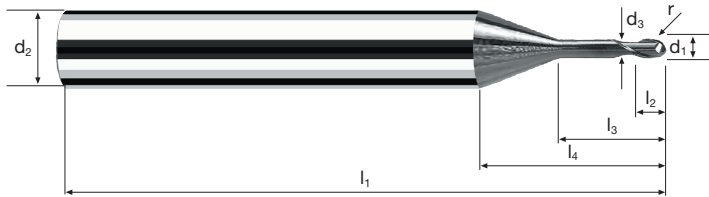
# Kugelpkopfräser MicroX

Schaft Ø 6mm, zylindrischer Hals, 5xd



**HM  
XA**

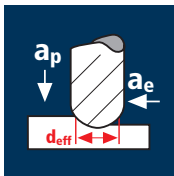
$\lambda$  30°  
 $\gamma$ -10°



|                    |                       |                        |                        |                     |                     |                    |                          |                       |                                 |
|--------------------|-----------------------|------------------------|------------------------|---------------------|---------------------|--------------------|--------------------------|-----------------------|---------------------------------|
| <b>Rm</b><br>< 850 | <b>Rm</b><br>850-1100 | <b>Rm</b><br>1100-1300 | <b>Rm</b><br>1300-1500 | <b>HRC</b><br>48-56 | <b>HRC</b><br>56-60 | <b>HRC</b><br>> 60 | <b>Inox</b><br>Stainless | <b>Ti</b><br>Titanium | <b>Cobalt-Chrome<br/>Copper</b> |
|--------------------|-----------------------|------------------------|------------------------|---------------------|---------------------|--------------------|--------------------------|-----------------------|---------------------------------|

|           |     | Beispiel:<br>Bestell-Nr. |      | Beschichtung<br><b>X</b> | Artikel-Nr.<br><b>6564</b> | α-Code<br><b>010</b> |      |             |       |   | X-AL |       |
|-----------|-----|--------------------------|------|--------------------------|----------------------------|----------------------|------|-------------|-------|---|------|-------|
|           |     |                          |      |                          |                            |                      |      |             |       |   |      | X6564 |
| Ø<br>Code | d1  | d2<br>h5                 | d3   | l1                       | l2                         | l3                   | l4   | r<br>±0.005 | α     | z |      |       |
| new! 010  | 0.1 | 6                        | 0.09 | 57                       | 0.1                        | 0.5                  | 17.7 | 0.05        | 14.5° | 2 |      | ●     |
| new! 020  | 0.2 | 6                        | 0.18 | 57                       | 0.2                        | 1.0                  | 17.9 | 0.10        | 13.9° | 2 |      | ●     |
| new! 030  | 0.3 | 6                        | 0.25 | 57                       | 0.3                        | 1.5                  | 18.2 | 0.15        | 13.8° | 2 |      | ●     |
| new! 040  | 0.4 | 6                        | 0.35 | 57                       | 0.4                        | 2.0                  | 18.5 | 0.20        | 12.8° | 2 |      | ●     |
| 050       | 0.5 | 6                        | 0.45 | 57                       | 0.5                        | 2.5                  | 13.5 | 0.25        | 12.3° | 2 |      | ●     |
| 060       | 0.6 | 6                        | 0.55 | 57                       | 0.6                        | 3.0                  | 13.8 | 0.30        | 11.9° | 2 |      | ●     |
| 080       | 0.8 | 6                        | 0.75 | 57                       | 0.8                        | 4.0                  | 14.5 | 0.40        | 11.0° | 2 |      | ●     |
| 100       | 1.0 | 6                        | 0.95 | 57                       | 1.0                        | 5.0                  | 15.1 | 0.50        | 10.2° | 2 |      | ●     |
| 108       | 1.2 | 6                        | 1.10 | 57                       | 1.2                        | 6.0                  | 15.8 | 0.60        | 9.4°  | 2 |      | ●     |
| 120       | 1.5 | 6                        | 1.40 | 61                       | 1.5                        | 7.5                  | 16.7 | 0.75        | 8.4°  | 2 |      | ●     |
| 140       | 2.0 | 6                        | 1.90 | 61                       | 2.0                        | 10.0                 | 18.3 | 1.00        | 6.9°  | 2 |      | ●     |
| 152       | 2.3 | 6                        | 2.10 | 61                       | 2.3                        | 11.5                 | 19.4 | 1.15        | 6.0°  | 2 |      | ●     |
| 160       | 2.5 | 6                        | 2.30 | 61                       | 2.5                        | 12.5                 | 20.1 | 1.25        | 5.5°  | 2 |      | ●     |
| 172       | 2.8 | 6                        | 2.60 | 61                       | 2.8                        | 14.0                 | 21.0 | 1.40        | 4.9°  | 2 |      | ●     |
| 180       | 3.0 | 6                        | 2.80 | 66                       | 3.0                        | 15.0                 | 21.6 | 1.50        | 4.4°  | 2 |      | ●     |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |
|           |     |                          |      |                          |                            |                      |      |             |       |   |      |       |

## Anwendung



## Werkstoff

Werkzeugstahl gehärtet  
42 - 48 HRC



Werkzeugstahl gehärtet  
48 - 52 HRC



Werkzeugstahl gehärtet  
52 - 56 HRC



Werkzeugstahl gehärtet  
56 - 60 HRC



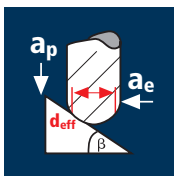
| d1 [mm] | z | vc [m/min] | fz [mm] | ap [mm] | ae [mm] | d_eff [mm] | n [min <sup>-1</sup> ] | vf [mm/min] | Q [mm <sup>3</sup> /min] |
|---------|---|------------|---------|---------|---------|------------|------------------------|-------------|--------------------------|
| 0.2     | 2 | 140        | 0.006   | 0.01    | 0.04    | 0.09       | 60000                  | 720         | 0.3                      |
| 0.4     | 2 | 140        | 0.014   | 0.02    | 0.08    | 0.17       | 60000                  | 1680        | 2.7                      |
| 0.5     | 2 | 140        | 0.016   | 0.03    | 0.10    | 0.24       | 60000                  | 1920        | 5.8                      |
| 0.8     | 2 | 140        | 0.026   | 0.04    | 0.16    | 0.35       | 60000                  | 3120        | 20.0                     |
| 1.0     | 2 | 140        | 0.034   | 0.05    | 0.20    | 0.44       | 60000                  | 4080        | 41.0                     |
| 1.5     | 2 | 140        | 0.050   | 0.08    | 0.30    | 0.67       | 60000                  | 6000        | 144.0                    |
| 2.0     | 2 | 140        | 0.066   | 0.10    | 0.40    | 0.87       | 51225                  | 6760        | 270.5                    |
| 2.5     | 2 | 140        | 0.084   | 0.13    | 0.50    | 1.11       | 40150                  | 6745        | 438.5                    |
| 3.0     | 2 | 140        | 0.100   | 0.15    | 0.60    | 1.31       | 34020                  | 6805        | 612.5                    |

|     |   |     |       |      |      |      |       |      |       |
|-----|---|-----|-------|------|------|------|-------|------|-------|
| 0.2 | 2 | 120 | 0.006 | 0.01 | 0.04 | 0.09 | 60000 | 720  | 0.3   |
| 0.4 | 2 | 120 | 0.014 | 0.02 | 0.08 | 0.17 | 60000 | 1680 | 2.7   |
| 0.5 | 2 | 120 | 0.016 | 0.03 | 0.10 | 0.24 | 60000 | 1920 | 5.8   |
| 0.8 | 2 | 120 | 0.024 | 0.04 | 0.16 | 0.35 | 60000 | 2880 | 18.4  |
| 1.0 | 2 | 120 | 0.032 | 0.05 | 0.20 | 0.44 | 60000 | 3840 | 38.5  |
| 1.5 | 2 | 120 | 0.048 | 0.08 | 0.30 | 0.67 | 57010 | 5475 | 131.5 |
| 2.0 | 2 | 120 | 0.062 | 0.10 | 0.40 | 0.87 | 43905 | 5445 | 218.0 |
| 2.5 | 2 | 120 | 0.080 | 0.13 | 0.50 | 1.11 | 34415 | 5505 | 358.0 |
| 3.0 | 2 | 120 | 0.096 | 0.15 | 0.60 | 1.31 | 29160 | 5600 | 504.0 |

|     |   |     |       |      |      |      |       |      |       |
|-----|---|-----|-------|------|------|------|-------|------|-------|
| 0.2 | 2 | 100 | 0.006 | 0.01 | 0.04 | 0.09 | 60000 | 720  | 0.3   |
| 0.4 | 2 | 100 | 0.012 | 0.02 | 0.08 | 0.17 | 60000 | 1440 | 2.3   |
| 0.5 | 2 | 100 | 0.014 | 0.03 | 0.10 | 0.24 | 60000 | 1680 | 5.0   |
| 0.8 | 2 | 100 | 0.022 | 0.04 | 0.16 | 0.35 | 60000 | 2640 | 16.9  |
| 1.0 | 2 | 100 | 0.030 | 0.05 | 0.20 | 0.44 | 60000 | 3600 | 36.0  |
| 1.5 | 2 | 100 | 0.044 | 0.08 | 0.30 | 0.67 | 47510 | 4180 | 100.5 |
| 2.0 | 2 | 100 | 0.058 | 0.10 | 0.40 | 0.87 | 36590 | 4245 | 170.0 |
| 2.5 | 2 | 100 | 0.074 | 0.13 | 0.50 | 1.11 | 28675 | 4245 | 276.0 |
| 3.0 | 2 | 100 | 0.088 | 0.15 | 0.60 | 1.31 | 24300 | 4275 | 385.0 |

|     |   |    |       |      |      |      |       |      |       |
|-----|---|----|-------|------|------|------|-------|------|-------|
| 0.2 | 2 | 60 | 0.004 | 0.01 | 0.04 | 0.09 | 60000 | 480  | 0.2   |
| 0.4 | 2 | 60 | 0.012 | 0.02 | 0.08 | 0.17 | 60000 | 1440 | 2.3   |
| 0.5 | 2 | 60 | 0.012 | 0.03 | 0.10 | 0.24 | 60000 | 1440 | 4.3   |
| 0.8 | 2 | 60 | 0.020 | 0.04 | 0.16 | 0.35 | 54570 | 2185 | 14.0  |
| 1.0 | 2 | 60 | 0.028 | 0.05 | 0.20 | 0.44 | 43405 | 2430 | 24.5  |
| 1.5 | 2 | 60 | 0.040 | 0.08 | 0.30 | 0.67 | 28505 | 2280 | 54.5  |
| 2.0 | 2 | 60 | 0.052 | 0.10 | 0.40 | 0.87 | 21955 | 2285 | 91.5  |
| 2.5 | 2 | 60 | 0.068 | 0.13 | 0.50 | 1.11 | 17205 | 2340 | 152.0 |
| 3.0 | 2 | 60 | 0.080 | 0.15 | 0.60 | 1.31 | 14580 | 2335 | 210.0 |

## Anwendung



## Werkstoff

Werkzeugstahl gehärtet  
42 - 48 HRC



Werkzeugstahl gehärtet  
48 - 52 HRC



Werkzeugstahl gehärtet  
52 - 56 HRC



Werkzeugstahl gehärtet  
56 - 60 HRC



| d1 [mm] | z | vc [m/min] | fz [mm] | ap [mm] | ae [mm] | d_eff [mm] | n [min <sup>-1</sup> ] | vf [mm/min] | β [°] |
|---------|---|------------|---------|---------|---------|------------|------------------------|-------------|-------|
| 0.2     | 2 | 300        | 0.008   | 0.008   | 0.008   | 0.19       | 60000                  | 960         | 45°   |
| 0.4     | 2 | 300        | 0.014   | 0.016   | 0.016   | 0.37       | 60000                  | 1680        | 45°   |
| 0.5     | 2 | 300        | 0.020   | 0.020   | 0.020   | 0.46       | 60000                  | 2400        | 45°   |
| 0.8     | 2 | 300        | 0.022   | 0.032   | 0.032   | 0.74       | 60000                  | 2640        | 45°   |
| 1.0     | 2 | 300        | 0.028   | 0.042   | 0.042   | 0.93       | 60000                  | 3360        | 45°   |
| 1.5     | 2 | 300        | 0.034   | 0.062   | 0.062   | 1.40       | 60000                  | 4080        | 45°   |
| 2.0     | 2 | 300        | 0.038   | 0.082   | 0.082   | 1.86       | 51340                  | 3900        | 45°   |
| 2.5     | 2 | 300        | 0.040   | 0.102   | 0.102   | 2.32       | 41160                  | 3295        | 45°   |
| 3.0     | 2 | 300        | 0.046   | 0.122   | 0.122   | 2.79       | 34230                  | 3150        | 45°   |

|     |   |     |       |       |       |      |       |      |     |
|-----|---|-----|-------|-------|-------|------|-------|------|-----|
| 0.2 | 2 | 250 | 0.008 | 0.008 | 0.008 | 0.19 | 60000 | 960  | 45° |
| 0.4 | 2 | 250 | 0.014 | 0.016 | 0.016 | 0.37 | 60000 | 1680 | 45° |
| 0.5 | 2 | 250 | 0.020 | 0.020 | 0.020 | 0.46 | 60000 | 2400 | 45° |
| 0.8 | 2 | 250 | 0.020 | 0.032 | 0.032 | 0.74 | 60000 | 2400 | 45° |
| 1.0 | 2 | 250 | 0.026 | 0.042 | 0.042 | 0.93 | 60000 | 3120 | 45° |
| 1.5 | 2 | 250 | 0.032 | 0.062 | 0.062 | 1.40 | 56845 | 3640 | 45° |
| 2.0 | 2 | 250 | 0.036 | 0.082 | 0.082 | 1.86 | 42785 | 3080 | 45° |
| 2.5 | 2 | 250 | 0.038 | 0.102 | 0.102 | 2.32 | 34300 | 2605 | 45° |
| 3.0 | 2 | 250 | 0.044 | 0.122 | 0.122 | 2.79 | 28525 | 2510 | 45° |

|     |   |     |       |       |       |      |       |      |     |
|-----|---|-----|-------|-------|-------|------|-------|------|-----|
| 0.2 | 2 | 200 | 0.008 | 0.008 | 0.008 | 0.19 | 60000 | 960  | 45° |
| 0.4 | 2 | 200 | 0.012 | 0.016 | 0.016 | 0.37 | 60000 | 1440 | 45° |
| 0.5 | 2 | 200 | 0.018 | 0.020 | 0.020 | 0.46 | 60000 | 2160 | 45° |
| 0.8 | 2 | 200 | 0.020 | 0.032 | 0.032 | 0.74 | 60000 | 2400 | 45° |
| 1.0 | 2 | 200 | 0.026 | 0.042 | 0.042 | 0.93 | 60000 | 3120 | 45° |
| 1.5 | 2 | 200 | 0.030 | 0.062 | 0.062 | 1.40 | 45475 | 2730 | 45° |
| 2.0 | 2 | 200 | 0.034 | 0.082 | 0.082 | 1.86 | 34230 | 2330 | 45° |
| 2.5 | 2 | 200 | 0.036 | 0.102 | 0.102 | 2.32 | 27440 | 1975 | 45° |
| 3.0 | 2 | 200 | 0.042 | 0.122 | 0.122 | 2.79 | 22820 | 1915 | 45° |

|     |   |     |       |       |       |      |       |      |     |
|-----|---|-----|-------|-------|-------|------|-------|------|-----|
| 0.2 | 2 | 150 | 0.006 | 0.008 | 0.008 | 0.19 | 60000 | 720  | 45° |
| 0.4 | 2 | 150 | 0.012 | 0.016 | 0.016 | 0.37 | 60000 | 1440 | 45° |
| 0.5 | 2 | 150 | 0.016 | 0.020 | 0.020 | 0.46 | 60000 | 1920 | 45° |
| 0.8 | 2 | 150 | 0.018 | 0.032 | 0.032 | 0.74 | 60000 | 2160 | 45° |
| 1.0 | 2 | 150 | 0.022 | 0.042 | 0.042 | 0.93 | 51340 | 2260 | 45° |
| 1.5 | 2 | 150 | 0.028 | 0.062 | 0.062 | 1.40 | 34105 | 1910 | 45° |
| 2.0 | 2 | 150 | 0.030 | 0.082 | 0.082 | 1.86 | 25670 | 1540 | 45° |
| 2.5 | 2 | 150 | 0.032 | 0.102 | 0.102 | 2.32 | 20580 | 1315 | 45° |
| 3.0 | 2 | 150 | 0.036 | 0.122 | 0.122 | 2.79 | 17115 | 1230 | 45° |