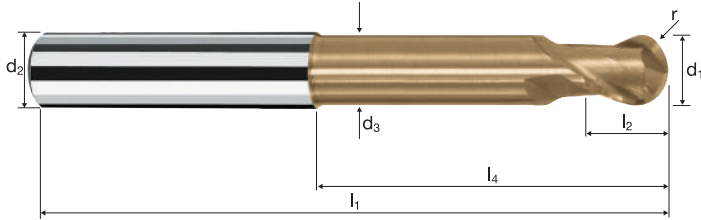
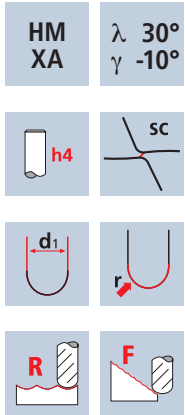


Ball nose end mills SpheroX

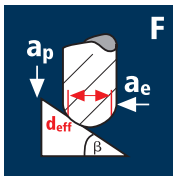
Tolerance $r \pm 0.005$, 4.5xd



| | | | | | | | | | |
|--|--|-----------------|-----------------|--------------|--------------|-------------|--|----------------|------------------|
| | | Rm 1100-1300 | Rm 1300-1500 | HRC 48-56 | HRC 56-60 | HRC > 60 | | Ti Titanium | HSS ToolSteel |
|--|--|-----------------|-----------------|--------------|--------------|-------------|--|----------------|------------------|

| Ø Code | Example: Order-N°. | | | | | | | | | | | DURO-V | |
|------------|---------------------|----------------------|----------------|---------------------------|----------------|----------------|----------------------|-------------|-------|---|--|--------|--------------|
| | d ₁ | d ₂ h4 | d ₃ | l ₁ | l ₂ | l ₃ | l ₄ | r ±0.005 | α | z | | | |
| | Coating V | | | Article-N° 7472 | | | ø-Code 100 | | | | | | V7472 |
| 100 | 1.00 | 6.00 | 0.95 | 61 | 1.50 | 4.50 | 14.58 | 0.500 | 10.0° | 2 | | ● | |
| 140 | 2.00 | 6.00 | 1.90 | 61 | 3.00 | 9.00 | 17.31 | 1.000 | 6.8° | 2 | | ● | |
| 180 | 3.00 | 6.00 | 2.80 | 61 | 4.00 | 13.50 | 20.13 | 1.500 | 4.5° | 2 | | ● | |
| 220 | 4.00 | 6.00 | 3.70 | 66 | 5.00 | 18.00 | 22.95 | 2.000 | 2.7° | 2 | | ● | |
| 260 | 5.00 | 6.00 | 4.60 | 66 | 6.00 | 22.50 | 25.77 | 2.500 | 1.4° | 2 | | ● | |
| 300 | 6.00 | 6.00 | 5.50 | 69 | 7.00 | 30.34 | 31.00 | 3.000 | 0.0° | 2 | | ● | |
| 391 | 8.00 | 8.00 | 7.40 | 80 | 9.00 | 39.29 | 40.00 | 4.000 | 0.0° | 2 | | ● | |
| 450 | 10.00 | 10.00 | 9.20 | 90 | 11.00 | 47.20 | 48.00 | 5.000 | 0.0° | 2 | | ● | |
| 501 | 12.00 | 12.00 | 11.00 | 105 | 13.00 | 54.13 | 55.00 | 6.000 | 0.0° | 2 | | ● | |
| 610 | 16.00 | 16.00 | 15.00 | 125 | 17.00 | 74.13 | 75.00 | 8.000 | 0.0° | 2 | | ● | |

Application



Material

Hardened tool steel
52 - 56 HRC

| d1 [mm] | z | v _c [m/min] | f _s [mm] | a _s [mm] | a _e [mm] | d _{eff} [mm] | n [min ⁻¹] | v _t [mm/min] | β [°] |
|---------|---|------------------------|---------------------|---------------------|---------------------|-----------------------|------------------------|-------------------------|-------|
| 1.00 | 2 | 120 | 0.018 | 0.030 | 0.090 | 0.91 | 41975 | 1510 | 45° |
| 2.00 | 2 | 140 | 0.028 | 0.030 | 0.120 | 1.72 | 25910 | 1450 | 45° |
| 3.00 | 2 | 180 | 0.042 | 0.050 | 0.150 | 2.59 | 22120 | 1860 | 45° |
| 4.00 | 2 | 180 | 0.052 | 0.050 | 0.180 | 3.39 | 16900 | 1760 | 45° |
| 5.00 | 2 | 180 | 0.058 | 0.050 | 0.210 | 4.17 | 13740 | 1595 | 45° |
| 6.00 | 2 | 180 | 0.064 | 0.050 | 0.230 | 4.94 | 11600 | 1485 | 45° |
| 8.00 | 2 | 180 | 0.068 | 0.080 | 0.280 | 6.67 | 8590 | 1170 | 45° |
| 10.00 | 2 | 180 | 0.074 | 0.080 | 0.310 | 8.22 | 6970 | 1030 | 45° |
| 12.00 | 2 | 180 | 0.082 | 0.100 | 0.340 | 9.89 | 5795 | 950 | 45° |

Hardened tool steel
56 - 60 HRC

| | | | | | | | | | |
|-------|---|-----|-------|-------|-------|------|-------|------|-----|
| 1.00 | 2 | 110 | 0.018 | 0.030 | 0.090 | 0.91 | 38475 | 1385 | 45° |
| 2.00 | 2 | 110 | 0.028 | 0.030 | 0.120 | 1.72 | 20355 | 1140 | 45° |
| 3.00 | 2 | 140 | 0.042 | 0.050 | 0.150 | 2.59 | 17205 | 1445 | 45° |
| 4.00 | 2 | 140 | 0.052 | 0.050 | 0.180 | 3.39 | 13145 | 1365 | 45° |
| 5.00 | 2 | 140 | 0.058 | 0.050 | 0.210 | 4.17 | 10685 | 1240 | 45° |
| 6.00 | 2 | 140 | 0.064 | 0.050 | 0.230 | 4.94 | 9020 | 1155 | 45° |
| 8.00 | 2 | 140 | 0.068 | 0.080 | 0.280 | 6.67 | 6680 | 910 | 45° |
| 10.00 | 2 | 140 | 0.074 | 0.080 | 0.310 | 8.22 | 5420 | 800 | 45° |
| 12.00 | 2 | 140 | 0.082 | 0.100 | 0.340 | 9.89 | 4505 | 740 | 45° |

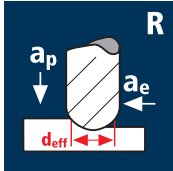
Hardened tool steel
> 60 HRC

| | | | | | | | | | |
|-------|---|----|-------|-------|-------|------|-------|-----|-----|
| 1.00 | 2 | 70 | 0.018 | 0.030 | 0.090 | 0.91 | 24485 | 880 | 45° |
| 2.00 | 2 | 70 | 0.028 | 0.030 | 0.120 | 1.72 | 12955 | 725 | 45° |
| 3.00 | 2 | 90 | 0.042 | 0.050 | 0.150 | 2.59 | 11060 | 930 | 45° |
| 4.00 | 2 | 90 | 0.052 | 0.050 | 0.180 | 3.39 | 8450 | 880 | 45° |
| 5.00 | 2 | 90 | 0.058 | 0.050 | 0.210 | 4.17 | 6870 | 795 | 45° |
| 6.00 | 2 | 90 | 0.064 | 0.050 | 0.230 | 4.94 | 5800 | 740 | 45° |
| 8.00 | 2 | 90 | 0.068 | 0.080 | 0.280 | 6.67 | 4295 | 585 | 45° |
| 10.00 | 2 | 90 | 0.074 | 0.080 | 0.310 | 8.22 | 3485 | 515 | 45° |
| 12.00 | 2 | 90 | 0.082 | 0.100 | 0.340 | 9.89 | 2895 | 475 | 45° |

High speed steel,
hardened
64 - 70 HRC

| | | | | | | | | | |
|-------|---|----|-------|-------|-------|------|-------|-----|-----|
| 1.00 | 2 | 40 | 0.018 | 0.030 | 0.090 | 0.91 | 13990 | 505 | 45° |
| 2.00 | 2 | 40 | 0.028 | 0.030 | 0.120 | 1.72 | 7405 | 415 | 45° |
| 3.00 | 2 | 50 | 0.042 | 0.050 | 0.150 | 2.59 | 6145 | 515 | 45° |
| 4.00 | 2 | 50 | 0.052 | 0.050 | 0.180 | 3.39 | 4695 | 490 | 45° |
| 5.00 | 2 | 50 | 0.058 | 0.050 | 0.210 | 4.17 | 3815 | 445 | 45° |
| 6.00 | 2 | 50 | 0.064 | 0.050 | 0.230 | 4.94 | 3220 | 410 | 45° |
| 8.00 | 2 | 50 | 0.068 | 0.080 | 0.280 | 6.67 | 2385 | 325 | 45° |
| 10.00 | 2 | 50 | 0.074 | 0.080 | 0.310 | 8.22 | 1935 | 285 | 45° |
| 12.00 | 2 | 50 | 0.082 | 0.100 | 0.340 | 9.89 | 1610 | 265 | 45° |

Application



Material

Hardened tool steel
52 - 56 HRC

| d1 [mm] | z | v _c [m/min] | f _s [mm] | a _s [mm] | a _e [mm] | d _{eff} [mm] | n [min ⁻¹] | v _t [mm/min] | Q [mm ³ /min] |
|---------|---|------------------------|---------------------|---------------------|---------------------|-----------------------|------------------------|-------------------------|--------------------------|
| 1.00 | 2 | 100 | 0.028 | 0.180 | 0.200 | 0.77 | 41340 | 2315 | 83.3 |
| 2.00 | 2 | 100 | 0.048 | 0.280 | 0.400 | 1.39 | 22900 | 2200 | 246.2 |
| 3.00 | 2 | 100 | 0.060 | 0.360 | 0.600 | 1.95 | 16325 | 1960 | 423.1 |
| 4.00 | 2 | 100 | 0.072 | 0.480 | 0.800 | 2.60 | 12245 | 1765 | 677.0 |
| 5.00 | 2 | 100 | 0.080 | 0.600 | 1.000 | 3.25 | 9795 | 1565 | 940.2 |
| 6.00 | 2 | 100 | 0.086 | 0.720 | 1.200 | 3.90 | 8160 | 1405 | 1212.9 |
| 8.00 | 2 | 100 | 0.106 | 0.960 | 1.600 | 5.20 | 6120 | 1300 | 1993.3 |
| 10.00 | 2 | 100 | 0.120 | 1.200 | 2.000 | 6.50 | 4895 | 1175 | 2820.7 |
| 12.00 | 2 | 100 | 0.125 | 1.440 | 2.400 | 7.80 | 4080 | 1020 | 3525.9 |

Hardened tool steel
56 - 60 HRC

| | | | | | | | | | |
|-------|---|----|-------|-------|-------|------|-------|-----|--------|
| 1.00 | 2 | 61 | 0.017 | 0.160 | 0.200 | 0.74 | 26240 | 890 | 28.5 |
| 2.00 | 2 | 61 | 0.029 | 0.250 | 0.400 | 1.33 | 14600 | 845 | 84.7 |
| 3.00 | 2 | 61 | 0.036 | 0.320 | 0.600 | 1.86 | 10440 | 750 | 144.3 |
| 4.00 | 2 | 61 | 0.043 | 0.430 | 0.800 | 2.48 | 7830 | 675 | 231.6 |
| 5.00 | 2 | 61 | 0.048 | 0.540 | 1.000 | 3.10 | 6265 | 600 | 324.7 |
| 6.00 | 2 | 61 | 0.052 | 0.650 | 1.200 | 3.72 | 5220 | 545 | 423.4 |
| 8.00 | 2 | 61 | 0.063 | 0.860 | 1.600 | 4.97 | 3905 | 490 | 677.3 |
| 10.00 | 2 | 61 | 0.072 | 1.080 | 2.000 | 6.21 | 3125 | 450 | 972.5 |
| 12.00 | 2 | 61 | 0.075 | 1.300 | 2.400 | 7.45 | 2605 | 390 | 1219.7 |

Hardened tool steel
> 60 HRC

| | | | | | | | | | |
|-------|---|----|-------|-------|-------|------|-------|-----|-------|
| 1.00 | 2 | 46 | 0.014 | 0.130 | 0.200 | 0.66 | 22185 | 620 | 16.2 |
| 2.00 | 2 | 46 | 0.023 | 0.200 | 0.400 | 1.19 | 12305 | 565 | 45.3 |
| 3.00 | 2 | 46 | 0.029 | 0.250 | 0.600 | 1.66 | 8820 | 510 | 76.7 |
| 4.00 | 2 | 46 | 0.035 | 0.340 | 0.800 | 2.22 | 6595 | 460 | 125.6 |
| 5.00 | 2 | 46 | 0.038 | 0.420 | 1.000 | 2.77 | 5285 | 400 | 168.7 |
| 6.00 | 2 | 46 | 0.041 | 0.500 | 1.200 | 3.33 | 4395 | 360 | 216.3 |
| 8.00 | 2 | 46 | 0.051 | 0.670 | 1.600 | 4.44 | 3300 | 335 | 360.6 |
| 10.00 | 2 | 46 | 0.058 | 0.840 | 2.000 | 5.55 | 2640 | 305 | 514.1 |
| 12.00 | 2 | 46 | 0.060 | 1.010 | 2.400 | 6.66 | 2200 | 265 | 639.5 |

High speed steel,
hardened
64 - 70 HRC

| | | | | | | | | | |
|-------|---|----|-------|-------|-------|------|-------|-----|-------|
| 1.00 | 2 | 31 | 0.011 | 0.130 | 0.200 | 0.66 | 14950 | 330 | 8.6 |
| 2.00 | 2 | 31 | 0.018 | 0.200 | 0.400 | 1.19 | 8290 | 300 | 23.9 |
| 3.00 | 2 | 31 | 0.023 | 0.250 | 0.600 | 1.66 | 5945 | 275 | 41.0 |
| 4.00 | 2 | 31 | 0.028 | 0.340 | 0.800 | 2.22 | 4445 | 250 | 67.7 |
| 5.00 | 2 | 31 | 0.031 | 0.420 | 1.000 | 2.77 | 3560 | 220 | 92.8 |
| 6.00 | 2 | 31 | 0.033 | 0.500 | 1.200 | 3.33 | 2965 | 195 | 117.3 |
| 8.00 | 2 | 31 | 0.041 | 0.670 | 1.600 | 4.44 | 2220 | 180 | 195.4 |
| 10.00 | 2 | 31 | 0.046 | 0.840 | 2.000 | 5.55 | 1780 | 165 | 274.8 |
| 12.00 | 2 | 31 | 0.048 | 1.010 | 2.400 | 6.66 | 1480 | 140 | 344.8 |