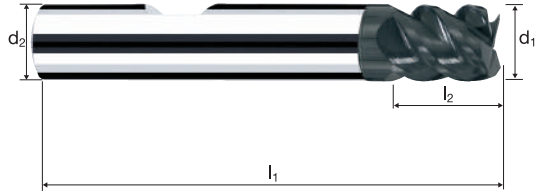
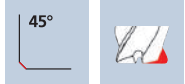


# Cylindrical end mills HX

Smooth-edged, short version



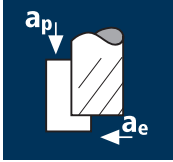
HM  
MG10     λ 55°  
                  γ -10°



|  |  |                 |                 |              |              |             |  |                |       |
|--|--|-----------------|-----------------|--------------|--------------|-------------|--|----------------|-------|
|  |  | Rm<br>1100-1300 | Rm<br>1300-1500 | HRC<br>48-56 | HRC<br>56-60 | HRC<br>> 60 |  | Ti<br>Titanium | GG(G) |
|--|--|-----------------|-----------------|--------------|--------------|-------------|--|----------------|-------|

| Ø<br>Code | d <sub>1</sub><br>e8 | d <sub>2</sub><br>h6 | l <sub>1</sub> | l <sub>2</sub> | l <sub>4</sub> | 45°  | α     | z | Example:<br>Order-N°. |                           | POLYCHROM            | DURO-S |
|-----------|----------------------|----------------------|----------------|----------------|----------------|------|-------|---|-----------------------|---------------------------|----------------------|--------|
|           |                      |                      |                |                |                |      |       |   | Coating<br><b>D</b>   | Article-N°<br><b>5349</b> | ø-Code<br><b>100</b> |        |
| 100       | 1.00                 | 6.00                 | 50             | 1.00           | 11.79          | 0.07 | 13.0° | 3 |                       |                           | P5349                | D5349  |
| 108       | 1.20                 | 6.00                 | 50             | 1.20           | 11.82          | 0.07 | 12.5° | 3 |                       |                           | P5249                | D5249  |
| 120       | 1.50                 | 6.00                 | 50             | 1.50           | 11.56          | 0.07 | 12.0° | 3 |                       |                           |                      |        |
| 140       | 2.00                 | 6.00                 | 50             | 2.00           | 11.12          | 0.10 | 11.0° | 3 |                       |                           |                      |        |
| 148       | 2.20                 | 6.00                 | 50             | 2.20           | 11.45          | 0.10 | 10.0° | 3 |                       |                           |                      |        |
| 160       | 2.50                 | 6.00                 | 50             | 2.50           | 11.19          | 0.10 | 9.5°  | 3 |                       |                           |                      |        |
| 180       | 3.00                 | 6.00                 | 50             | 3.00           | 10.76          | 0.10 | 8.5°  | 4 |                       |                           |                      |        |
| 220       | 4.00                 | 6.00                 | 54             | 4.00           | 9.89           | 0.10 | 6.5°  | 4 |                       |                           |                      |        |
| 260       | 5.00                 | 6.00                 | 54             | 5.00           | 9.02           | 0.15 | 3.5°  | 4 |                       |                           |                      |        |
| 300       | 6.00                 | 6.00                 | 54             | 7.00           | -              | 0.15 | 0.0°  | 4 |                       |                           |                      |        |
| 391       | 8.00                 | 8.00                 | 58             | 9.00           | -              | 0.15 | 0.0°  | 4 |                       |                           |                      |        |
| 450       | 10.00                | 10.00                | 66             | 11.00          | -              | 0.20 | 0.0°  | 4 |                       |                           |                      |        |
| 501       | 12.00                | 12.00                | 73             | 13.00          | -              | 0.20 | 0.0°  | 4 |                       |                           |                      |        |
| 610       | 16.00                | 16.00                | 82             | 17.00          | -              | 0.20 | 0.0°  | 4 |                       |                           |                      |        |

## Application



## Material

Hardened tool steel  
42 - 48 HRC



| d1 [mm] | z | v <sub>r</sub> [m/min] | f <sub>s</sub> [mm] | a <sub>p</sub> [mm] | a <sub>e</sub> [mm] | n [min <sup>-1</sup> ] | v <sub>r</sub> [mm/min] | Q [cm <sup>3</sup> /min] |
|---------|---|------------------------|---------------------|---------------------|---------------------|------------------------|-------------------------|--------------------------|
| 2.00    | 3 | 90                     | 0.015               | 2.000               | 1.200               | 14325                  | 645                     | 1.5                      |
| 3.00    | 4 | 90                     | 0.025               | 3.000               | 1.800               | 9550                   | 955                     | 5.2                      |
| 4.00    | 4 | 90                     | 0.025               | 4.000               | 2.400               | 7160                   | 715                     | 6.9                      |
| 5.00    | 4 | 90                     | 0.035               | 5.000               | 3.000               | 5730                   | 800                     | 12.0                     |
| 6.00    | 4 | 90                     | 0.040               | 6.000               | 1.500               | 4775                   | 765                     | 6.9                      |
| 8.00    | 4 | 90                     | 0.055               | 8.000               | 4.800               | 3580                   | 790                     | 30.3                     |
| 10.00   | 4 | 90                     | 0.070               | 10.000              | 6.000               | 2865                   | 800                     | 48.1                     |
| 12.00   | 4 | 90                     | 0.085               | 12.000              | 7.200               | 2385                   | 810                     | 70.1                     |
| 16.00   | 4 | 90                     | 0.110               | 16.000              | 4.000               | 1790                   | 790                     | 50.4                     |

Hardened tool steel  
48 - 52 HRC



|       |   |    |       |        |       |       |     |      |
|-------|---|----|-------|--------|-------|-------|-----|------|
| 2.00  | 3 | 70 | 0.010 | 2.000  | 1.200 | 11140 | 335 | 0.8  |
| 3.00  | 4 | 70 | 0.020 | 3.000  | 1.800 | 7425  | 595 | 3.2  |
| 4.00  | 4 | 70 | 0.025 | 4.000  | 2.400 | 5570  | 555 | 5.3  |
| 5.00  | 4 | 70 | 0.030 | 5.000  | 3.000 | 4455  | 535 | 8.0  |
| 6.00  | 4 | 70 | 0.035 | 6.000  | 1.500 | 3715  | 520 | 4.7  |
| 8.00  | 4 | 70 | 0.050 | 8.000  | 4.800 | 2785  | 555 | 21.4 |
| 10.00 | 4 | 70 | 0.060 | 10.000 | 6.000 | 2230  | 535 | 32.1 |
| 12.00 | 4 | 70 | 0.075 | 12.000 | 7.200 | 1855  | 555 | 48.1 |
| 16.00 | 4 | 70 | 0.100 | 16.000 | 4.000 | 1395  | 555 | 35.7 |

Hardened tool steel  
52 - 56 HRC



|       |   |    |       |        |       |      |     |      |
|-------|---|----|-------|--------|-------|------|-----|------|
| 2.00  | 3 | 50 | 0.010 | 2.000  | 1.200 | 7960 | 240 | 0.6  |
| 3.00  | 4 | 50 | 0.015 | 3.000  | 1.800 | 5305 | 320 | 1.7  |
| 4.00  | 4 | 50 | 0.020 | 4.000  | 2.400 | 3980 | 320 | 3.1  |
| 5.00  | 4 | 50 | 0.025 | 5.000  | 3.000 | 3185 | 320 | 4.8  |
| 6.00  | 4 | 50 | 0.030 | 6.000  | 1.500 | 2655 | 320 | 2.9  |
| 8.00  | 4 | 50 | 0.040 | 8.000  | 4.800 | 1990 | 320 | 12.2 |
| 10.00 | 4 | 50 | 0.050 | 10.000 | 6.000 | 1590 | 320 | 19.1 |
| 12.00 | 4 | 50 | 0.060 | 12.000 | 7.200 | 1325 | 320 | 27.5 |
| 16.00 | 4 | 50 | 0.080 | 16.000 | 4.000 | 995  | 320 | 20.4 |

Hardened tool steel  
56 - 60 HRC



|       |   |    |       |        |       |      |     |      |
|-------|---|----|-------|--------|-------|------|-----|------|
| 2.00  | 3 | 25 | 0.005 | 2.000  | 1.200 | 3980 | 60  | 0.1  |
| 3.00  | 4 | 25 | 0.010 | 3.000  | 1.800 | 2655 | 105 | 0.6  |
| 4.00  | 4 | 25 | 0.015 | 4.000  | 2.400 | 1990 | 120 | 1.1  |
| 5.00  | 4 | 25 | 0.020 | 5.000  | 3.000 | 1590 | 125 | 1.9  |
| 6.00  | 4 | 25 | 0.020 | 6.000  | 1.500 | 1325 | 105 | 1.0  |
| 8.00  | 4 | 25 | 0.030 | 8.000  | 4.800 | 995  | 120 | 4.6  |
| 10.00 | 4 | 25 | 0.035 | 10.000 | 6.000 | 795  | 110 | 6.7  |
| 12.00 | 4 | 25 | 0.045 | 12.000 | 7.200 | 665  | 120 | 10.3 |
| 16.00 | 4 | 25 | 0.060 | 16.000 | 4.000 | 495  | 120 | 7.6  |

Hardened tool steel  
42 - 48 HRC



|       |   |    |       |       |        |       |     |      |
|-------|---|----|-------|-------|--------|-------|-----|------|
| 2.00  | 3 | 75 | 0.010 | 1.000 | 2.000  | 11935 | 360 | 0.7  |
| 3.00  | 4 | 75 | 0.015 | 1.500 | 3.000  | 7960  | 475 | 2.1  |
| 4.00  | 4 | 75 | 0.025 | 2.000 | 4.000  | 5970  | 595 | 4.8  |
| 5.00  | 4 | 75 | 0.025 | 2.500 | 5.000  | 4775  | 475 | 6.0  |
| 6.00  | 4 | 75 | 0.035 | 3.000 | 6.000  | 3980  | 555 | 10.0 |
| 8.00  | 4 | 75 | 0.045 | 4.000 | 8.000  | 2985  | 535 | 17.2 |
| 10.00 | 4 | 75 | 0.055 | 5.000 | 10.000 | 2385  | 525 | 26.3 |
| 12.00 | 4 | 75 | 0.070 | 6.000 | 12.000 | 1990  | 555 | 40.1 |
| 16.00 | 4 | 75 | 0.085 | 4.000 | 16.000 | 1490  | 505 | 32.5 |

Hardened tool steel  
48 - 52 HRC



|       |   |    |       |       |        |      |     |      |
|-------|---|----|-------|-------|--------|------|-----|------|
| 2.00  | 3 | 60 | 0.010 | 1.000 | 2.000  | 9550 | 285 | 0.6  |
| 3.00  | 4 | 60 | 0.015 | 1.500 | 3.000  | 6365 | 380 | 1.7  |
| 4.00  | 4 | 60 | 0.020 | 2.000 | 4.000  | 4775 | 380 | 3.1  |
| 5.00  | 4 | 60 | 0.030 | 2.500 | 5.000  | 3820 | 460 | 5.7  |
| 6.00  | 4 | 60 | 0.035 | 3.000 | 6.000  | 3185 | 445 | 8.0  |
| 8.00  | 4 | 60 | 0.045 | 4.000 | 8.000  | 2385 | 430 | 13.8 |
| 10.00 | 4 | 60 | 0.055 | 5.000 | 10.000 | 1910 | 420 | 21.0 |
| 12.00 | 4 | 60 | 0.065 | 6.000 | 12.000 | 1590 | 415 | 29.8 |
| 16.00 | 4 | 60 | 0.090 | 4.000 | 16.000 | 1195 | 430 | 27.5 |

Hardened tool steel  
52 - 56 HRC



|       |   |    |       |       |        |      |     |      |
|-------|---|----|-------|-------|--------|------|-----|------|
| 2.00  | 3 | 40 | 0.010 | 1.000 | 2.000  | 6365 | 190 | 0.4  |
| 3.00  | 4 | 40 | 0.015 | 1.500 | 3.000  | 4245 | 255 | 1.1  |
| 4.00  | 4 | 40 | 0.020 | 2.000 | 4.000  | 3185 | 255 | 2.0  |
| 5.00  | 4 | 40 | 0.020 | 2.500 | 5.000  | 2545 | 205 | 2.5  |
| 6.00  | 4 | 40 | 0.025 | 3.000 | 6.000  | 2120 | 210 | 3.8  |
| 8.00  | 4 | 40 | 0.035 | 4.000 | 8.000  | 1590 | 225 | 7.1  |
| 10.00 | 4 | 40 | 0.045 | 5.000 | 10.000 | 1275 | 230 | 11.5 |
| 12.00 | 4 | 40 | 0.055 | 6.000 | 12.000 | 1060 | 235 | 16.8 |
| 16.00 | 4 | 40 | 0.070 | 4.000 | 16.000 | 795  | 225 | 14.3 |

Hardened tool steel  
56 - 60 HRC



|       |   |    |       |       |        |      |    |     |
|-------|---|----|-------|-------|--------|------|----|-----|
| 2.00  | 3 | 20 | 0.006 | 1.000 | 2.000  | 3185 | 55 | 0.1 |
| 3.00  | 4 | 20 | 0.009 | 1.500 | 3.000  | 2120 | 75 | 0.3 |
| 4.00  | 4 | 20 | 0.013 | 2.000 | 4.000  | 1590 | 85 | 0.7 |
| 5.00  | 4 | 20 | 0.016 | 2.500 | 5.000  | 1275 | 80 | 1.0 |
| 6.00  | 4 | 20 | 0.019 | 3.000 | 6.000  | 1060 | 80 | 1.5 |
| 8.00  | 4 | 20 | 0.025 | 4.000 | 8.000  | 795  | 80 | 2.5 |
| 10.00 | 4 | 20 | 0.031 | 5.000 | 10.000 | 635  | 80 | 3.9 |
| 12.00 | 4 | 20 | 0.038 | 6.000 | 12.000 | 530  | 80 | 5.8 |
| 16.00 | 4 | 20 | 0.050 | 4.000 | 16.000 | 400  | 80 | 5.1 |