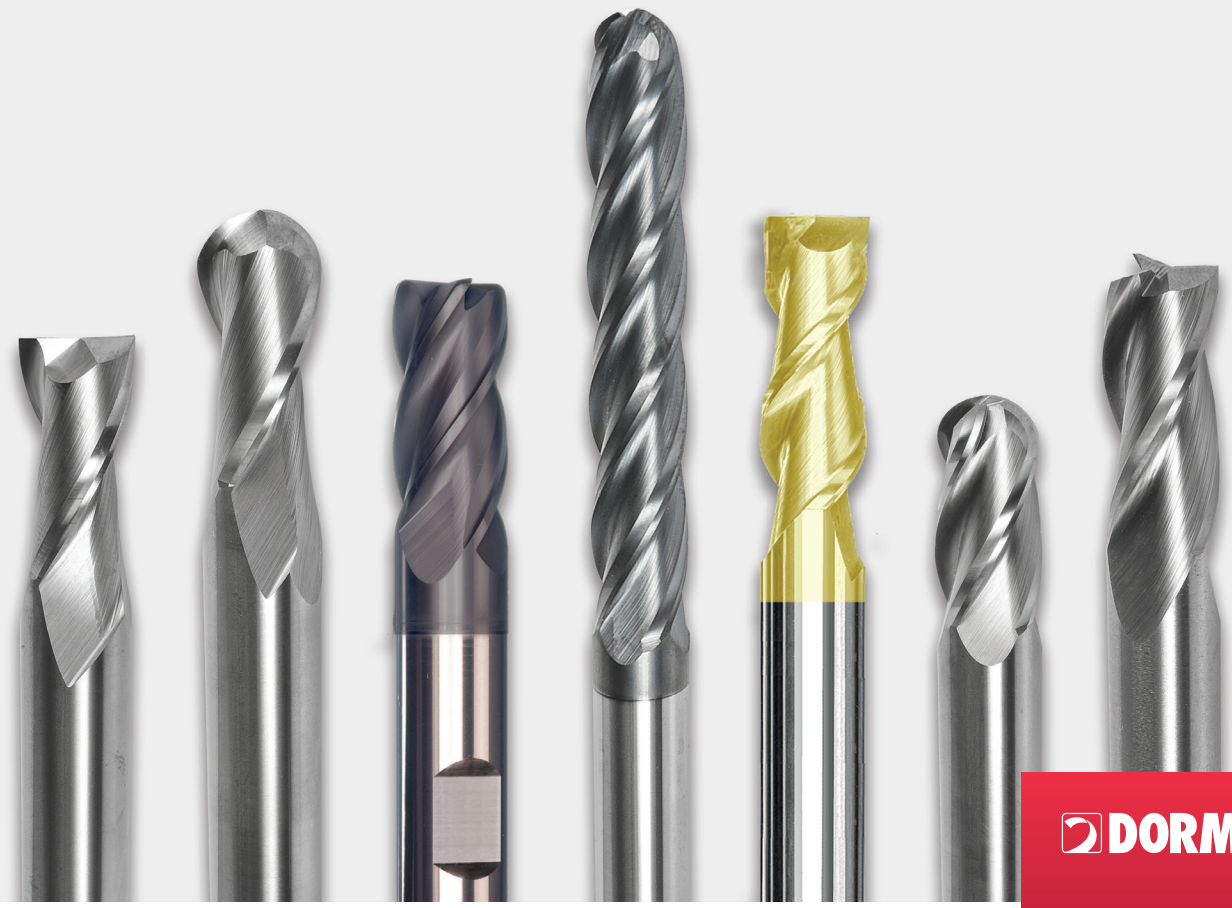
DORMER PRAMET

# END MILL CATALOG

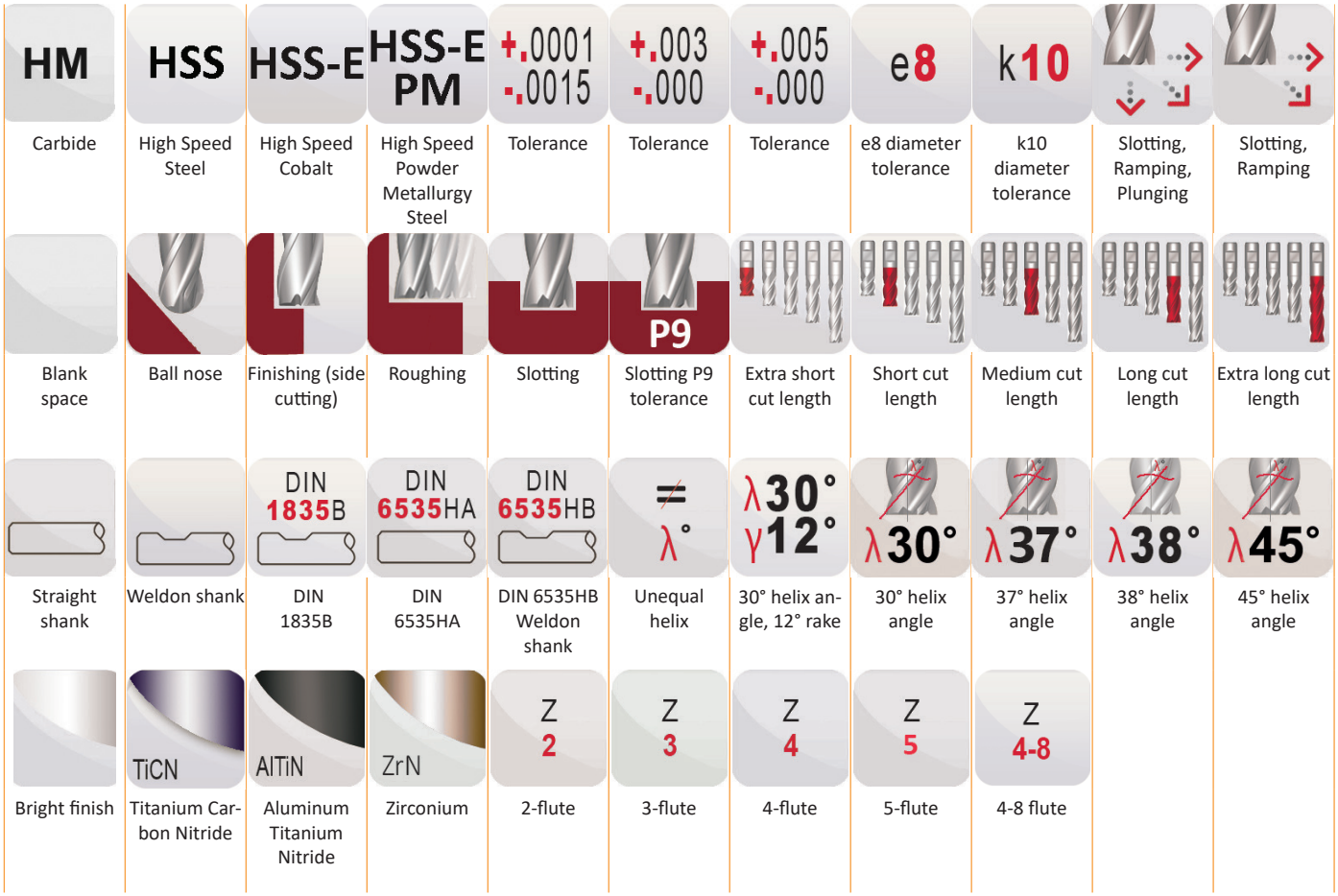


DORMER

# List Number Index - End Mills



# Icon Key




**You may have noticed a change. Although our products are still the same, our style numbers and eCodes are different. To help you find the end mill you are currently using, an EDP number conversion chart can be found on page 60.**

# SOLID CARBIDE END MILLS

## INTRODUCTION

Dormer Pramet's new range of Solid Carbide End Mills represent a new direction in our branding of end mill products all under the Dormer brand name. These solid carbide end mills are suited for the most common milling operations such as slotting, plunging, side and face milling, as well as ramping and copy milling in a wide range of materials.

## FEATURES AND BENEFITS

- Consistent performance and repeatability in multiple material applications across a diverse array of machines and conditions.
- This solid carbide end mill family offers ranges of uncoated and coated end mills with options for square end, ball nosed, and radius corners as well as various length options.
- The designs of these products enable them to deliver high quality and performance at an exceptional value. Some styles are specifically designed as material or application specific products. See AMG tables for running parameters in the different materials.

## TOOL MATERIAL

Premium micrograin carbide provides an excellent combination of hardness and toughness, resulting in high wear resistance and long consistent tool life.

## COATINGS

- A Zirconium Nitride (ZrN) coating on some products offer improved performance in milling aluminum (including high silica aluminum).
- Multi-layer Aluminum Titanium Nitride (AlTiN) coating on some products offer improved cutting edge stability, outstanding wear protection, higher hot hardness and increased tool life.

## GEOMETRY

- New 2-flute aluminum cutters introduced offer excellent performance in aluminum, aluminum alloys and other non-ferrous materials. This geometry when coupled with the ZrN coating promotes excellent chip evacuation, improves material removal rates and improves surface finishes.
- New variable helix design cutters introduced with radius corners offer increased stability and lower harmonics during the milling process. This reduces the possibility of vibrations and lowers the risk of chipping at the cutting edges or corners. Increased stability also allows these cutters to be used in a wide variety of materials and applications where conventional type cutters do not perform as well.

## SHANKS

High precision (h6) shanks are offered as standard on most cutters. Cylindrical shanks are made to DIN 6535 HA but on some of the variable helix designs a Weldon shank design is used. These are made to DIN 6535 HB.

# HSS, HSS-E & HSS-E-PM END MILLS

## INTRODUCTION

Dormer Pramet's new range of High Speed Steel End Mills represent a new direction in our branding of end mill products all under the Dormer name. These end mills are suited for most general milling operations such as slotting, plunging, side and face milling, as well as ramping and copy milling depending on the style selected.

## FEATURES AND BENEFITS

- Consistent performance and repeatability in multiple material applications across a diverse array of machines and adverse conditions.
- The designs of these products enable them to deliver good quality and performance at an exceptional value.
- This HSS end mill family offers ranges and length options of mostly uncoated end mills with options for square end and ball nosed end, as well as scalloped fine & roughing profile cutters.

## TOOL MATERIAL

Manufactured from premium grades of HSS, HSS-E and HSS-E-PM materials.

- HSS tools will flex slightly under pressure and absorb more shock which can be advantageous when rigidity or tool holding is not optimal and vibrations are present.

- HSS-E (HSCo) tool substrate is harder and more wear resistant but will not withstand the shock and vibrations that HSS substrates will absorb which can cause chipping or tool breakage if conditions are not stable.

- HSS-E-PM tools are produced with powder metallurgy technology. These substrates have a finer grain structure resulting in a material with superior edge strength and toughness but similar to HSCo a rigid set-up and good tool holding is important to avoid excess shock and vibrations that can cause cutting edges to chip or fracture.

## SHANKS

All cutters in this range are offered with standard Weldon shanks. Weldon type holders are typically used for most HSS cutters but higher quality tool holding with HSS-E or HSS-E-PM cutters can provide better results.

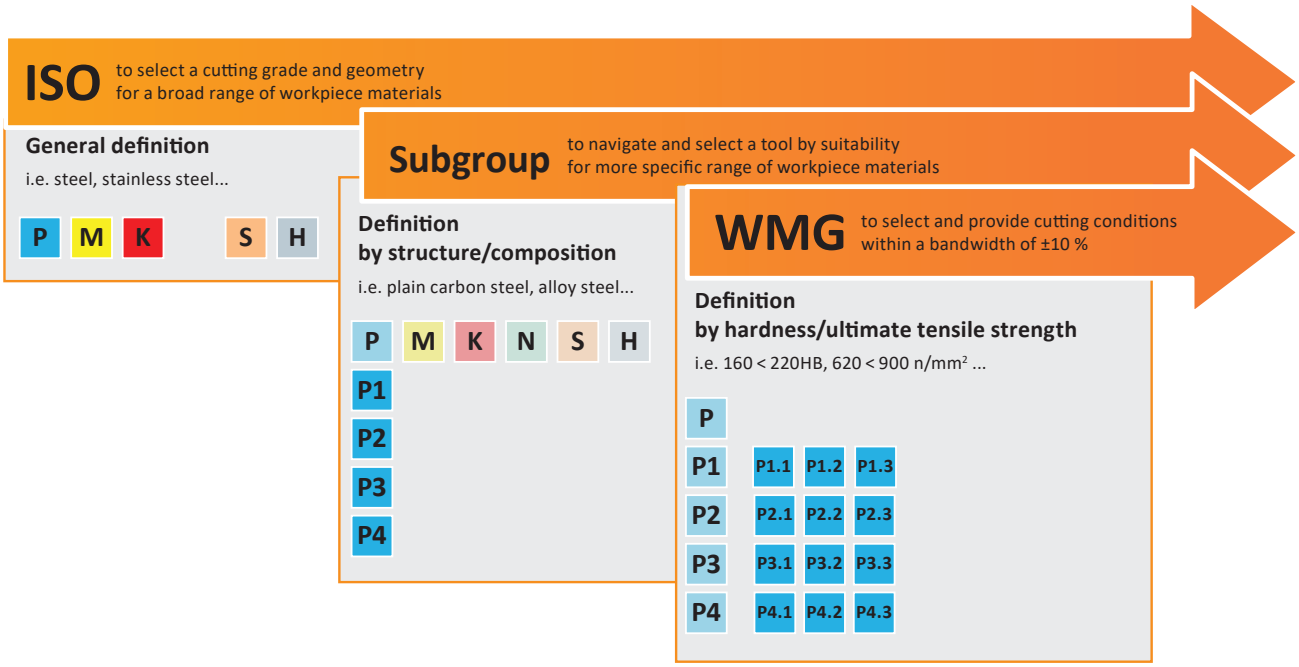
## GEOMETRY

- 2-flute, 3-flute, 4-flute and multi-flute end mills are offered in various tool substrates.
- Most end mills in this range have a 30° helix angle for general purpose milling in a wide variety of materials.
- Some styles have a higher 38° Helix to facilitate chip flow when milling aluminum and other non-ferrous materials.
- Various lengths are available to offer longer than standard cut-lengths for milling deeper pockets.
- P9 slotting tolerance end mills are offered in 2-flute and 3-flute options. HSS-E scalloped roughing cutters are available in coarse and fine profile styles to allow for maximum metal removal in a single pass.

## COATINGS

- Most HSS, HSS-E & HSS-E-PM end mills in this range are offered as uncoated products.
- Some of our scalloped roughing coarse and fine profile cutters are also offered as coated products.
- The Titanium Carbon Nitride (TiCN) coating on these products will lower the coefficient of friction and improve wear resistance which allows for better chip flow and longer tool life.

# WORKPIECE MATERIAL GROUPS (WMG)




## ABOUT DORMER PRAMET'S WORKPIECE MATERIAL CLASSIFICATION

Workpiece material groups ("WMG") are used to support easy and reliable selection of the right cutting tool and starting values for machining conditions in particular applications.

Dormer Pramet classifies workpiece materials into six different colored groups;

- **Blue**: Steel and cast steel (P-group)
- **Yellow**: Stainless steel (M-group)
- **Red**: Cast iron (K-group)
- **Green**: Non-ferrous metals (N-group)
- **Orange**: High-temperature alloys (S-group)
- **Grey**: Hardened materials (H-group)

Each of these are divided into subgroups based on their structure and/or composition. For example, P-group steel and cast steel is split into four subgroups, namely;

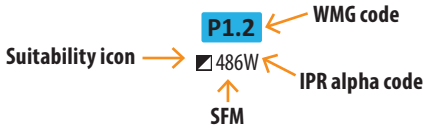
- P1 – **Free machining steel**
- P2 – **Plain carbon steel**
- P3 – **Alloy steel**
- P4 – **Tool steel**

A final division includes material properties, such as hardness and ultimate tensile strength. This is to provide our customers with a complete tool recommendation, including starting values for cutting speed and feed.

The table on the next page includes a description of each workpiece material group, as well as examples of commonly used designations.

## HOW TO USE THE WMG CHART

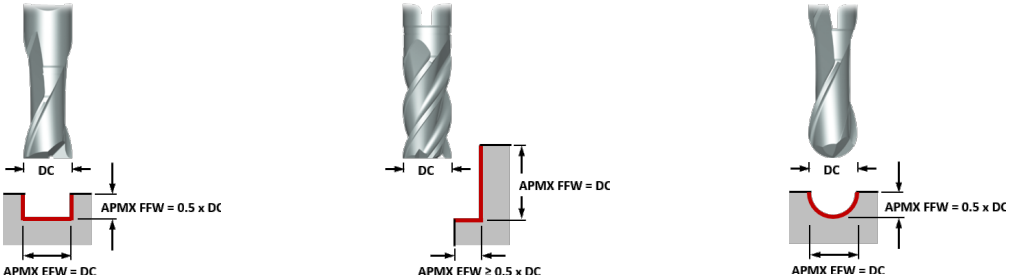
**To find speeds and feeds:**




- Select the product you want in our catalog or brochure
- Find the appropriate ISO work material group (WMG) at the top of the page
  - This will let you know if the tool is suitable for your operation and provides the speed (SFM) and alpha character for feed rate (IPR)
- Use the corresponding alpha character to find your cutting feed rate (IPR) in the chart provided in the WMG section of the catalog or brochure (usually near the front of the publication)

| ISO | | WMG (Workpiece Material Groups) | | | Hardness HB or HRC | Ultimate tensile strength Mpa | Examples of material (AISI-SAE, ASTM, UNS) | Old Dormer AMG | Old Pramet ISO |
|---|---|---|---|---|---|---|---|---|---|
| P | P1 | P1.1 | Free machining steel | sulfurized | < 240 HB | ≤ 760 | 1108, 1109,1113, 1117, 1118, 1132, 1137, 1139, 1140, 1141… | 1.1 | P1 |
| | | P1.2 | (carbon steels with increased machinability) | sulfurized and phosphorized | < 180 HB | ≤ 620 | 1211, 1212, 1213, 1215… | 1.1 | P1 |
| | | P1.3 | | sulfurized/phosphorized and leaded | < 180 HB | ≤ 550 | 12L13, 12L14, 12L15… | 1.1 | P1 |
| | P2 | P2.1 | Plain carbon steel | containing <0.25%C | < 180 HB | ≤ 620 | 1005, 1006, 1008, 1012, 1013, 1513, 1015, 1020, 1022, 1025, 1024, 1025 | 1.2 | P2 |
| | | P2.2 | (steels comprised of mainly iron and carbon) | containing <0.55%C | < 240 HB | ≤ 830 | 1026, 1526, 1030, 1035, 1536, 1040, 1541, 1042, 1045, 1548, 1050, 1055 | 1.3 | P2 |
| | | P2.3 | | containing >0.55%C | < 300 HB | ≤ 1030 | 1059, 1060, 1561, 1064, 1565, 1065, 1070, 1074, 1078, 1080, 1086, 1090 | 1.5 | P3 |
| | P3 | P3.1 | Alloy steel | annealed | < 180 HB | ≤ 620 | 1330 -1345…A2317, A2515…3140…4023 - 4047…4118, 4130 - 4137, 4140 - 4147, 4150, 4161... 4320, 4340... 4419, 4422, 4427… 4615 - 4626… 4718, 4720… 4815 - 4820… E50100 | 1.4 | P3 |
| | | P3.2 | (carbon steels with an alloying content ≤ 10%) | hardened and tempered | 180 - 260 HB | > 620 ≤ 900 | | 1.4 | P3 |
| | | P3.3 | | | 260 - 360 HB | > 900 ≤ 1240 | | 1.5 | P4 |
| | P4 | P4.1 | Tool steel | annealed | < 26 HRC | ≤ 900 | A-2, D4, F-1, H-13, P-2… | 1.4 | P3 |
| | | P4.2 | (special alloy steel for tools, dies and molds) | hardened and tempered | 26 - 39 HRC | > 900 ≤ 1240 | 1.1520, 1.1645, 1.2008, 1.2319, 1.2378… | 1.5 | P4 |
| | | P4.3 | | | 39 - 45 HRC | > 1250 ≤ 1450 | 100CrMo5, 38CrCoWV18-17-17, 40CrMoS4, X40CrMoV5-1 | 1.6 | H1 |
| M | M1 | M1.1 | Ferritic stainless steel | | < 160 HB | ≤ 520 | 405, 409, 429, 430, 430F, 434, 436, 439, 441, 442, 443, 444, 446 | 2.1 | M1 |
| | | M1.2 | (straight chromium non-hardenable alloys) | | 160 - 220 HB | > 520 ≤ 700 | 1.4516, 1.4002, 1.4589, 1.4595, 1.4017, 1.4590, 1.4749, 1.4713, 1.4724 | 2.1 | M1 |
| | M2 | M2.1 | Martensitic stainless steel | annealed | < 200 HB | ≤ 670 | 403, 410, 420, 422, 455, 490 1.4000, 1.4021, 1.4024, 1.4028, 1.4031, 1.4034, 1.4110, 1.4122,1.4313,1.4418,1.4419, 1.4422, 1.4423, 1.4592, 1.4762 | 2.3 | M2 |
| | | M2.2 | (straight chromium hardenable alloys) | quenched and tempered | 200 - 280 HB | > 670 ≤ 950 | | 2.3 | M2 |
| | | M2.3 | | precipitation-hardened | 280 - 380 HB | > 950 ≤ 1300 | | 2.4 | M2 |
| | M3 | M3.1 | Austenitic stainless steel | | < 200 HB | ≤ 750 | 201, 202, 204, 205, 301, 3012, 303, 304, 305, 308, 316, 317, 321, 347 | 2.2 | M3 |
| | | M3.2 | (chromium-nickel and chromium-nickel-manganese alloys) | | 200 - 260 HB | >750 ≤ 870 | 201L, 301L, 303Se, 304H, 304L, 304LN, 309Cb, 316Ti, 317LMN, 347H | 2.2 | M3 |
| | | M3.3 | | | 260 - 300 HB | > 870 ≤ 1040 | 1.4308, 1.4301, 1.4305, 1.4311, 1.4552, 1.4401, 1.4571, 1.4878, 1.4961 | 2.2 | M3 |
| | M4 | M4.1 | Austenitic-ferritic **(DUPLEX)** or super-austenitic stainless steel | | < 300 HB | ≤ 990 | 310MoLN, 314, 904L, 330, S32304, 1.4362, 1.4462, 1.4854.1.4529 | 2.3 | M4 |
| | | M4.2 | Precipitation hardening austenitic stainless steel | | 300 - 380 HB | ≤ 1320 | 630, 632, 635, PH13-8Mo, 15-5PH, PH15-7Mo, S15500, S17400 | 2.4 | M4 |
| K | K1 | K1.1 | Gray iron **(ASTM A48)** or | ferritic or ferritic-pearlitic | < 180 HB | ≤ 190 | GG10, GG15, G1800, ASTM Grades 20 and 25 | 3.1 | K1 |
| | | K1.2 | Automotive Gray iron **(ASTM A159)** | ferritic-pearlictic or pearlitic | 180 - 240 HB | > 190 ≤ 310 | GG20, GG25, G2500, G3000, A48 Class 25 and 30 | 3.2 | K1 |
| | | K1.3 | (iron-carbon castings with a lamellar graphite microstructure) | pearlitic | 240 - 280 HB | >310 ≤ 390 | GG30, GG35, G3500, G4000, A48 Class 50 | 3.2 | K1 |
| | K2 | K2.1 | Malleable iron **(ASTM A602)** | ferritic | < 160 HB | ≤ 400 | GTS-35-10, GTW-35-04, GTW-S-38-12, GTW-40-05, A47 grade 22010 | 3.3 | K2 |
| | | K2.2 | (iron-carbon castings with a graphite-free microstructure) | ferritic or pearlitic | 160 - 200 HB | > 400 ≤ 550 | GTS-45-06, GTW45-07 | 3.3 | K2 |
| | | K2.3 | | pearlitic | 200 - 240 HB | > 550 ≤ 660 | GTS55-04, GTS-65-02, GTS-70-02, 5.4204, KTB 550-04 | 3.4 | K2 |
| | K3 | K3.1 | Ductile iron **(ASTM A536)** | ferritic | < 180 HB | ≤ 560 | GGG-35,3, GGG-40, GGG-50, A439 types D-2C and D-3A | 3.3 | K3 |
| | | K3.2 | (iron-carbon castings with a nodular graphite | ferritic or pearlitic | 180 - 220 HB | > 560 ≤ 680 | GGG-60, GGG-70, A476, SA-476 | 3.3 | K4 |
| | | K3.3 | microsturcture) | pearlitic | 220 - 260 HB | > 680 ≤ 800 | GGG-80, A897 grade 1050/700/7, AD 1600, F34800 | 3.4 | K4 |
| | K4 | K4.1 | Austenitic gray iron **(ASTM A436)** | | < 180 HB | ≤ 610 | GGG & GGL-NiMn 13 7, GGG & GGL-NiCr 20 3, 0.6652, 0.7652 | | |
| | | K4.2 | Austenitic ductile iron **(ASTM A439 or ASTM A571)** | | < 240 HB | > 610 ≤ 840 | GGL-NiSiCr 30 5 5, GGG-NiSiCCr 30 5 5, 0.6680, 0.7680 | | |
| | | K4.3 | Austempered ductile iron **(ASTM A897)** | | < 280 HB | > 840 ≤ 980 | A897 GRADE 1, A897 GRADE 2, A897 GRADE 3… | | |
| | | K4.4 | (iron-carbon alloy castings with an ausferrite | | 280 - 320 HB | > 980 ≤ 1130 | EN-GJS-800-8, EN-GJS-800-10, EN-GJS-900-8, EN-GJS-1050-6, EN-GJS-1200-3 | | |
| | | K4.5 | microstructure) | | 320 - 360 HB | > 1130 ≤ 1280 | | | |
| | K5 | K5.1 | Compacted graphite iron CGI **(ASTM A842)** | ferritic | < 180 HB | | A842-300, 5.2100, 5.2200, EN-GJV-300, EN-GJV-350 | | |
| | | K5.2 | (iron-carbon castings with a vermicular graphite structure) | ferritic or pearlitic | 180 - 220 HB | | A842-300, 5.2100, EN-GJV-300, EN-GJV-350, -400, -450 | | |
| | | K5.3 | | pearlitic | 220 - 260 HB | | EN-GJV-400, EN-GJV-450, EN-GJV-500 | | |
| N | N1 | N1.1 | Commercially pure wrought aluminum | | < 60 HB | ≤ 240 | Al99.8, Al99.0Cu, AA1050, AA1100, AA1175, 3.0255, 3.0275, 3.0205 | 7.1 | N1 |
| | | N1.2 | Wrought aluminum alloys | half hard tempered | 60 - 100 HB | > 240 ≤ 400 | AlCu4MgSi, AlMn1Mg1, AA2017, AA3003, AA4043, 3.1325, 3.1355 | 7.1 | N1 |
| | | N1.3 | | full hard tempered | 100 - 150 HB | > 400 ≤ 590 | AlMg1SiPb, AlZn6CuMgZn, AlZn5.5MgCu, AA6262, AA7050, 3.0517 | 7.2 | N2 |
| | N2 | N2.1 | Cast aluminum alloys | | < 75 HB | ≤ 240 | G-AlCu4S, GAlSI5Cu1Mg, G-AlSi7Mg, A295.0, A355.0, LM11, LM21, LM25 | 7.3 | N1 |
| | | N2.2 | | | 75 - 90 HB | > 240 ≤ 270 | G-AlSi5Cu1Mg, G-AlSi7Mg, A242.0, A319.0, LM14, LM4, LM16 | 7.3 | N1 |
| | | N2.3 | | | 90 - 140 HB | > 270 ≤ 440 | G-AlCu4MgTi, G-AlCu4Ni2Mg2, A204.0, A771.0, LM30, LM24, ELT-204 | 7.3 | N2 |
| | N3 | N3.1 | Free-cutting copper-alloys materials with excellent machining properties | | | | CuPb1P, CuSP, CuZn39Pb3, 2.1498, 2.1546, 2.0780, C18700, C79800, C34200 | 6.3 | N3 |
| | | N3.2 | Short-chip copper-alloys with good to moderate machining properties | | | | CuNi3Si, CuZn40, CuZn40Al2, 2.0857, 2.0360, 2.0550, CZ109, CZ135, C28000 | 6.2 | N3 |
| | | N3.3 | Electrolytic copper and long-chip copper-alloys with moderate to poor machining properties | | | | Cu-OFE, SF-Cu, CuNi2Be, 2.0070, 2.0090, 2.0855, C103, C10100,C12200 | 6.1 | N4 |
| | N4 | N4.1 | Thermoplastic polymers | | | | Polyolefine, PE, PP, Styrol, PS, SAN, ABS, PMMA, Acryl, PC | 8.1 | |
| | | N4.2 | Thermosetting polymers | | | | Aramid, Epoxy, Fluoropolymer, Melamine, Mehacrylate, Phenolic, Polyester | 8.2 | |
| | | N4.3 | Reinforced polymers or composites | | | | GFK, CFK, GMT, LFT, SMC, Kevlar, Honeycomb, Organo | 8.3 | |
| | N5 | N5.1 | Graphite | | | | Extruded, Compression Molded and Isostatically Pressed | 10.1 | |
| S | S1 | S1.1 | Titanium or titanium alloys | | < 200 HB | ≤ 660 | R50250, 3.7025, T35, 2TA1, R50400, 3.7035, 2TA2, | 4.1 | S1 |
| | | S1.2 | | | 200 - 280 HB | > 660 ≤ 950 | TA6V, Ti-6Al-4V, Ti 10.2.3, Ti5553 | 4.2 | S1 |
| | | S1.3 | | | 280 - 360 HB | > 950 ≤ 1200 | | 4.3 | S1 |
| | S2 | S2.1 | Fe-based high-temperature alloys | | < 200 HB | ≤ 690 | A-286, Discaloy, Haynes 556, Iconel 909, Greek Ascolloy | | S2 |
| | | S2.2 | | | 200 - 280 HB | > 690 ≤ 970 | | | S2 |
| | S3 | S3.1 | Ni-based high-temperature alloys | | < 280 HB | ≤ 940 | Inconel 718, 706 Waspalloy, Udimet 720, Inconel 625 | 5.2 | S3 |
| | | S3.2 | | | 280 - 360 HB | > 940 ≤ 1200 | | 5.3 | S3 |
| | S4 | S4.1 | Co-based high-temperature alloys | | < 240 HB | ≤ 800 | Haynes 25, Stellite 21, 31 | | S4 |
| | | S4.2 | | | 240 - 320 HB | > 800 ≤ 1070 | | | S4 |
| H | H1 | H1.1 | Chilled cast iron | | < 440 HB | | GHK-CrNi 350, GHK-470, GHK-475 | | |
| | H2 | H2.1 | Hardened cast iron | | < 55 HRC | | GHK-500, GHK-530, EN-GJN-HV550, EN-GJN-HV600, EN-GJN-HV600(XCr11), | | H2 |
| | | H2.2 | | | > 55 HRC | | EN-GJN-HV600(XCr14), EN-GJN-NH600(XCr18) | | H2 |
| | H3 | H3.1 | Hardened steel <55HRC | | < 51 HRC | | 1026, 1526… 1059, 1060… 1090, 1330… A2317, A2515… 3140… 4023… 4118, 4130…E50100… 50B40, 50B44… 5120, 5130… A-2, D-4, F-1, H-13, P-2… 1.1520, 1.2319, 1.2378… 100CrMo5, 38CrCoWV18 17-17, 40CRMoS4, X40CrMoVS-1… | 1.7 | H3 |
| | | H3.2 | | | 51 - 55 HRC | | | 1.7 | H3 |
| | H4 | H4.1 | Hardened steel >55HRC | | 55 - 59 HRC | | | 1.8 | H4 |
| | | H4.2 | | | > 59 HRC | | | 1.8 | H4 |

# FEED TABLES AND CORRECTION FACTORS (WMG)




## HSS Milling Feed (IPT) with ≥ 50% radial immersion

| Ø DC (decimal) | Ø DC (mm) | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0394 | 1.00 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0004 | 0.0005 | 0.0006 |
| 0.0787 | 2.00 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0003 | 0.0004 | 0.0005 | 0.0006 | 0.0007 |
| 0.1181 | 3.00 | 0.0001 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0005 | 0.0006 | 0.0007 | 0.0008 |
| 0.1575 | 4.00 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0004 | 0.0005 | 0.0006 | 0.0007 | 0.0009 | 0.0011 |
| 0.1969 | 5.00 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0005 | 0.0006 | 0.0007 | 0.0008 | 0.0010 | 0.0012 |
| 0.2362 | 6.00 | 0.0002 | 0.0003 | 0.0003 | 0.0004 | 0.0005 | 0.0006 | 0.0007 | 0.0009 | 0.0011 | 0.0013 |
| 0.3150 | 8.00 | 0.0003 | 0.0004 | 0.0004 | 0.0006 | 0.0007 | 0.0008 | 0.0009 | 0.0011 | 0.0014 | 0.0017 |
| 0.3937 | 10.00 | 0.0004 | 0.0005 | 0.0006 | 0.0007 | 0.0009 | 0.0011 | 0.0013 | 0.0016 | 0.0019 | 0.0022 |
| 0.4724 | 12.00 | 0.0004 | 0.0006 | 0.0007 | 0.0009 | 0.0011 | 0.0013 | 0.0015 | 0.0019 | 0.0022 | 0.0026 |
| 0.5512 | 14.00 | 0.0005 | 0.0006 | 0.0008 | 0.0010 | 0.0013 | 0.0015 | 0.0018 | 0.0022 | 0.0026 | 0.0031 |
| 0.6299 | 16.00 | 0.0006 | 0.0007 | 0.0009 | 0.0011 | 0.0014 | 0.0017 | 0.0020 | 0.0024 | 0.0030 | 0.0035 |
| 0.7087 | 18.00 | 0.0007 | 0.0009 | 0.0011 | 0.0013 | 0.0017 | 0.0020 | 0.0024 | 0.0029 | 0.0034 | 0.0041 |
| 0.7874 | 20.00 | 0.0007 | 0.0009 | 0.0011 | 0.0014 | 0.0018 | 0.0021 | 0.0026 | 0.0031 | 0.0037 | 0.0044 |
| 0.8661 | 22.00 | 0.0008 | 0.0010 | 0.0013 | 0.0016 | 0.0020 | 0.0024 | 0.0029 | 0.0035 | 0.0042 | 0.0050 |
| 0.9843 | 25.00 | 0.0009 | 0.0011 | 0.0014 | 0.0018 | 0.0022 | 0.0026 | 0.0032 | 0.0038 | 0.0046 | 0.0055 |
| 1.1024 | 28.00 | 0.0011 | 0.0013 | 0.0017 | 0.0020 | 0.0026 | 0.0031 | 0.0037 | 0.0044 | 0.0053 | 0.0064 |
| 1.2598 | 32.00 | 0.0012 | 0.0015 | 0.0019 | 0.0023 | 0.0029 | 0.0035 | 0.0042 | 0.0050 | 0.0060 | 0.0072 |
| 1.4173 | 36.00 | 0.0013 | 0.0016 | 0.0020 | 0.0025 | 0.0031 | 0.0038 | 0.0045 | 0.0054 | 0.0065 | 0.0078 |
| 1.5748 | 40.00 | 0.0013 | 0.0017 | 0.0021 | 0.0026 | 0.0033 | 0.0040 | 0.0048 | 0.0057 | 0.0069 | 0.0082 |
| 2.4803 | 63.00 | 0.0017 | 0.0021 | 0.0026 | 0.0033 | 0.0041 | 0.0050 | 0.0059 | 0.0071 | 0.0086 | 0.0103 |
| 3.1496 | 80.00 | 0.0018 | 0.0022 | 0.0028 | 0.0035 | 0.0044 | 0.0052 | 0.0063 | 0.0076 | 0.0091 | 0.0109 |
| 3.9370 | 100.00 | 0.0017 | 0.0020 | 0.0026 | 0.0032 | 0.0040 | 0.0048 | 0.0058 | 0.0069 | 0.0083 | 0.0100 |

NOTE: ONLY If plunging into solid material with a center cutting end mill the values in the chart should be considered as “IPR“

### How To Use This Chart to Find Cutting Feed Rate (IPT):

1. Find your Alpha Code on the product page (example: 279U, “U“ is the Alpha Code).
2. Find the closest diameter for your cutting application on the left side of the chart.
3. Find your Alpha Code in the top row of the chart.
4. The intersection (cell) of the Diameter and Alpha Code is the feed rate in inches per tooth (IPT)

## HM Milling Feed (IPT) with ≥ 50% radial immersion

| Ø DC (decimal) | Ø DC (mm) | A | B | C | D | E | F | G | I | J | K | N | O | P | R | S |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0.0394 | 1.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0006 | 0.0007 | 0.0009 |
| 0.0787 | 2.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 | 0.0002 | 0.0004 | 0.0005 | 0.0006 | 0.0008 | 0.0011 | 0.0015 | 0.0019 |
| 0.1181 | 3.00 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0006 | 0.0007 | 0.0010 | 0.0013 | 0.0018 | 0.0024 | 0.0031 |
| 0.1575 | 4.00 | 0.0002 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0006 | 0.0007 | 0.0010 | 0.0014 | 0.0019 | 0.0024 | 0.0033 | 0.0043 | 0.0058 |
| 0.1969 | 5.00 | 0.0002 | 0.0002 | 0.0002 | 0.0003 | 0.0004 | 0.0005 | 0.0007 | 0.0009 | 0.0013 | 0.0017 | 0.0023 | 0.0031 | 0.0041 | 0.0054 | 0.0072 |
| 0.2362 | 6.00 | 0.0003 | 0.0003 | 0.0003 | 0.0003 | 0.0005 | 0.0006 | 0.0009 | 0.0012 | 0.0016 | 0.0021 | 0.0028 | 0.0038 | 0.0050 | 0.0067 | 0.0089 |
| 0.3150 | 8.00 | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0006 | 0.0007 | 0.0010 | 0.0014 | 0.0019 | 0.0025 | 0.0034 | 0.0045 | 0.0060 | 0.0080 | 0.0106 |
| 0.3937 | 10.00 | 0.0004 | 0.0004 | 0.0004 | 0.0005 | 0.0006 | 0.0009 | 0.0012 | 0.0017 | 0.0022 | 0.0030 | 0.0040 | 0.0053 | 0.0071 | 0.0094 | 0.0125 |
| 0.4724 | 12.00 | 0.0006 | 0.0006 | 0.0006 | 0.0006 | 0.0007 | 0.0010 | 0.0014 | 0.0019 | 0.0026 | 0.0035 | 0.0046 | 0.0061 | 0.0081 | 0.0109 | 0.0144 |
| 0.5512 | 14.00 | 0.0006 | 0.0006 | 0.0006 | 0.0006 | 0.0008 | 0.0011 | 0.0016 | 0.0021 | 0.0029 | 0.0039 | 0.0052 | 0.0069 | 0.0091 | 0.0121 | 0.0161 |
| 0.6299 | 16.00 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0009 | 0.0013 | 0.0017 | 0.0024 | 0.0033 | 0.0043 | 0.0057 | 0.0077 | 0.0102 | 0.0136 | 0.0181 |
| 0.7087 | 18.00 | 0.0007 | 0.0007 | 0.0007 | 0.0007 | 0.0010 | 0.0014 | 0.0019 | 0.0026 | 0.0035 | 0.0047 | 0.0063 | 0.0084 | 0.0111 | 0.0148 | 0.0198 |
| 0.7874 | 20.00 | 0.0008 | 0.0008 | 0.0008 | 0.0008 | 0.0011 | 0.0015 | 0.0021 | 0.0029 | 0.0039 | 0.0052 | 0.0069 | 0.0092 | 0.0122 | 0.0163 | 0.0217 |
| 0.8661 | 22.00 | 0.0010 | 0.0010 | 0.0010 | 0.0010 | 0.0012 | 0.0017 | 0.0022 | 0.0031 | 0.0042 | 0.0056 | 0.0074 | 0.0099 | 0.0132 | 0.0176 | 0.0233 |
| 0.9843 | 25.00 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.0013 | 0.0019 | 0.0025 | 0.0035 | 0.0047 | 0.0063 | 0.0083 | 0.0111 | 0.0148 | 0.0197 | 0.0263 |

NOTE: Only if plunging into solid material with a center cutting end mill the values in the chart should be considered as “IPR“

## Correction Factors for < 50% Radial Immersion

### Shoulder Milling

Correction factors for cutting speed $V_c$ for square shoulder milling with <50% radial immersion

| APMX EFW / DC | 5% | 10% | 15% | 20% | 25% | 30% | 40% | ≥ 50% |
|---|---|---|---|---|---|---|---|---|
| X.V | 1.48 | 1.35 | 1.27 | 1.22 | 1.19 | 1.16 | 1.11 | 1.00 |

Correction factors for feed per tooth $f_z$ when milling with <50% radial immersion

| APMX FFW / DC | 5% | 10% | 15% | 20% | 25% | 30% | 40% | ≥ 50% |
|---|---|---|---|---|---|---|---|---|
| X.f | 2.29 | 1.67 | 1.40 | 1.25 | 1.15 | 1.09 | 1.02 | 1.00 |

### Slot Milling

Correction factors for feed per tooth $f_z$ for slot milling operations at different depths of cut

| APMX EFW / DC | 25% | 50% | 100% | 150% |
|---|---|---|---|---|
| X.V | 1.25 | 1.00 | 0.75 | 00.50 |

| APMX FFW / DC | 25% | 50% | 100% | 150% |
|---|---|---|---|---|
| X.f | 1.25 | 1.00 | 0.75 | 0.50 |

# Visual Index - End Mills

| | S106 | S206 | S207 | S116 | S108 | S208 | S109 | S110 | S111 | S211 | S112 | S212 | S113 | S213 | S114 | S115 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tool Material: | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM |
| Application: | | | | | | | | | | | | | | | | |
| Number of Flutes: | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 |
| Cut Length: | | | | | | | | | | | | | | | | |
| Helix: | λ45° | λ45° | λ37° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° |
| Shank: | | | | | | | | | | | | | | | | |
| Finish/Coating: | | ZrN | ZrN | | | AlTiN | | | | AlTiN | | AlTiN | | AlTiN | | |
| Direction: | | | | | | | | | | | | | | | | |
| Style: | S106 | S206 | S207 | S116 | S108 | S208 | S109 | S110 | S111 | S211 | S112 | S212 | S113 | S213 | S114 | S115 |
| Range: | 1/4 - 1.0" | 1/4 - 1.0" | 1/8 - 1.0" | 1/8 - 1/2 | 1/16 - 1" | 1/16 - 5/8 | 2.00 - 25.00 | 1/8 - 1/2 | 1/8 - 1/2 | 1/8 - 1/2 | 1/16 - 1/2 | 1/16 - 1/2 | 2.00 - 20.00 | 3.00 - 12.00 | 1/8 - 5/8 | 1/8 - 1/2 |
| Page # | 13 | 13 | 14 | 15 | 16 | 16 | 17 | 18 | 19 | 19 | 20 | 20 | 21 | 21 | 22 | 23 |
| P | P1 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | P2 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | P3 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | P4 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| M | M1 | | | | ■ | ◪ | ■ | ◪ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | M2 | | | | ■ | ◪ | ■ | ◪ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | M3 | | | | ■ | ◪ | ■ | ◪ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | M4 | | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ■ | ■ | ■ | ■ | ◪ | ■ |
| K | K1 | | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | K2 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | K3 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | K4 | | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | K5 | | | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| N | N1 | ■ | ■ | ■ | ◪ | ◪ | | ◪ | ◪ | ◪ | | ◪ | | ◪ | | ◪ | ◪ |
| | N2 | ■ | ■ | ■ | ◪ | ◪ | | ◪ | ◪ | ◪ | | ◪ | | ◪ | | ◪ | ◪ |
| | N3 | ■ | ■ | ■ | ■ | ■ | | ■ | ■ | ■ | | ■ | | ■ | | ■ | ■ |
| | N4 | ■ | ■ | ■ | | | | | | | | | | | | | |
| | N5 | | | | | | | | | | | | | | | | |
| S | S1 | | | | | | ◪ | | | | ◪ | | ◪ | | ◪ | | |
| | S2 | | | | | | ◪ | | | | ◪ | | ◪ | | ◪ | | |
| | S3 | | | | | | ◪ | | | | ◪ | | ◪ | | ◪ | | |
| | S4 | | | | | | ◪ | | | | ◪ | | ◪ | | ◪ | | |
| H | H1 | | | | | | | | | | | | | | | | |
| | H2 | | | | | | | | | | | | | | | | |
| | H3 | | | | | | | | | | | | | | | | |
| | H4 | | | | | | | | | | | | | | | | |

# Visual Index - End Mills

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tool Material: | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | HM | |
| Application: | | | | | | | | | | | | | | | | | |
| Number of Flutes: | Z 2 | Z 3 | Z 3 | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | |
| Cut Length: | | | | | | | | | | | | | | | | | |
| Helix: | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | |
| Shank: | | | | | | | | | | | | | | | | | |
| Finish/Coating: | AlTiN | | AlTiN | | | AlTiN | | AlTiN | | AlTiN | | AlTiN | | AlTiN | | AlTiN | |
| Direction: | | | | | | | | | | | | | | | | | |
| Style: | S215 | S121 | S221 | S129 | S134 | S234 | S135 | S235 | S136 | S236 | S137 | S237 | S138 | S238 | S139 | S239 | |
| Range: | 1/8 - 1/2 | 1/16 - 1/2 | 1/16 - 1/2 | 1/8 - 1/2 | 1/16 - 1" | 1/16 - 1" | 2.00 - 25.00 | 2.00 - 20.00 | 1/8 - 3/4 | 1/8 - 3/4 | 1/8 - 1" | 1/8 - 1" | 1/16 - 3/4 | 1/16 - 3/4 | 2.00 - 12.00 | 2.00 - 12.00 | |
| Page # | 23 | 24 | 24 | 25 | 26 | 26 | 27 | 27 | 28 | 28 | 29 | 29 | 30 | 30 | 31 | 31 | |
| P | P1 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | P2 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | P3 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | P4 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| M | M1 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | M2 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | M3 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | M4 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| K | K1 | ■ | ◪ | ◪ | ◪ | ◪ | ■ | ◪ | ■ | ◪ | ■ | ◪ | ■ | ◪ | ■ | ◪ | ■ |
| | K2 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | K3 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | K4 | ■ | ◪ | ◪ | ◪ | ◪ | ■ | ◪ | ■ | ◪ | ■ | ◪ | ■ | ◪ | ■ | ◪ | ■ |
| | K5 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| N | N1 | | ◪ | | ◪ | ◪ | | ◪ | | ◪ | | ◪ | | ◪ | | ◪ | |
| | N2 | | ◪ | | ◪ | ◪ | | ◪ | | ◪ | | ◪ | | ◪ | | ◪ | |
| | N3 | | ■ | | ■ | ■ | | ■ | | ■ | | ■ | | ■ | | ■ | |
| | N4 | | | | | | | | | | | | | | | | |
| | N5 | | | | | | | | | | | | | | | | |
| S | S1 | ◪ | | ◪ | | | ◪ | | ◪ | | ◪ | | ◪ | | ◪ | | ◪ |
| | S2 | ◪ | | ◪ | | | ◪ | | ◪ | | ◪ | | ◪ | | ◪ | | ◪ |
| | S3 | ◪ | | ◪ | | | ◪ | | ◪ | | ◪ | | ◪ | | ◪ | | ◪ |
| | S4 | ◪ | | ◪ | | | ◪ | | ◪ | | ◪ | | ◪ | | ◪ | | ◪ |
| H | H1 | | | | | | | | | | | | | | | | |
| | H2 | | | | | | | | | | | | | | | | |
| | H3 | | | | | | | | | | | | | | | | |
| | H4 | | | | | | | | | | | | | | | | |

# Visual Index - End Mills

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tool Material: | HM | HM | HM | HM | HM | HM | HM | HM | HSS-E PM | HSS | HSS | HSS | HSS-E | HSS-E PM | HSS |
| Application: | | | | | | | | | P9 | | | | | P9 | |
| Number of Flutes: | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | Z 4 | Z 5 | Z 5 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 | Z 2 |
| Cut Length: | | | | | | | | | | | | | | | |
| Helix: | λ30° | λ30° | λ30° | λ30° | = λ° | = λ° | = λ° | = λ° | λ30° γ12° | λ30° | λ30° | λ30° | λ30° | λ30° γ12° | λ30° |
| Shank: | | | | | DIN 6535HA | DIN 6535HB | DIN 6535HA | DIN 6535HB | DIN 1835B | | | | | DIN 1835B | |
| Finish/Coating: | | AlTiN | | AlTiN | AlTiN | AlTiN | AlTiN | AlTiN | | | | | | | |
| | | | | | | | | | e8 | +.003 -.000 | +.003 -.000 | +.0001 -.0015 | +.003 -.000 | e8 | +.003 -.000 |
| Direction: | | | | | | | | | | | | | | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Style: | S146 | S246 | S147 | S247 | S223HA | S223HB | S248HA | S248HB | C110 | C600 | C601 | C602 | C603 | C123 | C604 |
| Range: | 1/4 - 5/8 | 1/4 - 5/8 | 1/8 - 5/8 | 1/8 - 5/8 | 1/8 - 1.0" | 1/8 - 1.0" | 5/16 - 1.0" | 5/16 - 1.0" | 1.00 - 50.00 | 1/8 - 3/4 | 1/8 - 1.1/2 | 1/8 - 1" | 1/8 - 1" | 1/16 - 40.00 | 1/8 - 3/4 |
| Page # | 32 | 32 | 33 | 33 | 34 | 34 | 35 | 35 | 36 | 38 | 39 | 40 | 41 | 42 | 44 |
| P P1 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| P P2 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ◪ | ◪ | ◪ | ◪ | ■ | ■ | ◪ |
| P P3 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ◪ | | | | ◪ | ■ | |
| P P4 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ◪ | | | | ◪ | ■ | |
| M M1 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ◪ | | | | ◪ | ◪ | |
| M M2 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ◪ | | | | ◪ | ◪ | |
| M M3 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | |
| M M4 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | | | | | | |
| K K1 | ◪ | ◪ | ◪ | ◪ | ■ | ■ | ■ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| K K2 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| K K3 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| K K4 | ◪ | ◪ | ◪ | ◪ | ■ | ■ | ■ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| K K5 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| N N1 | ◪ | | ◪ | | | | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| N N2 | ◪ | | ◪ | | | | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| N N3 | ■ | | ■ | | | | | | ■ | ◪ | ◪ | ◪ | ■ | ■ | ◪ |
| N N4 | | | | | | | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| N N5 | | | | | | | | | | | | | | | |
| S S1 | | ◪ | | ◪ | ■ | ■ | ■ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| S S2 | | ◪ | | ◪ | ■ | ■ | ■ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| S S3 | | ◪ | | ◪ | ■ | ■ | ■ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| S S4 | | ◪ | | ◪ | ■ | ■ | ■ | ■ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| H H1 | | | | | ■ | ■ | ■ | ■ | | | | | | | |
| H H2 | | | | | ■ | ■ | ■ | ■ | | | | | | | |
| H H3 | | | | | ■ | ■ | ■ | ■ | | | | | | | |
| H H4 | | | | | ◪ | ◪ | ◪ | ◪ | | | | | | | |

# Visual Index - End Mills

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tool Material: | HSS | HSS | HSS | HSS-E | HSS-E | HSS-E | HSS-E | HSS-E | HSS-E | HSS-E | HSS | HSS | HSS-E PM | HSS-E PM | HSS | HSS-E |
| Application: | | | | | | | | | | | | | | | | |
| Number of Flutes: | Z 2 | Z 2 | Z 3 | Z 3 | Z 4-8 | Z 4-8 | Z 4-8 | Z 4-8 | Z 4-8 | Z 4-8 | Z 4 | Z 4 | Z 4-8 | Z 4-8 | Z 4-8 | Z 4-8 |
| Cut Length: | | | | | | | | | | | | | | | | |
| Helix: | λ38° | λ38° | λ30° | λ30° γ12° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° | λ30° γ12° | λ30° γ12° | λ30° | λ30° |
| Shank: | | | | DIN 1835B | | | | | | | | | DIN 1835B | DIN 1835B | | |
| Finish/Coating: | | | | | | TiCN | | TiCN | | | | | | | | |
| | +.003 -.000 | +.003 -.000 | +.003 -.000 | e8 | +.005 -.000 | +.005 -.000 | +.005 -.000 | +.005 -.000 | +.005 -.000 | +.005 -.000 | | +.003 -.000 | k10 | k10 | +.003 -.000 | +.003 -.000 |
| Direction: | | | | | | | | | | | | | | | | |
| |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Style: | C605 | C606 | C607 | C346 | C608 | C609 | C610 | C611 | C612 | C613 | C614 | C615 | C247 | C273 | C617 | C618 |
| Range: | 1/4 - 1" | 1/4 - 3/4 | 1/8 - 1" | 3.00 - 20.00 | 1/4 - 1" | 1/4 - 1" | 1/4 - 1" | 1/4 - 1" | 1/4 - 1" | 1/4 - 3/4 | 1/8 - 3/4 | 1/8 - 1" | 2.00 - 50.00 | 2.00 - 40.00 | 1/8 - 1" | 1/8 - 1" |
| Page # | 45 | 46 | 47 | 48 | 49 | 49 | 50 | 50 | 51 | 52 | 53 | 54 | 55 | 57 | 58 | 59 |
| P | P1 | ◪ | ◪ | ◪ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | P2 | ◪ | ◪ | ◪ | ◪ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | P3 | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | P4 | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| M | M1 | ◪ | ◪ | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | M2 | ◪ | ◪ | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | M3 | ◪ | ◪ | ◪ | | | | | | | | | | | | | |
| | M4 | | | | | | | | | | | | | | | | |
| K | K1 | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | K2 | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | K3 | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | K4 | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | K5 | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| N | N1 | ■ | ■ | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | N2 | ■ | ■ | ◪ | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | N3 | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ | ■ |
| | N4 | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | N5 | | | | | | | | | | | | | | | | | |
| S | S1 | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | S2 | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | S3 | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| | S4 | | | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ | ◪ |
| H | H1 | | | | | | | | | | | | | | | | | |
| | H2 | | | | | | | | | | | | | | | | | |
| | H3 | | | | | | | | | | | | | | | | | |
| | H4 | | | | | | | | | | | | | | | | | |

## Regular length, Square End, 45° Helix

| S106 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | N4.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2326 P | 1749 P | 1171 P | 1171 0 | 1050 0 | 751 0 | 1224 0 | 719 0 | 367 0 | 1224 R | 472 R |

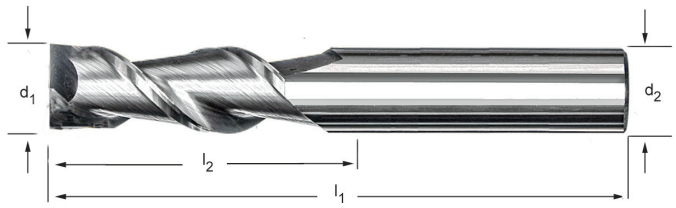
HM — Z 2

Double gullet flute design allows for fast, efficient evacuation of chips in soft and non-ferrous materials

| S206 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | N4.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2326 P | 1749 P | 1171 P | 1171 0 | 1050 0 | 751 0 | 1224 0 | 719 0 | 367 0 | 1224 R | 472 R |

HM — ZrN — Z 2

Zirconium coating increases surface hardness, improves chip evacuation and tool life allowing for higher removal rates in soft and non-ferrous materials





| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S106 | S206 |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 0.2500 | 1/4 | 1 | 2-1/2 | 2 | 1 | 7648490 | 7648497 |
| 5/16 | 0.3125 | 5/16 | 1 | 3 | 2 | 1 | 7648491 | 7648498 |
| 3/8 | 0.3750 | 3/8 | 1 | 2-1/2 | 2 | 1 | 7648492 | 7648499 |
| 1/2 | 0.5000 | 1/2 | 1-1/4 | 3 | 2 | 1 | 7648493 | 7648500 |
| 5/8 | 0.6250 | 5/8 | 1-5/8 | 3-1/2 | 2 | 1 | 7648494 | 7648501 |
| 3/4 | 0.7500 | 3/4 | 1-3/4 | 4 | 2 | 1 | 7648495 | 7648502 |
| 1 | 1.0000 | 1 | 1-1/2 | 4 | 2 | 1 | 7648496 | 7648503 |

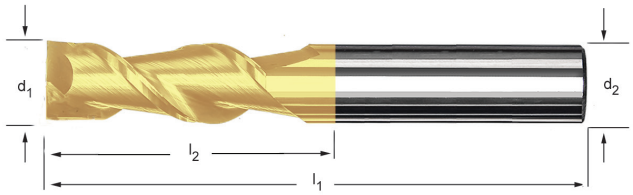
# Solid Carbide 2-Flute End Mill

## Regular Length, Square End, 37° Helix

| S207 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | N4.2 | N4.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ■ 2093 P | ■ 1575 P | ■ 1056 P | ■ 1056 O | ■ 945 O | ■ 676 O | ■ 1102 O | ■ 646 O | ■ 331 O | ■ 1102 R | ■ 427 R | ◪ 456 R |

HM | ZrN | Z 2

Unique flute design along with the Zirconium coating allow for faster speeds and feeds in soft and non-ferrous materials




S207

1/8 - 1“

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S207 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 1/8 | 1/2 | 1-1/2 | 2 | 1 | 7648504 |
| 1/8 | 0.1250 | 1/8 | 3/4 | 2“ | 2 | 1 | 7648505 |
| 5/32 | 0.1563 | 5/32 | 9/16 | 2“ | 2 | 1 | 7648506 |
| 3/16 | 0.1875 | 3/16 | 3/4 | 2“ | 2 | 1 | 7648507 |
| 3/16 | 0.1875 | 3/16 | 1-1/8 | 3“ | 2 | 1 | 7648508 |
| 1/4 | 0.2500 | 1/4 | 1“ | 2-1/2 | 2 | 1 | 7648509 |
| 1/4 | 0.2500 | 1/4 | 1-1/2 | 4“ | 2 | 1 | 7648510 |
| 5/16 | 0.3125 | 5/16 | 3/4 | 2-1/2 | 2 | 1 | 7648511 |
| 5/16 | 0.3125 | 5/16 | 1-5/8 | 4“ | 2 | 1 | 7648512 |
| 3/8 | 0.3750 | 3/8 | 1“ | 2-1/2 | 2 | 1 | 7648513 |
| 3/8 | 0.3750 | 3/8 | 2“ | 4“ | 2 | 1 | 7648514 |
| 7/16 | 0.4375 | 7/16 | 1“ | 2-1/2 | 2 | 1 | 7648515 |
| 7/16 | 0.4375 | 7/16 | 2“ | 4“ | 2 | 1 | 7648516 |
| 1/2 | 0.5000 | 1/2 | 1“ | 3“ | 2 | 1 | 7648517 |
| 1/2 | 0.5000 | 1/2 | 3“ | 6“ | 2 | 1 | 7648518 |
| 9/16 | 0.5625 | 9/16 | 1-1/4 | 3“ | 2 | 1 | 7648519 |
| 5/8 | 0.6250 | 5/8 | 1-5/8 | 3-1/2 | 2 | 1 | 7648520 |
| 5/8 | 0.6250 | 5/8 | 2-1/4 | 5“ | 2 | 1 | 7648521 |
| 3/4 | 0.7500 | 3/4 | 1-3/4 | 4“ | 2 | 1 | 7648522 |
| 3/4 | 0.7500 | 3/4 | 3“ | 6“ | 2 | 1 | 7648523 |
| 1“ | 1.0000 | 1“ | 1-1/2 | 4“ | 2 | 1 | 7648524 |
| 1“ | 1.0000 | 1“ | 4“ | 6“ | 2 | 1 | 7648525 |

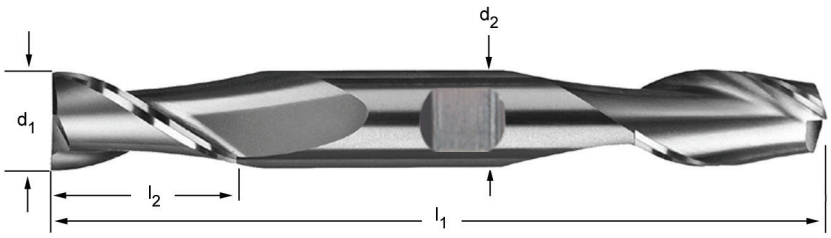
## Regular Length, Square End, Double End, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S116 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 276 K | ■ 308 K | ■ 322 K | ■ 236 K | ■ 207 K | ■ 184 J | ■ 220 K | ■ 177 J | ■ 151 J | ■ 131 J | ■ 112 J | ◪ 92 J | ■ 256 K | ■ 217 K | ■ 230 K | ■ 187 J | ◪ 154 J | ■ 154 J | ■ 131 J | ■ 118 J |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■ 102 J | ◪ 85 J | ■ 348 K | ◪ 256 K | ◪ 194 K | ■ 364 K | ■ 295 K | ◪ 236 J | ■ 325 K | ■ 246 K | ◪ 197 J | ■ 299 J | ■ 226 J | ◪ 164 J | ◪ 141 J | ◪ 118 J | ■ 338 J | ■ 253 J | ◪ 197 J | ◪ 1394 K |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪ 1047 K | ◪ 699 K | ◪ 932 K | ◪ 837 K | ◪ 604 K | ■ 784 K | ■ 463 K | ■ 233 K | | | | | | | | | | | | |

HM

Z 2

Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft and non-ferrous materials.




S116

1/8 - 1/2

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S116 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 3/8 | 3“ | 2 | 1 | 7648650 |
| 5/32 | 0.1562 | 3/8 | 7/16 | 3“ | 2 | 1 | 7648651 |
| 3/16 | 0.1875 | 3/8 | 1/2 | 3“ | 2 | 1 | 7648652 |
| 1/4 | 0.2500 | 3/8 | 5/8 | 3“ | 2 | 1 | 7648653 |
| 5/16 | 0.3125 | 3/8 | 3/4 | 3.1/2 | 2 | 1 | 7648654 |
| 3/8 | 0.3750 | 3/8 | 3/4 | 3.1/2 | 2 | 1 | 7648655 |
| 1/2 | 0.5000 | 1/2 | 1“ | 4“ | 2 | 1 | 7648656 |

# Solid Carbide 2-Flute End Mill

## Regular Length, Square End, 30° Helix

**S108**

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ 295 K | ■ 331 K | ■ 344 K | ■ 253 K | ■ 223 K | ■ 197 J | ■ 236 K | ■ 190 J | ■ 161 J | ■ 141 J | ■ 121 J | ◪ 98 J | ◪ 276 K | ◪ 233 K | ◪ 246 K | ◪ 200 J | ◪ 167 J | ◪ 164 J | ◪ 141 J | ◪ 128 J |
| **M4.1** | **M4.2** | **K1.1** | **K1.2** | **K1.3** | **K2.1** | **K2.2** | **K2.3** | **K3.1** | **K3.2** | **K3.3** | **K4.1** | **K4.2** | **K4.3** | **K4.4** | **K4.5** | **K5.1** | **K5.2** | **K5.3** | **N1.1** |
| ◪ 108 J | ◪ 92 J | ■ 374 K | ◪ 276 K | ◪ 207 K | ■ 390 K | ■ 318 K | ◪ 253 J | ■ 348 K | ■ 266 K | ◪ 213 J | ■ 322 J | ■ 243 J | ◪ 177 J | ◪ 151 J | ◪ 128 J | ■ 364 J | ■ 272 J | ◪ 210 J | ◪ 1499 K |
| **N1.2** | **N1.3** | **N2.1** | **N2.2** | **N2.3** | **N3.1** | **N3.2** | **N3.3** | | | | | | | | | | | | |
| ◪ 1125 K | ◪ 751 K | ◪ 1001 K | ◪ 899 K | ◪ 650 K | ■ 843 K | ■ 499 K | ■ 249 K | | | | | | | | | | | | |

HM | Z 2

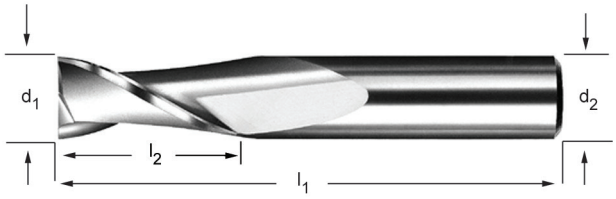
Bright finish improves chip flow in soft and non-ferrous materials.

**S208**

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ 397 K | ■ 443 K | ■ 459 K | ■ 338 K | ■ 299 K | ■ 262 J | ■ 338 K | ■ 272 J | ■ 230 J | ■ 203 J | ■ 171 J | ■ 141 J | ■ 446 K | ■ 377 K | ■ 397 K | ■ 325 J | ■ 272 J | ■ 259 J | ■ 223 J | ■ 200 J |
| **M4.1** | **M4.2** | **K1.1** | **K1.2** | **K1.3** | **K2.1** | **K2.2** | **K2.3** | **K3.1** | **K3.2** | **K3.3** | **K4.1** | **K4.2** | **K4.3** | **K4.4** | **K4.5** | **K5.1** | **K5.2** | **K5.3** | **S1.1** |
| ■ 174 J | ◪ 151 J | ■ 551 K | ◪ 407 K | ◪ 305 K | ■ 646 K | ■ 525 K | ◪ 417 J | ■ 571 K | ■ 436 K | ◪ 354 J | ■ 528 J | ■ 400 J | ◪ 292 J | ◪ 249 J | ◪ 210 J | ■ 600 J | ■ 449 J | ■ 348 J | ■ 230 J |
| **S1.2** | **S1.3** | **S2.1** | **S2.2** | **S3.1** | **S3.2** | **S4.1** | **S4.2** | | | | | | | | | | | | |
| ◪ 200 J | ◪ 190 J | ◪ 213 J | ◪ 138 J | ◪ 161 J | ◪ 98 J | ◪ 125 J | ◪ 79 J | | | | | | | | | | | | |

HM | AlTiN | Z 2

ALTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| S108 | S208 |
|---|---|
|  |  |
| 1/16 - 1“ | 1/16 - 5/8“ |

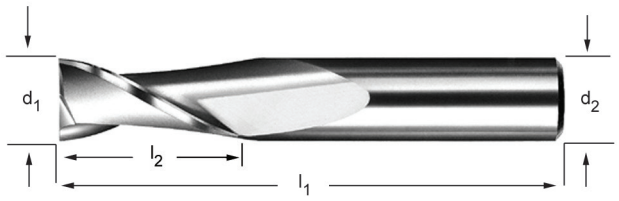
| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S108 | S208 |
|---|---|---|---|---|---|---|---|---|
| 1/16 | 0.0625 | 1/8 | 1/4 | 1.1/2 | 2 | 1 | 7648526 | 7648544 |
| 5/64 | 0.0781 | 1/8 | 1/4 | 1.1/2 | 2 | 1 | 7648527 | 7648545 |
| 3/32 | 0.0938 | 1/8 | 3/8 | 1.1/2 | 2 | 1 | 7648528 | 7648546 |
| 1/8 | 0.1250 | 1/8 | 1/2 | 1.1/2 | 2 | 1 | 7648529 | 7648547 |
| 9/64 | 0.1406 | 3/16 | 9/16 | 2“ | 2 | 1 | 7648530 | — |
| 5/32 | 0.1562 | 3/16 | 9/16 | 2“ | 2 | 1 | 7648531 | 7648548 |
| 11/64 | 0.1719 | 3/16 | 9/16 | 2“ | 2 | 1 | 7648532 | — |
| 3/16 | 0.1875 | 3/16 | 5/8 | 2“ | 2 | 1 | 7648533 | 7648549 |
| 7/32 | 0.2188 | 1/4 | 5/8 | 2.1/2 | 2 | 1 | 7648534 | 7648550 |
| 1/4 | 0.2500 | 1/4 | 3/4 | 2.1/2 | 2 | 1 | 7648535 | 7648551 |
| 5/16 | 0.3125 | 5/16 | 7/8 | 2.1/2 | 2 | 1 | 7648536 | 7648552 |
| 3/8 | 0.3750 | 3/8 | 7/8 | 2.1/2 | 2 | 1 | 7648537 | 7648553 |
| 7/16 | 0.4375 | 7/16 | 1“ | 2.1/2 | 2 | 1 | 7648538 | 7648554 |
| 1/2 | 0.5000 | 1/2 | 1“ | 3“ | 2 | 1 | 7648539 | 7648555 |
| 9/16 | 0.5625 | 9/16 | 1.1/4 | 3.1/2 | 2 | 1 | 7648540 | 7648556 |
| 5/8 | 0.6250 | 5/8 | 1.1/4 | 3.1/2 | 2 | 1 | 7648541 | 7648557 |
| 3/4 | 0.7500 | 3/4 | 1.1/2 | 4“ | 2 | 1 | 7648542 | — |
| 1“ | 1.0000 | 1“ | 1.1/2 | 4“ | 2 | 1 | 7648543 | — |

## Regular Length, Square End, 30° Helix, Metric

| S109 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ■ 295 K | ■ 331 K | ■ 344 K | ■ 253 K | ■ 223 K | ■ 197 J | ■ 236 K | ■ 190 J | ■ 161 J | ■ 141 J | ■ 121 J | ◪ 98 J | ◪ 276 K | ◪ 233 K | ◪ 246 K | ◪ 200 J | ◪ 167 J | ◪ 164 J | ◪ 141 J | ◪ 128 J |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ◪ 108 J | ◪ 92 J | ■ 374 K | ◪ 276 K | ◪ 207 K | ■ 390 K | ■ 318 K | ◪ 253 J | ■ 348 K | ■ 266 K | ◪ 213 J | ■ 322 J | ■ 243 J | ◪ 177 J | ◪ 151 J | ◪ 128 J | ■ 364 J | ■ 272 J | ◪ 210 J | ◪ 1499 K |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪ 1125 K | ◪ 751 K | ◪ 1001 K | ◪ 899 K | ◪ 650 K | ■ 843 K | ■ 499 K | ■ 249 K | | | | | | | | | | | | |

HM | Z 2

Bright finish improves chip flow in soft and non-ferrous materials.




S109

2.00 - 25.00

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S109 |
|---|---|---|---|---|---|---|---|
| 2.00 | 0.0787 | 3.0 | 6.0 | 38.0 | 2 | 1 | 7648558 |
| 2.50 | 0.0984 | 3.0 | 7.0 | 38.0 | 2 | 1 | 7648559 |
| 3.00 | 0.1181 | 3.0 | 12.0 | 38.0 | 2 | 1 | 7648560 |
| 4.00 | 0.1575 | 4.0 | 14.0 | 50.0 | 2 | 1 | 7648561 |
| 4.50 | 0.1772 | 5.0 | 14.0 | 50.0 | 2 | 1 | 7648562 |
| 5.00 | 0.1969 | 5.0 | 16.0 | 50.0 | 2 | 1 | 7648563 |
| 6.00 | 0.2362 | 6.0 | 19.0 | 63.0 | 2 | 1 | 7648564 |
| 7.00 | 0.2756 | 8.0 | 19.0 | 63.0 | 2 | 1 | 7648565 |
| 8.00 | 0.3150 | 8.0 | 20.0 | 63.0 | 2 | 1 | 7648566 |
| 9.00 | 0.3543 | 10.0 | 22.0 | 70.0 | 2 | 1 | 7648567 |
| 10.00 | 0.3937 | 10.0 | 22.0 | 70.0 | 2 | 1 | 7648568 |
| 11.00 | 0.4331 | 11.0 | 25.0 | 70.0 | 2 | 1 | 7648569 |
| 12.00 | 0.4724 | 12.0 | 25.0 | 75.0 | 2 | 1 | 7648570 |
| 14.00 | 0.5512 | 14.0 | 30.0 | 88.0 | 2 | 1 | 7648571 |
| 16.00 | 0.6299 | 16.0 | 32.0 | 88.0 | 2 | 1 | 7648572 |
| 20.00 | 0.7874 | 20.0 | 38.0 | 100.0 | 2 | 1 | 7648573 |
| 25.00 | 0.9843 | 25.0 | 38.0 | 100.0 | 2 | 1 | 7648574 |

# Solid Carbide 2-Flute End Mill

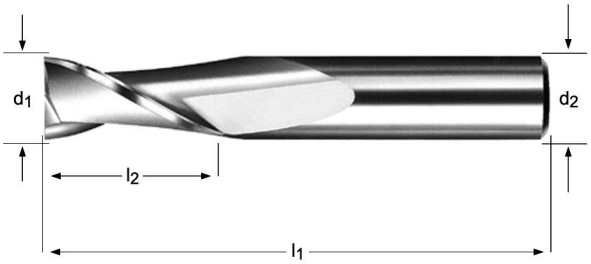
## Long Length, Square End, 30° Helix

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S110 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 276 K | ■ 308 K | ■ 322 K | ■ 236 K | ■ 207 K | ■ 184 J | ■ 220 K | ■ 177 J | ■ 151 J | ■ 131 J | ■ 112 J | ◪ 92 J | ■ 256 K | ■ 217 K | ■ 230 K | ■ 187 J | ◪ 154 J | ■ 154 J | ■ 131 J | ■ 118 J |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■ 102 J | ◪ 85 J | ■ 348 K | ◪ 256 K | ◪ 194 K | ■ 364 K | ■ 295 K | ◪ 236 J | ■ 325 K | ■ 246 K | ◪ 197 J | ■ 299 J | ■ 226 J | ◪ 164 J | ◪ 141 J | ◪ 118 J | ■ 338 J | ■ 253 J | ◪ 197 J | ◪ 1394 K |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪ 1047 K | ◪ 699 K | ◪ 932 K | ◪ 837 K | ◪ 604 K | ■ 784 K | ■ 463 K | ■ 233 K | | | | | | | | | | | | |

HM

Z 2

Bright finish improves chip flow in soft and non-ferrous materials.




S110

1/8 - 1/2

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S110 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 1/8 | 3/4 | 2“ | 2 | 1 | 7648575 |
| 3/16 | 0.1875 | 3/16 | 3/4 | 2.1/2 | 2 | 1 | 7648576 |
| 1/4 | 0.2500 | 1/4 | 1.1/8 | 3“ | 2 | 1 | 7648577 |
| 3/8 | 0.3750 | 3/8 | 1.1/8 | 3“ | 2 | 1 | 7648578 |
| 1/2 | 0.5000 | 1/2 | 2“ | 4“ | 2 | 1 | 7648579 |

# Solid Carbide 2-Flute End Mill

## Extra Long Length, Square End, 30° Helix

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S111 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 266 K | ■ 299 K | ■ 308 K | ■ 226 K | ■ 200 K | ■ 177 J | ■ 213 K | ■ 171 J | ■ 144 J | ■ 128 J | ■ 108 J | ◪ 89 J | ■ 246 K | ■ 210 K | ■ 220 K | ■ 180 J | ◪ 151 J | ■ 125 J | ■ 108 J | ■ 98 J |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■ 98 J | ◪ 85 J | ■ 299 K | ◪ 220 K | ◪ 167 K | ■ 305 K | ■ 249 K | ◪ 200 J | ■ 272 K | ■ 207 K | ◪ 167 J | ■ 253 J | ■ 190 J | ◪ 138 J | ◪ 118 J | ◪ 98 J | ■ 285 J | ■ 213 J | ◪ 164 J | ◪ 1348 K |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪ 1010 K | ◪ 676 K | ◪ 899 K | ◪ 807 K | ◪ 584 K | ■ 761 K | ■ 449 K | ■ 226 K | | | | | | | | | | | | |

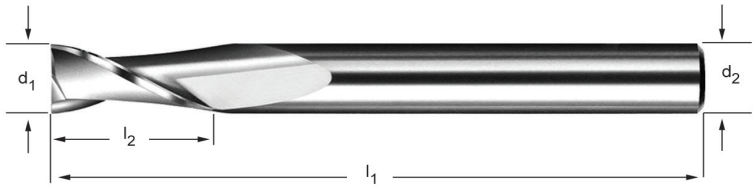
HM | Z 2

Bright finish improves chip flow in soft and non-ferrous materials.

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S211 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 358 K | ■ 400 K | ■ 413 K | ■ 305 K | ■ 269 K | ■ 240 J | ■ 295 K | ■ 236 J | ■ 200 J | ■ 177 J | ■ 148 J | ■ 121 J | ■ 410 K | ■ 348 K | ■ 364 K | ■ 299 J | ◪ 249J | ■ 210 J | ■ 180 J | ■ 164 J |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| | ■ 171 J | ◪ 148 J | ■ 499 K | ■ 371 K | ■ 276 K | ■ 492 K | ■ 400 K | ■ 318 J | ■ 436 K | ■ 331 K | ■ 269 J | ■ 404 J | ■ 305 J | ■ 223 J | ■ 190 J | ■ 161 J | ■ 456 J | ■ 344 J | ■ 266 J | ■ 200 J |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | |
| | ◪ 180 J | ◪ 174 J | ◪ 187 J | ◪ 121 J | ◪ 141 J | ◪ 85 J | ◪ 112 J | ◪ 69 J | | | | | | | | | | | | |

HM | AlTiN | Z 2

ALTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S111 | S211 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | |  |  |
| | | | | | | | 1/8 - 1/2 | 1/8 - 1/2 |
| 1/8 | 0.1250 | 1/8 | 1“ | 3“ | 2 | 1 | 7648580 | 7648586 |
| 3/16 | 0.1875 | 3/16 | 1.1/8 | 3“ | 2 | 1 | 7648581 | 7648587 |
| 1/4 | 0.2500 | 1/4 | 1.1/2 | 4“ | 2 | 1 | 7648582 | 7648588 |
| 5/16 | 0.3125 | 5/16 | 1.5/8 | 4“ | 2 | 1 | 7648583 | — |
| 3/8 | 0.3750 | 3/8 | 1.3/4 | 4“ | 2 | 1 | 7648584 | 7648589 |
| 1/2 | 0.5000 | 1/2 | 3“ | 6“ | 2 | 1 | 7648585 | 7648590 |

# Solid Carbide 2-Flute End Mill

## Regular Length, Ball Nose, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S112 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 295 F | ■ 331 F | ■ 344 F | ■ 253 F | ■ 223 F | ■ 197 F | ■ 236 F | ■ 190 F | ■ 161 F | ■ 141 F | ■ 121 F | ◪ 98 F | ■ 276 F | ■ 233 F | ■ 246 F | ■ 200 F | ■ 167 F | ■ 164 F | ■ 141 F | ■ 128 E |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■ 108 E | ■ 92 E | ■ 374 F | ◪ 276 F | ◪ 207 F | ■ 390 F | ■ 318 F | ◪ 253 F | ■ 348 F | ■ 266 F | ◪ 213 F | ■ 322 F | ■ 243 F | ◪ 177 F | ◪ 151 E | ◪ 128 E | ■ 364 F | ■ 272 F | ◪ 210 F | ◪ 1499 G |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪ 1125 G | ◪ 751 G | ◪ 1001 F | ◪ 899 F | ◪ 650 F | ◪ 843 F | ◪ 499 F | ◪ 249 F | | | | | | | | | | | | |

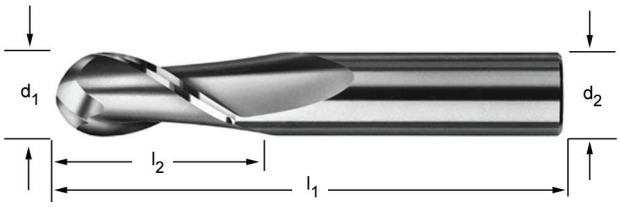
HM | Z 2

Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S212 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 397 F | ■ 443 F | ■ 459 F | ■ 338 F | ■ 299 F | ■ 262 F | ■ 338 F | ■ 272 F | ■ 230 F | ■ 203 F | ■ 171 F | ■ 141 F | ■ 446 F | ■ 377 F | ■ 397 F | ■ 325 F | ■ 272 F | ■ 259 F | ■ 223 F | ■ 200 E |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| | ■ 174 E | ■ 151 E | ■ 551 F | ◪ 407 F | ◪ 305 F | ■ 646 F | ■ 525 F | ◪ 417 F | ■ 571 F | ■ 436 F | ◪ 354 F | ■ 528 F | ■ 400 F | ◪ 292 F | ◪ 249 E | ◪ 210 E | ■ 600 F | ■ 449 F | ◪ 348 F | ■ 230 F |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | |
| | ◪ 200 F | ◪ 190 E | ◪ 213 L | ◪ 138 E | ◪ 161 E | ◪ 98 E | ◪ 125 E | ◪ 79 E | | | | | | | | | | | | |

HM | AlTiN | Z 2

Ball nose for cutting internal part radius. ALTiN coating increases surface hardness, improves chip flow and tool life, allowing higher metal removal rates.




| S112 | S212 |
|---|---|
|  |  |
| 1/16 - 1/2 | 1/16 - 1/2 |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S112 | S212 |
|---|---|---|---|---|---|---|---|---|
| 1/16 | 0.0625 | 1/8 | 1/4 | 1.1/2 | 2 | 1 | 7648591 | 7648601 |
| 3/32 | 0.0938 | 1/8 | 3/8 | 1.1/2 | 2 | 1 | 7648592 | — |
| 1/8 | 0.1250 | 1/8 | 1/2 | 1.1/2 | 2 | 1 | 7648593 | 7648602 |
| 5/32 | 0.1562 | 3/16 | 9/16 | 2“ | 2 | 1 | 7648594 | — |
| 3/16 | 0.1875 | 3/16 | 5/8 | 2“ | 2 | 1 | 7648595 | 7648603 |
| 7/32 | 0.2188 | 1/4 | 5/8 | 2.1/2 | 2 | 1 | 7648596 | 7648604 |
| 1/4 | 0.2500 | 1/4 | 3/4 | 2.1/2 | 2 | 1 | 7648597 | 7648605 |
| 5/16 | 0.3125 | 5/16 | 7/8 | 2.1/2 | 2 | 1 | 7648598 | 7648606 |
| 3/8 | 0.3750 | 3/8 | 7/8 | 2.1/2 | 2 | 1 | 7648599 | 7648607 |
| 1/2 | 0.5000 | 1/2 | 1“ | 3“ | 2 | 1 | 7648600 | 7648608 |

## Regular Length, Ball Nose, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S113 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 295 F | ■ 331 F | ■ 344 F | ■ 253 F | ■ 223 F | ■ 197 F | ■ 236 F | ■ 190 F | ■ 161 F | ■ 141 F | ■ 121 F | ◪ 98 F | ■ 276 F | ■ 233 F | ■ 246 F | ■ 200 F | ■ 167 F | ■ 164 F | ■ 141 F | ■ 128 E |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■ 108 E | ■ 92 E | ■ 374 F | ◪ 276 F | ◪ 207 F | ■ 390 F | ■ 318 F | ◪ 253 F | ■ 348 F | ■ 266 F | ◪ 213 F | ■ 322 F | ■ 243 F | ◪ 177 F | ◪ 151 E | ◪ 128 E | ■ 364 F | ■ 272 F | ◪ 210 F | ◪ 1499 G |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪ 1125 G | ◪ 751 G | ◪ 1001 F | ◪ 899 F | ◪ 650 F | ■ 843 F | ■ 499 F | ■ 249 F | | | | | | | | | | | | |

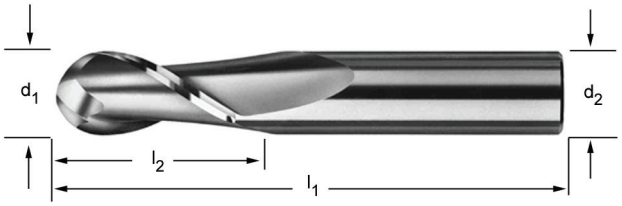
HM | Z 2

Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S213 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 397 F | ■ 443 F | ■ 459 F | ■ 338 F | ■ 299 F | ■ 262 F | ■ 338 F | ■ 272 F | ■ 230 F | ■ 203 F | ■ 171 F | ■ 141 F | ■ 446 F | ■ 377 F | ■ 397 F | ■ 325 F | ■ 272 F | ■ 259 F | ■ 223 F | ■ 200 E |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| | ■ 174 E | ■ 151 E | ■ 551 H | ◪ 407 F | ◪ 305 F | ■ 646 F | ■ 525 F | ◪ 417 F | ■ 571 F | ■ 436 F | ◪ 354 F | ■ 528 F | ■ 400 F | ◪ 292 F | ◪ 249 E | ◪ 210 E | ■ 600 F | ■ 449 F | ◪ 348 F | ■ 230 F |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | |
| | ◪ 200 F | ◪ 190 E | ◪ 213 E | ◪ 138 E | ◪ 161 E | ◪ 98 E | ◪ 125 E | ◪ 79 E | | | | | | | | | | | | |

HM | AlTiN | Z 2

Ball nose for cutting internal part radius. ALTiN coating increases surface hardness, improves chip flow and tool life, allowing higher metal removal rates.




| S113 | S213 |
|---|---|
|  |  |
| 2.00 - 20.00 | 3.00 - 12.00 |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S113 | S213 |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 0.0787 | 3.0 | 6.0 | 38.0 | 2 | 1 | 7648609 | — |
| 2.50 | 0.0984 | 3.0 | 6.0 | 38.0 | 2 | 1 | 7648610 | — |
| 3.00 | 0.1181 | 3.0 | 12.0 | 38.0 | 2 | 1 | 7648611 | 7648622 |
| 4.00 | 0.1575 | 4.0 | 14.0 | 50.0 | 2 | 1 | 7648612 | 7648623 |
| 5.00 | 0.1969 | 5.0 | 16.0 | 50.0 | 2 | 1 | 7648613 | 7648624 |
| 6.00 | 0.2362 | 6.0 | 19.0 | 63.0 | 2 | 1 | 7648614 | 7648625 |
| 7.00 | 0.2756 | 8.0 | 19.0 | 63.0 | 2 | 1 | 7648615 | 7648626 |
| 8.00 | 0.3150 | 8.0 | 19.0 | 63.0 | 2 | 1 | 7648616 | 7648627 |
| 9.00 | 0.3543 | 10.0 | 22.0 | 70.0 | 2 | 1 | 7648617 | 7648628 |
| 10.00 | 0.3937 | 10.0 | 22.0 | 70.0 | 2 | 1 | 7648618 | 7648629 |
| 12.00 | 0.4724 | 12.0 | 25.0 | 75.0 | 2 | 1 | 7648619 | 7648630 |
| 16.00 | 0.6299 | 16.0 | 32.0 | 88.0 | 2 | 1 | 7648620 | — |
| 20.00 | 0.7874 | 20.0 | 38.0 | 100.0 | 2 | 1 | 7648621 | — |

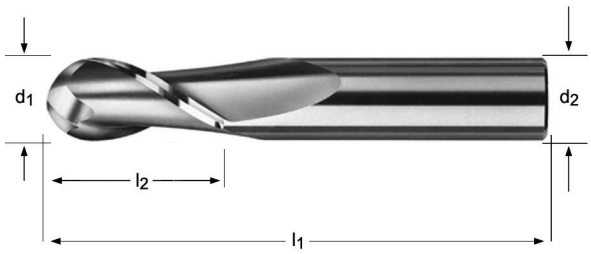
# Solid Carbide 2-Flute End Mill

## Long Length, Ball Nose, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S114 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 276 F | ■ 308 F | ■ 322 F | ■ 236 F | ■ 207 F | ■ 184 F | ■ 220 F | ■ 177 F | ■ 151 F | ■ 131 F | ■ 112 F | ◪ 92 F | ■ 256 F | ■ 217 F | ■ 230 F | ■ 187 F | ◪ 154 F | ■ 154 F | ■ 131 F | ■ 118 E |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■ 102 E | ◪ 85 E | ■ 348 F | ◪ 256 F | ◪ 194 F | ■ 364 F | ■ 295 F | ◪ 236 F | ■ 325 F | ■ 246 F | ◪ 197 F | ■ 299 F | ■ 226 F | ◪ 164 F | ◪ 141 E | ◪ 118 E | ■ 338 F | ■ 253 F | ◪ 197 F | ◪ 1394 G |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪ 1047 G | ◪ 699 G | ◪ 932 F | ◪ 837 F | ◪ 604 F | ■ 784 F | ■ 463 F | ■ 233 F | | | | | | | | | | | | |

HM | Z 2

Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.




S114

1/8 - 5/8

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S114 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 1/8 | 3/4 | 2“ | 2 | 1 | 7648631 |
| 3/16 | 0.1875 | 3/16 | 3/4 | 2.1/2 | 2 | 1 | 7648632 |
| 1/4 | 0.2500 | 1/4 | 1.1/8 | 3“ | 2 | 1 | 7648633 |
| 5/16 | 0.3125 | 5/16 | 1.1/8 | 3“ | 2 | 1 | 7648634 |
| 3/8 | 0.3750 | 3/8 | 1.1/8 | 3“ | 2 | 1 | 7648635 |
| 1/2 | 0.5000 | 1/2 | 2“ | 4“ | 2 | 1 | 7648636 |
| 5/8 | 0.6250 | 5/8 | 2.1/4 | 5“ | 2 | 1 | 7648637 |

## Extra Long Length, Ball Nose, 30° Helix

| S115 | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.3 | M3.2 | M3.3 |
| | ■266 F | ■299 F | ■308 F | ■226 F | ■200 F | ■177 F | ■213 F | ■171 F | ■144 F | ■128 F | ■108 F | ◪ 89 F | ■246 F | ■210 F | ■220 F | ■180 F | ■151 F | ■125 F | ■108 F | ■98 E |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■98 E | ■85 E | ■299 F | ◪220 F | ◪167 F | ■305 F | ■249 F | ◪200 F | ■272 F | ■207 F | ◪167 F | ■253 F | ■190 F | ◪138 F | ◪118 E | ◪98 E | ■285 F | ■213 F | ◪164 F | ◪1348 G |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪1010 G | ◪676 G | ◪899 F | ◪807 F | ◪584 F | ■761 F | ■449 F | ■226 F | | | | | | | | | | | | |

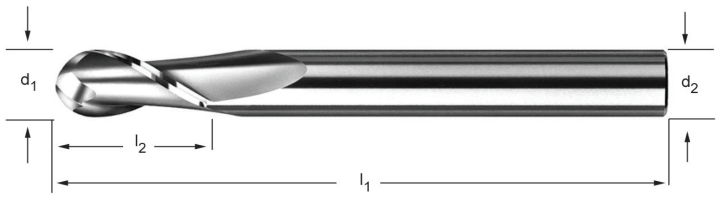
HM   Z 2 

Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

| S215 | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■358 F | ■400 F | ■413 F | ■305 F | ■269 F | ■240 F | ■295 F | ■236 F | ■200 F | ■177 F | ■148 F | ■121 F | ■410 F | ■348 F | ■364 F | ■299 F | ■249 F | ■210 F | ■180 F | ■164 E |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| | ■171 E | ■148 E | ■499 F | ■371 F | ■276 F | ■492 F | ■400 F | ■318 F | ■436 F | ■331 F | ■269 F | ■404 F | ■305 F | ■223 F | ■190 E | ■161 E | ■456 F | ■344 F | ■266 F | ■200 F |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | |
| | ◪180 F | ◪174 E | ◪187 E | ◪121 E | ◪141 E | ◪85 E | ◪112 E | ◪69 E | | | | | | | | | | | | |

HM  AlTiN  Z 2 

Ball nose for cutting internal part radius. ALTiN coating increases surface hardness, improves chip flow and tool life, allowing higher metal removal rates.




| S115 | S215 |
|---|---|
|  |  |
| 1/8 - 1/2 | 1/8 - 1/2 |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S115 | S215 |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 1/8 | 1“ | 3“ | 2 | 1 | 7648638 | 7648644 |
| 3/16 | 0.1875 | 3/16 | 1.1/8 | 3“ | 2 | 1 | 7648639 | 7648645 |
| 1/4 | 0.2500 | 1/4 | 1.1/2 | 4“ | 2 | 1 | 7648640 | 7648646 |
| 5/16 | 0.3125 | 5/16 | 1.5/8 | 4“ | 2 | 1 | 7648641 | 7648647 |
| 3/8 | 0.3750 | 3/8 | 1.3/4 | 4“ | 2 | 1 | 7648642 | 7648648 |
| 1/2 | 0.5000 | 1/2 | 3“ | 6“ | 2 | 1 | 7648643 | 7648649 |

# Solid Carbide 3-Flute End Mill

## Regular Length, Square End, 30° Helix

**S121**

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M3.1 | M3.2 | M3.3 | M4.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■295 J | ■331 J | ■344 J | ■253 J | ■223 J | ■197 I | ■236 J | ■190 I | ■161 I | ■141 I | ■121 I | ◪98 I | ■276 J | ■233 J | ■246 J | ■200 I | ■164 I | ■141 I | ■128 I | ■108 I |
| **K1.1** | **K1.2** | **K1.3** | **K2.1** | **K2.2** | **K2.3** | **K3.1** | **K3.2** | **K3.3** | **K4.1** | **K4.2** | **K4.3** | **K4.4** | **K4.5** | **K5.1** | **K5.2** | **K5.3** | **N1.1** | **N1.2** | **N1.3** |
| ■374 J | ◪276 J | ◪207 J | ■390 J | ■318 J | ◪253 I | ■348 I | ■266 J | ◪213 I | ■322 I | ■243 I | ◪177 I | ◪151 I | ◪128 I | ■364 I | ■272 I | ◪210 I | ◪1499 K | ◪1125 K | ◪751 K |
| **N2.1** | **N2.2** | **N2.3** | **N3.1** | **N3.2** | **N3.3** | | | | | | | | | | | | | | |
| ◪1001 J | ◪899 J | ◪650 J | ■843 J | ■499 J | ■249 J | | | | | | | | | | | | | | |

HM | Z 2

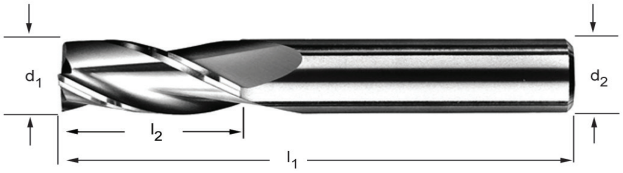
3-flute design for less chatter. Bright finish improves chip flow in soft or non-ferrous materials.

**S221**

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M3.1 | M3.2 | M3.3 | M4.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■397 J | ■443 J | ■459 J | ■338 J | ■299 J | ■262 I | ■338 J | ■272 I | ■230 I | ■203 I | ■171 I | ■141 I | ■446 J | ■377 J | ■397 J | ■325 I | ■259 I | ■223 I | ■200 I | ■174 I |
| **K1.1** | **K1.2** | **K1.3** | **K2.1** | **K2.2** | **K2.3** | **K3.1** | **K3.2** | **K3.3** | **K4.1** | **K4.2** | **K4.3** | **K4.4** | **K4.5** | **K5.1** | **K5.2** | **K5.3** | **S1.1** | **S1.2** | **S1.3** |
| ■551 J | ◪407 J | ◪305 J | ■646 J | ■525 J | ◪417 I | ■571 I | ■436 J | ◪354 I | ■528 I | ■400 I | ◪292 I | ◪249 I | ◪210 I | ■600 I | ■449 I | ◪348 I | ■230 I | ◪200 I | ◪190 I |
| **S2.1** | **S2.2** | **S3.1** | **S3.2** | **S4.1** | **S4.2** | | | | | | | | | | | | | | |
| ◪213 I | ◪138 I | ◪161 I | ◪98 I | ◪125 I | ◪79 I | | | | | | | | | | | | | | |

HM | AlTiN | Z 2

3-flute design for less chatter. ALTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| S121 | S221 |
|---|---|
|  |  |
| 1/16 - 1/2 | 1/16 - 1/2 |

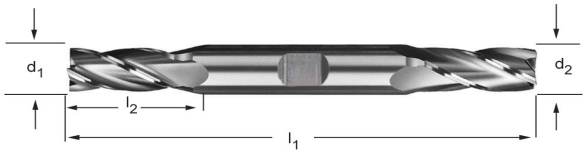
| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S121 | S221 |
|---|---|---|---|---|---|---|---|---|
| 1/16 | 0.0625 | 1/8 | 1/4 | 1.1/2 | 3 | 1 | 7648657 | 7648666 |
| 3/32 | 0.0938 | 1/8 | 3/8 | 1.1/2 | 3 | 1 | 7648658 | 7648667 |
| 1/8 | 0.1250 | 1/8 | 1/2 | 1.1/2 | 3 | 1 | 7648659 | 7648668 |
| 5/32 | 0.1562 | 3/16 | 9/16 | 2“ | 3 | 1 | 7648660 | 7648669 |
| 3/16 | 0.1875 | 3/16 | 5/8 | 2“ | 3 | 1 | 7648661 | 7648670 |
| 1/4 | 0.2500 | 1/4 | 3/4 | 2.1/2 | 3 | 1 | 7648662 | 7648671 |
| 5/16 | 0.3125 | 5/16 | 7/8 | 2.1/2 | 3 | 1 | 7648663 | 7648672 |
| 3/8 | 0.3750 | 3/8 | 7/8 | 2.1/2 | 3 | 1 | 7648664 | 7648673 |
| 1/2 | 0.5000 | 1/2 | 1“ | 3“ | 3 | 1 | 7648665 | 7648674 |

# Solid Carbide 4-Flute End Mill

## Square End, Double End, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S129 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■276 J | ■308 J | ■322 J | ■236 J | ■207 J | ■184 I | ■220 J | ■177 I | ■151 I | ■131 I | ■112 I | ◪92 I | ■256 J | ■217 J | ■230 J | ■187 I | ■154 I | ■154 I | ■131 I | ■118 I |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■102 I | ■85 I | ■348 J | ◪256 J | ◪194 J | ■364 J | ■295 J | ◪236 I | ■325 I | ■246 J | ◪197 I | ■299 I | ■226 I | ◪164 I | ◪141 I | ◪118 I | ■338 I | ■253 I | ◪197 I | ◪1394 J |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪1047 J | ◪699 J | ◪932 J | ◪837 J | ◪604 J | ■784 J | ■463 J | ■233 J | | | | | | | | | | | | |


**Regular Length**. Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft and non-ferrous materials.




S129

1/8 - 1/2

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S129 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 3/8 | 3“ | 4 | 1 | 7648719 |
| 5/32 | 0.1562 | 3/8 | 7/16 | 3“ | 4 | 1 | 7648720 |
| 3/16 | 0.1875 | 3/8 | 1/2 | 3“ | 4 | 1 | 7648721 |
| 1/4 | 0.2500 | 3/8 | 5/8 | 3“ | 4 | 1 | 7648722 |
| 5/16 | 0.3125 | 3/8 | 3/4 | 3.1/2 | 4 | 1 | 7648723 |
| 3/8 | 0.3750 | 3/8 | 3/4 | 3.1/2 | 4 | 1 | 7648724 |
| 1/2 | 0.5000 | 1/2 | 1“ | 4“ | 4 | 1 | 7648725 |

## Regular Length, Square End, 30° Helix

**S134**

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 295 J | 331 J | 344 J | 253 J | 223 J | 197 I | 236 J | 190 I | 161 I | 141 I | 121 I | 98 I | 276 J | 233 J | 246 J | 200 I | 167 I | 164 I | 141 I | 128 I |
| **M4.1** | **M4.2** | **K1.1** | **K1.2** | **K1.3** | **K2.1** | **K2.2** | **K2.3** | **K3.1** | **K3.2** | **K3.3** | **K4.1** | **K4.2** | **K4.3** | **K4.4** | **K4.5** | **K5.1** | **K5.2** | **K5.3** | **N1.1** |
| 108 I | 92 I | 374 J | 276 J | 207 J | 390 J | 318 J | 253 I | 348 I | 266 J | 213 I | 322 I | 243 I | 177 I | 151 I | 128 I | 364 I | 272 I | 210 I | 1499 J |
| **N1.2** | **N1.3** | **N2.1** | **N2.2** | **N2.3** | **N3.1** | **N3.2** | **N3.3** | | | | | | | | | | | | |
| 1125 J | 751 J | 1001 J | 899 J | 650 J | 843 J | 499 J | 249 J | | | | | | | | | | | | |

HM | Z 4

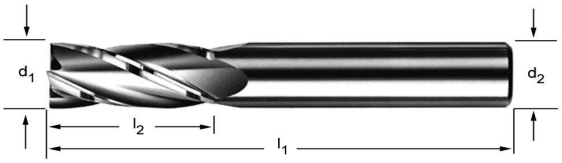
Bright finish improves chip flow in soft or non-ferrous materials.

**S234**

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 397 J | 443 J | 459 J | 338 J | 299 J | 262 I | 338 J | 272 I | 230 I | 203 I | 171 I | 141 I | 446 J | 377 J | 397 J | 325 I | 272 I | 259 I | 223 I | 200 I |
| **M4.1** | **M4.2** | **K1.1** | **K1.2** | **K1.3** | **K2.1** | **K2.2** | **K2.3** | **K3.1** | **K3.2** | **K3.3** | **K4.1** | **K4.2** | **K4.3** | **K4.4** | **K4.5** | **K5.1** | **K5.2** | **K5.3** | **S1.1** |
| 174 I | 151 I | 551 J | 407 J | 305 J | 646 J | 525 J | 417 I | 571 I | 436 J | 354 I | 528 I | 400 I | 292 I | 249 I | 210 I | 600 I | 449 I | 348 I | 230 I |
| **S1.2** | **S1.3** | **S2.1** | **S2.2** | **S3.1** | **S3.2** | **S4.1** | **S4.2** | | | | | | | | | | | | |
| 200 I | 190 I | 213 I | 138 I | 161 I | 98 I | 125 I | 79 I | | | | | | | | | | | | |

HM | AlTiN | Z 4

ALTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| S134 | S234 |
|---|---|
|  |  |
| 1/16 - 1“ | 1/16 - 1“ |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S134 | S234 |
|---|---|---|---|---|---|---|---|---|
| 1/16 | 0.0625 | 1/8 | 1/4 | 1.1/2 | 4 | 1 | 7648726 | 7648748 |
| 5/64 | 0.0781 | 1/8 | 1/4 | 1.1/2 | 4 | 1 | 7648727 | 7648749 |
| 3/32 | 0.0938 | 1/8 | 3/8 | 1.1/2 | 4 | 1 | 7648728 | 7648750 |
| 7/64 | 0.1094 | 1/8 | 3/8 | 1.1/2 | 4 | 1 | 7648729 | 7648751 |
| 1/8 | 0.1250 | 1/8 | 1/2 | 1.1/2 | 4 | 1 | 7648730 | 7648752 |
| 9/64 | 0.1406 | 3/16 | 9/16 | 2“ | 4 | 1 | 7648731 | 7648753 |
| 5/32 | 0.1562 | 3/16 | 9/16 | 2“ | 4 | 1 | 7648732 | 7648754 |
| 11/64 | 0.1719 | 3/16 | 9/16 | 2“ | 4 | 1 | 7648733 | 7648755 |
| 3/16 | 0.1875 | 3/16 | 5/8 | 2“ | 4 | 1 | 7648734 | 7648756 |
| 13/64 | 0.2031 | 1/4 | 5/8 | 2.1/2 | 4 | 1 | 7648735 | 7648757 |
| 7/32 | 0.2188 | 1/4 | 5/8 | 2.1/2 | 4 | 1 | 7648736 | 7648758 |
| 1/4 | 0.2500 | 1/4 | 3/4 | 2.1/2 | 4 | 1 | 7648737 | 7648759 |
| 5/16 | 0.3125 | 5/16 | 7/8 | 2.1/2 | 4 | 1 | 7648738 | 7648760 |
| 3/8 | 0.3750 | 3/8 | 7/8 | 2.1/2 | 4 | 1 | 7648739 | 7648761 |
| 7/16 | 0.4375 | 7/16 | 1“ | 2.1/2 | 4 | 1 | 7648740 | 7648762 |
| 1/2 | 0.5000 | 1/2 | 1“ | 3“ | 4 | 1 | 7648741 | 7648763 |
| 9/16 | 0.5625 | 9/16 | 1.1/4 | 3.1/2 | 4 | 1 | 7648742 | 7648764 |
| 5/8 | 0.6250 | 5/8 | 1.1/4 | 3.1/2 | 4 | 1 | 7648743 | 7648765 |
| 11/16 | 0.6875 | 3/4 | 1.1/2 | 4“ | 4 | 1 | 7648744 | 7648766 |
| 3/4 | 0.7500 | 3/4 | 1.1/2 | 4“ | 4 | 1 | 7648745 | 7648767 |
| 7/8 | 0.8750 | 7/8 | 1.1/2 | 4“ | 4 | 1 | 7648746 | 7648768 |
| 1“ | 1.0000 | 1“ | 1.1/2 | 4“ | 4 | 1 | 7648747 | 7648769 |

## Regular Length, Square End, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S135 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.3 | M3.3 |
| | ■ 295 J | ■ 331 J | ■ 344 J | ■ 253 J | ■ 223 J | ■ 197 I | ■ 236 J | ■ 190 I | ■ 161 I | ■ 141 I | ◪ 121 I | ◪ 98 I | ■ 276 J | ■ 233 J | ■ 246 J | ■ 200 I | ■ 167 I | ■ 164 I | ■ 141 I | ■ 128 I |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■ 108 I | ■ 92 I | ■ 374 J | ◪ 276 J | ◪ 207 J | ■ 390 J | ■ 318 J | ◪ 253 I | ■ 348 I | ■ 266 J | ◪ 213 I | ■ 322 I | ■ 243 I | ◪ 177 I | ◪ 151 I | ◪ 128 I | ■ 364 I | ■ 272 I | ◪ 210 I | ◪ 1499 J |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪ 1125 J | ◪ 751 J | ◪ 1001 J | ◪ 899 J | ◪ 650 J | ■ 843 J | ■ 499 J | ■ 249 J | | | | | | | | | | | | |

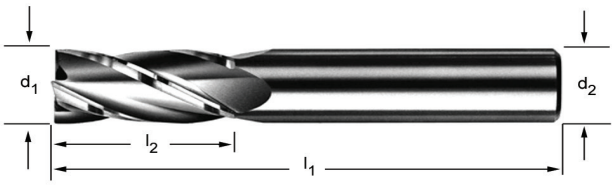
HM | Z 4

Bright finish improves chip flow in soft or non-ferrous materials.

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S235 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 397 J | ■ 443 J | ■ 459 J | ■ 338 J | ■ 299 J | ■ 262 I | ■ 338 J | ■ 272 I | ■ 230 I | ■ 203 I | ■ 171 I | ■ 141 I | ■ 446 J | ■ 377 J | ■ 397 J | ■ 325 I | ■ 272 I | ■ 259 I | ■ 223 I | ■ 200 I |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| | ■ 174 I | ■ 151 I | ■ 551 J | ■ 407 J | ■ 305 J | ■ 646 J | ■ 525 J | ■ 417 I | ■ 571 I | ■ 436 J | ■ 354 I | ■ 528 I | ■ 400 I | ■ 292 I | ■ 249 I | ■ 210 I | ■ 600 I | ■ 449 I | ■ 348 I | ■ 230 I |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | |
| | ◪ 200 I | ◪ 190 I | ◪ 213 I | ◪ 138 I | ◪ 161 I | ◪ 98 I | ◪ 125 I | ◪ 79 I | | | | | | | | | | | | |

HM | AlTiN | Z 4

AlTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| S135 | S235 |
|---|---|
|  |  |
| 2.00 - 25.00 | 2.00 - 20.00 |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S135 | S235 |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 0.0787 | 3.0 | 6.0 | 38.0 | 4 | 1 | 7648770 | 7648789 |
| 2.50 | 0.0984 | 3.0 | 7.0 | 38.0 | 4 | 1 | 7648771 | 7648790 |
| 3.00 | 0.1181 | 3.0 | 12.0 | 38.0 | 4 | 1 | 7648772 | 7648791 |
| 3.50 | 0.1378 | 4.0 | 12.0 | 50.0 | 4 | 1 | 7648773 | 7648792 |
| 4.00 | 0.1575 | 4.0 | 14.0 | 50.0 | 4 | 1 | 7648774 | 7648793 |
| 4.50 | 0.1772 | 5.0 | 14.0 | 50.0 | 4 | 1 | 7648775 | 7648794 |
| 5.00 | 0.1969 | 5.0 | 16.0 | 50.0 | 4 | 1 | 7648776 | 7648795 |
| 6.00 | 0.2362 | 6.0 | 19.0 | 63.0 | 4 | 1 | 7648777 | 7648796 |
| 7.00 | 0.2756 | 8.0 | 19.0 | 63.0 | 4 | 1 | 7648778 | 7648797 |
| 8.00 | 0.3150 | 8.0 | 19.0 | 63.0 | 4 | 1 | 7648779 | 7648798 |
| 9.00 | 0.3543 | 10.0 | 22.0 | 70.0 | 4 | 1 | 7648780 | 7648799 |
| 10.00 | 0.3937 | 10.0 | 22.0 | 70.0 | 4 | 1 | 7648781 | 7648800 |
| 11.00 | 0.4331 | 11.0 | 25.0 | 70.0 | 4 | 1 | 7648782 | 7648801 |
| 12.00 | 0.4724 | 12.0 | 25.0 | 75.0 | 4 | 1 | 7648783 | 7648802 |
| 14.00 | 0.5512 | 14.0 | 30.0 | 88.0 | 4 | 1 | 7648784 | 7648803 |
| 16.00 | 0.6299 | 16.0 | 32.0 | 88.0 | 4 | 1 | 7648785 | 7648804 |
| 18.00 | 0.7087 | 18.0 | 36.0 | 100.0 | 4 | 1 | 7648786 | 7648805 |
| 20.00 | 0.7874 | 20.0 | 38.0 | 100.0 | 4 | 1 | 7648787 | 7648806 |
| 25.00 | 0.9843 | 25.0 | 38.0 | 100.0 | 4 | 1 | 7648788 | — |

# DORMER Solid Carbide 4-Flute End Mill

## Long Length, Square End, 30° Helix

**S136**

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■276 J | ■308 J | ■322 J | ■236 J | ■207 J | ■184 I | ■220 J | ■177 I | ■151 I | ■131 I | ■112 I | ◪92 I | ■256 J | ■217 J | ■230 J | ■187 I | ■154 I | ■154 I | ■131 I | ■118 I |
| **M4.1** | **M4.2** | **K1.1** | **K1.2** | **K1.3** | **K2.1** | **K2.2** | **K2.3** | **K3.1** | **K3.2** | **K3.3** | **K4.1** | **K4.2** | **K4.3** | **K4.4** | **K4.5** | **K5.1** | **K5.2** | **K5.3** | **N1.1** |
| ■102 I | ■85 I | ■348 J | ◪256 J | ◪194 J | ■364 J | ■295 J | ◪236 I | ■325 I | ■246 J | ◪197 I | ■299 I | ■226 I | ◪164 I | ◪141 I | ◪118 I | ■338 I | ■253 I | ◪197 I | ◪1394 J |
| **N1.2** | **N1.3** | **N2.1** | **N2.2** | **N2.3** | **N3.1** | **N3.2** | **N3.3** | | | | | | | | | | | | |
| ◪1047 J | ◪699 J | ◪932 J | ◪837 J | ◪604 J | ■784 J | ■463 J | ■233 J | | | | | | | | | | | | |

HM | Z 4

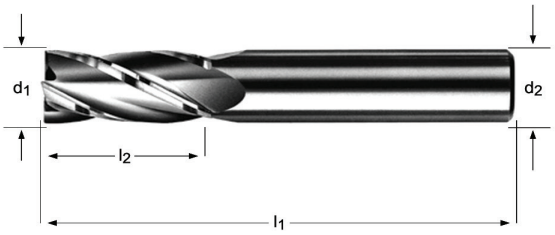
Bright finish improves chip flow in soft or non-ferrous materials.

**S236**

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■371 J | ■413 J | ■427 J | ■315 J | ■279 J | ■243 I | ■315 J | ■253 I | ■213 I | ■190 I | ■157 I | ■131 I | ■413 J | ■351 J | ■371 J | ■302 I | ■253 I | ■240 I | ■207 I | ■187 I |
| **M4.1** | **M4.2** | **K1.1** | **K1.2** | **K1.3** | **K2.1** | **K2.2** | **K2.3** | **K3.1** | **K3.2** | **K3.3** | **K4.1** | **K4.2** | **K4.3** | **K4.4** | **K4.5** | **K5.1** | **K5.2** | **K5.3** | **S1.1** |
| ■161 I | ■141 I | ■512 J | ■377 J | ■282 J | ■600 J | ■489 J | ■387 I | ■531 I | ■407 J | ■328 I | ■492 I | ■371 I | ■272 I | ■233 I | ■197 I | ■558 I | ■417 I | ■325 I | ◪213 I |
| **S1.2** | **S1.3** | **S2.1** | **S2.2** | **S3.1** | **S3.2** | **S4.1** | **S4.2** | | | | | | | | | | | | |
| ◪187 I | ◪177 I | ◪197 I | ◪128 I | ◪151 I | ◪92 I | ◪115 I | ◪72 I | | | | | | | | | | | | |

HM | AlTiN | Z 4

AlTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| S136 | S236 |
|---|---|
|  |  |
| 1/8 - 3/4 | 1/8 - 3/4 |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S136 | S236 |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 1/8 | 3/4 | 2“ | 4 | 1 | 7648807 | 7648816 |
| 3/16 | 0.1875 | 3/16 | 3/4 | 2.1/2 | 4 | 1 | 7648808 | 7648817 |
| 1/4 | 0.2500 | 1/4 | 1.1/8 | 3“ | 4 | 1 | 7648809 | 7648818 |
| 5/16 | 0.3125 | 5/16 | 1.1/8 | 3“ | 4 | 1 | 7648810 | 7648819 |
| 3/8 | 0.3750 | 3/8 | 1.1/8 | 3“ | 4 | 1 | 7648811 | 7648820 |
| 7/16 | 0.4375 | 7/16 | 2“ | 4“ | 4 | 1 | 7648812 | 7648821 |
| 1/2 | 0.5000 | 1/2 | 2“ | 4“ | 4 | 1 | 7648813 | 7648822 |
| 5/8 | 0.6250 | 5/8 | 2.1/4 | 5“ | 4 | 1 | 7648814 | 7648823 |
| 3/4 | 0.7500 | 3/4 | 2.1/4 | 5“ | 4 | 1 | 7648815 | 7648824 |

# Solid Carbide 4-Flute End Mill

DORMER

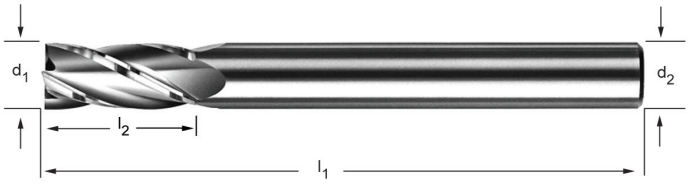
## Extra Long Length, Square End, 30° Helix

| S137 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ■266 J | ■299 J | ■308 J | ■226 J | ■200 J | ■177 I | ■213 J | ■171 I | ■144 I | ■128 I | ■108 I | ◪89 I | ■246 J | ■210 J | ■220 J | ■180 I | ■151 I | ■125 I | ■108 I | ■98 I |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■98 I | ■85 I | ■299 J | ◪220 J | ◪167 J | ■305 J | ■249 J | ◪200 I | ■272 I | ■207 J | ◪167 I | ■253 I | ■190 I | ◪138 I | ◪118 I | ◪98 I | ■285 I | ■213 I | ◪164 I | ◪1348 J |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪1010 J | ◪676 J | ◪899 J | ◪807 J | ◪584 J | ■761 J | ■449 J | ■226 J | | | | | | | | | | | | |


Bright finish improves chip flow in soft or non-ferrous materials.

| S237 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ■358 J | ■400 J | ■413 J | ■305 J | ■269 J | ■240 I | ■295 J | ■236 I | ■200 I | ■177 I | ■148 I | ■121 I | ■410 J | ■348 J | ■364 J | ■299 I | ■249 I | ■125 I | ■180 I | ■164 I |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| | ■171 I | ■148 I | ■499 J | ■371 J | ■276 J | ■492 J | ■400 J | ■318 I | ■436 I | ■331 J | ■269 I | ■404 I | ■305 I | ■223 I | ■190 I | ■161 I | ■456 I | ■344 I | ■266 I | ■200 I |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | |
| | ◪180 I | ◪174 I | ◪187 I | ◪121 I | ◪141 I | ◪85 I | ◪112 I | ◪69 I | | | | | | | | | | | | |


AlTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| S137 | S237 |
|---|---|
|  |  |
| 1/8 - 1“ | 1/8 - 1“ |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S137 | S237 |
|---|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 1/8 | 1“ | 3“ | 4 | 1 | 7648825 | 7648835 |
| 3/16 | 0.1875 | 3/16 | 1.1/8 | 3“ | 4 | 1 | 7648826 | 7648836 |
| 1/4 | 0.2500 | 1/4 | 1.1/2 | 4“ | 4 | 1 | 7648827 | 7648837 |
| 5/16 | 0.3125 | 5/16 | 1.5/8 | 4“ | 4 | 1 | 7648828 | 7648838 |
| 3/8 | 0.3750 | 3/8 | 1.3/4 | 4“ | 4 | 1 | 7648829 | 7648839 |
| 7/16 | 0.4375 | 7/16 | 3“ | 6“ | 4 | 1 | 7648830 | 7648840 |
| 1/2 | 0.5000 | 1/2 | 3“ | 6“ | 4 | 1 | 7648831 | 7648841 |
| 5/8 | 0.6250 | 5/8 | 3“ | 6“ | 4 | 1 | 7648832 | 7648842 |
| 3/4 | 0.7500 | 3/4 | 3“ | 6“ | 4 | 1 | 7648833 | 7648843 |
| 1“ | 1.0000 | 1“ | 3“ | 6“ | 4 | 1 | 7648834 | 7648844 |

# Solid Carbide 4-Flute End Mill

## Regular Length, Ball Nose, 30° Helix

| S138 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ■ 295 E | ■ 331 E | ■ 344 E | ■ 253 E | ■ 223 E | ■ 197 E | ■ 236 E | ■ 190 E | ■ 161 E | ■ 141 E | ■ 121 E | ◪ 98 E | ■ 276 E | ■ 233 E | ■ 246 E | ■ 200 E | ■ 167 E | ■ 164 E | ■ 141 E | ■ 128 D |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■ 108 D | ■ 92 D | ■ 374 E | ◪ 276 E | ◪ 207 E | ■ 390 E | ■ 318 E | ◪ 253 E | ■ 348 E | ■ 266 E | ◪ 213 E | ■ 322 E | ■ 243 E | ◪ 177 E | ◪ 151 D | ◪ 128 D | ■ 364 E | ■ 272 E | ◪ 210 E | ◪ 1499 F |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪ 1125 F | ◪ 751 F | ◪ 1001 E | ◪ 899 E | ◪ 650 E | ■ 843 E | ■ 499 E | ■ 249 E | | | | | | | | | | | | |

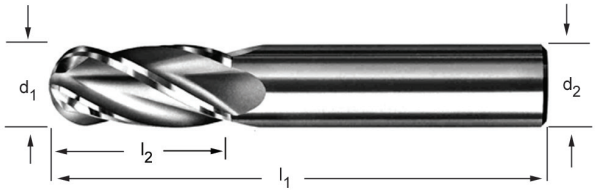
HM | Z 4

Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

| S238 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ■ 397 E | ■ 443 E | ■ 459 E | ■ 338 E | ■ 299 E | ■ 262 E | ■ 338 E | ■ 272 E | ■ 230 E | ■ 203 E | ■ 171 E | ■ 141 E | ■ 446 E | ■ 377 E | ■ 397 E | ■ 325 E | ■ 272 E | ■ 259 E | ■ 223 E | ■ 200 D |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| | ■ 174 D | ■ 151 D | ■ 551 E | ■ 407 E | ■ 305 E | ■ 646 E | ■ 525 E | ■ 417 E | ■ 571 E | ■ 436 E | ■ 354 E | ■ 528 E | ■ 400 E | ■ 292 E | ■ 249 D | ■ 210 D | ■ 600 E | ■ 449 E | ■ 348 E | ◪ 230 E |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | |
| | ◪ 200 E | ◪ 190 D | ◪ 213 D | ◪ 138 D | ◪ 161 D | ◪ 98 D | ◪ 125 D | ◪ 79 D | | | | | | | | | | | | |

HM | AlTiN | Z 4

Ball nose for cutting internal part radius. AlTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| S138 | S238 |
|---|---|
|  |  |
| 1/16 - 3/4 | 1/16 - 3/4 |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S138 | S238 |
|---|---|---|---|---|---|---|---|---|
| 1/16 | 0.0625 | 1/8 | 1/4 | 1.1/2 | 4 | 1 | 7648845 | 7648857 |
| 3/32 | 0.0938 | 1/8 | 3/8 | 1.1/2 | 4 | 1 | 7648846 | 7648858 |
| 1/8 | 0.1250 | 1/8 | 1/2 | 1.1/2 | 4 | 1 | 7648847 | 7648859 |
| 5/32 | 0.1562 | 3/16 | 9/16 | 2“ | 4 | 1 | 7648848 | 7648860 |
| 3/16 | 0.1875 | 3/16 | 5/8 | 2“ | 4 | 1 | 7648849 | 7648861 |
| 1/4 | 0.2500 | 1/4 | 3/4 | 2.1/2 | 4 | 1 | 7648850 | 7648862 |
| 5/16 | 0.3125 | 5/16 | 7/8 | 2.1/2 | 4 | 1 | 7648851 | 7648863 |
| 3/8 | 0.3750 | 3/8 | 7/8 | 2.1/2 | 4 | 1 | 7648852 | 7648864 |
| 7/16 | 0.4375 | 7/16 | 1“ | 2.1/2 | 4 | 1 | 7648853 | 7648865 |
| 1/2 | 0.5000 | 1/2 | 1“ | 3“ | 4 | 1 | 7648854 | 7648866 |
| 5/8 | 0.6250 | 5/8 | 1.1/4 | 3.1/2 | 4 | 1 | 7648855 | 7648867 |
| 3/4 | 0.7500 | 3/4 | 1.1/2 | 4“ | 4 | 1 | 7648856 | 7648868 |

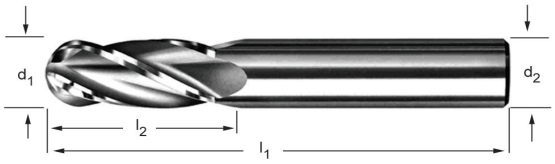
## Regular Length, Ball Nose, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S139 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 295 E | ■ 331 E | ■ 344 E | ■ 253 E | ■ 223 E | ■ 197 E | ■ 236 E | ■ 190 E | ■ 161 E | ■ 141 E | ■ 121 E | ◪ 98 E | ■ 276 E | ■ 233 E | ■ 246 E | ■ 200 E | ■ 167 E | ■ 164 E | ■ 141 E | ■ 128 D |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 |
| | ■ 108 D | ■ 92 D | ■ 374 E | ◪ 276 E | ◪ 207 E | ■ 390 E | ■ 318 E | ◪ 253 E | ■ 348 E | ■ 266 E | ◪ 213 E | ■ 322 E | ■ 243 E | ◪ 177 E | ◪ 151 D | ◪ 128 D | ■ 364 E | ■ 272 E | ◪ 210 E | ◪ 1499 F |
| | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | |
| | ◪ 1125 F | ◪ 751 F | ◪ 1001 E | ◪ 899 E | ◪ 650 E | ■ 843 E | ■ 499 E | ■ 249 E | | | | | | | | | | | | |


Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| S239 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
| | ■ 397 E | ■ 443 E | ■ 459 E | ■ 338 E | ■ 299 E | ■ 262 E | ■ 338 E | ■ 272 E | ■ 230 E | ■ 203 E | ■ 171 E | ■ 141 E | ■ 446 E | ■ 377 E | ■ 397 E | ■ 325 E | ■ 272 E | ■ 259 E | ■ 223 E | ■ 200 D |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| | ■ 174 D | ■ 151 D | ■ 551 E | ■ 407 E | ■ 305 E | ■ 646 E | ■ 525 E | ■ 417 E | ■ 571 E | ■ 436 E | ■ 354 E | ■ 528 E | ■ 400 E | ■ 292 E | ■ 249 D | ■ 210 D | ■ 600 E | ■ 449 E | ■ 348 E | ■ 230 E |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | |
| | ◪ 200 E | ◪ 190 D | ◪ 213 D | ◪ 138 D | ◪ 161 D | ◪ 98 D | ◪ 125 D | ◪ 79 D | | | | | | | | | | | | |


Ball nose for cutting internal part radius. AlTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| S139 | S239 |
|---|---|
|  |  |
| 2.00 - 12.00 | 2.00 - 12.00 |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S139 | S239 |
|---|---|---|---|---|---|---|---|---|
| 2.00 | 0.0787 | 3.0 | 6.0 | 38.0 | 4 | 1 | 7648877 | 7648878 |
| 3.00 | 0.1181 | 3.0 | 12.0 | 38.0 | 4 | 1 | 7648876 | 7648879 |
| 4.00 | 0.1575 | 4.0 | 14.0 | 50.0 | 4 | 1 | 7648875 | 7648880 |
| 4.50 | 0.1772 | 5.0 | 14.0 | 50.0 | 4 | 1 | 7648874 | — |
| 5.00 | 0.1969 | 5.0 | 16.0 | 50.0 | 4 | 1 | 7648873 | 7648881 |
| 6.00 | 0.2362 | 6.0 | 19.0 | 63.0 | 4 | 1 | 7648872 | 7648882 |
| 8.00 | 0.3150 | 8.0 | 19.0 | 63.0 | 4 | 1 | 7648871 | 7648883 |
| 10.00 | 0.3937 | 10.0 | 22.0 | 70.0 | 4 | 1 | 7648870 | 7648884 |
| 12.00 | 0.4724 | 12.0 | 25.0 | 75.0 | 4 | 1 | 7648869 | 7648885 |

# Solid Carbide 4-Flute End Mill

## Long Length, Ball Nose, 30° Helix

| S146 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M3.1 | M3.2 | M3.3 | M4.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 276 E | 308 E | 322 E | 236 E | 207 E | 184 E | 220 E | 177 E | 151 E | 131 E | 112 E | 92 E | 256 E | 217 E | 230 E | 187 E | 154 E | 131 E | 118 D | 102 D |
| | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 |
| | 348 E | 256 E | 194 E | 364 E | 295 E | 236 E | 325 E | 246 E | 197 E | 299 E | 226 E | 164 E | 141 D | 118 D | 338 E | 253 E | 197 E | 1394 F | 1047 F | 699 F |
| | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | | | |
| | 932 E | 837 E | 604 E | 784 E | 463 E | 233 E | | | | | | | | | | | | | | |

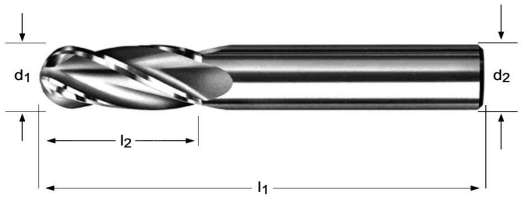
HM | Z 4

Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

| S246 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 371 E | 413 E | 427 E | 315 E | 279 E | 243 E | 315 E | 253 E | 213 E | 190 E | 157 E | 131 E | 413 E | 351 E | 371 E | 302 E | 253 E | 240 E | 207 E | 187 D |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| | 161 D | 141 D | 512 E | 377 E | 282 E | 600 E | 489 E | 387 E | 531 E | 407 E | 328 E | 492 E | 371 E | 272 E | 233 D | 197 D | 558 E | 417 E | 325 E | 213 E |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | |
| | 187 E | 177 D | 197 D | 128 D | 151 D | 92 D | 115 D | 72 D | | | | | | | | | | | | |

HM | AlTiN | Z 4

Ball nose for cutting internal part radius. AlTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| S146 | S246 |
|---|---|
|  |  |
| 1/4 - 5/8 | 1/4 - 5/8 |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S146 | S246 |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 0.2500 | 1/4 | 1.1/8 | 3“ | 4 | 1 | 7648886 | 7648890 |
| 3/8 | 0.3750 | 3/8 | 1.1/8 | 3“ | 4 | 1 | 7648887 | 7648891 |
| 1/2 | 0.5000 | 1/2 | 2“ | 4“ | 4 | 1 | 7648888 | 7648892 |
| 5/8 | 0.6250 | 5/8 | 2.1/4 | 5“ | 4 | 1 | 7648889 | 7648893 |

## Extra Long Length, Ball Nose, 30° Helix

| S147 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M3.1 | M3.2 | M3.3 | M4.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 276 E | 308 E | 322 E | 236 E | 207 E | 184 E | 220 E | 177 E | 151 E | 131 E | 112 E | 92 E | 256 E | 217 E | 230 E | 187 E | 154 E | 131 E | 118 D | 102 D |
| | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 |
| | 348 E | 256 E | 194 E | 364 E | 295 E | 236 E | 325 E | 246 E | 197 E | 299 E | 226 E | 164 E | 141 D | 118 D | 338 E | 253 E | 197 E | 1394 F | 1047 F | 699 F |
| | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | | | | | | | | | | | | | | |
| | 932 E | 837 E | 604 E | 784 E | 463 E | 233 E | | | | | | | | | | | | | | |

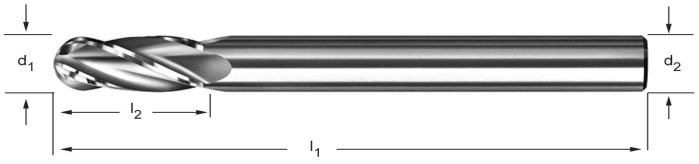
HM | Z 4

Ball nose for cutting internal part radius. Bright finish improves chip flow in soft or non-ferrous materials.

| S247 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.1 | M3.2 | M3.3 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 358 E | 400 E | 413 E | 305 E | 269 E | 240 E | 295 E | 236 E | 200 E | 177 E | 148 E | 121 E | 410 E | 348 E | 364 E | 299 E | 249 E | 210 E | 180 E | 164 D |
| | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| | 171 D | 148 D | 499 E | 371 E | 276 E | 492 E | 400 E | 318 E | 436 E | 331 E | 269 E | 404 E | 305 E | 223 E | 190 D | 161 D | 456 E | 344 E | 266 E | 200 E |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | |
| | 180 E | 174 D | 187 D | 121 D | 141 D | 85 D | 112 D | 69 D | | | | | | | | | | | | |

HM | AlTiN | Z 4

Ball nose for cutting internal part radius. AlTiN coating increases surface hardness, improves chip flow and tool life allowing higher metal removal rates.




| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | # of Flutes | Pack Qty | S147 | S247 |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 1/8 - 5/8 | 1/8 - 5/8 |
| 1/8 | 0.1250 | 1/8 | 1“ | 3“ | 4 | 1 | 7648894 | 7648901 |
| 3/16 | 0.1875 | 3/16 | 1.1/8 | 3“ | 4 | 1 | 7648895 | 7648902 |
| 1/4 | 0.2500 | 1/4 | 1.1/2 | 4“ | 4 | 1 | 7648896 | 7648903 |
| 5/16 | 0.3125 | 5/16 | 1.5/8 | 4“ | 4 | 1 | 7648897 | 7648904 |
| 3/8 | 0.3750 | 3/8 | 1.3/4 | 4“ | 4 | 1 | 7648898 | 7648905 |
| 1/2 | 0.5000 | 1/2 | 3“ | 6“ | 4 | 1 | 7648899 | 7648906 |
| 5/8 | 0.6250 | 5/8 | 3“ | 6“ | 4 | 1 | 7648900 | 7648907 |

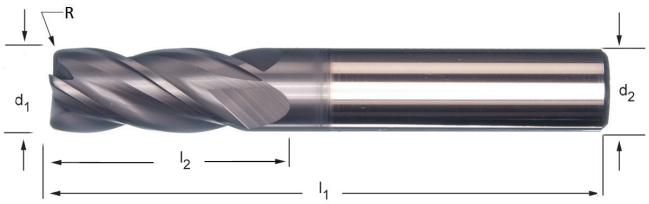
# Solid Carbide 4-Flute End Mill

## Regular length, Corner Radius, Unequal Helix

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.3 | M3.2 | M3.3 |
| | ■ 696 J | ■ 778 J | ■ 801 J | ■ 594 J | ■ 522 J | ■ 463 I | ■ 482 J | ■ 387 I | ■ 328 I | ■ 285 I | ■ 243 I | ■ 197 I | ■ 489 J | ■ 413 J | ■ 433 J | ■ 358 I | ■ 302 I | ■ 400 I | ■ 344 I | ■ 308 I |
| S223HA | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| S223HB | ■ 302 I | ■ 256 I | ■ 771 J | ■ 571 J | ■ 430 J | ■ 794 J | ■ 646 J | ■ 515 I | ■ 702 J | ■ 538 J | ■ 433 I | ■ 650 I | ■ 492 I | ■ 361 I | ■ 308 I | ■ 256 I | ■ 735 I | ■ 554 I | ■ 430 I | ■ 522 I |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | H1.1 | H2.1 | H2.2 | H3.1 | H3.2 | H4.1 | H4.2 | | | | | |
| | ■ 463 I | ■ 387 I | ■ 358 I | ■ 315 I | ■ 269 I | ■ 223 I | ■ 210 I | ■ 180 I | ■ 348 I | ■ 207 G | ◪ 177 E | ■ 230 G | ■ 187 G | ◪ 148 E | ◪ 125 B | | | | | |


ALTiN coating increases hardness, and improves tool life allowing higher metal removal rates. These unequal helix cutters with corner radii are designed for higher speeds and deeper cuts. Provides superior workpiece finishes by eliminating vibrations and harmonics. Excellent for milling tough alloys and hardened steels.

**S223HB** has a Weldon shank.




| S223HA | S223HB |
|---|---|
|  |  |
| 1/8 - 1“ | 1/8- 1“ |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | R Radius | # of Flutes | Pack Qty | S223HA | S223HB |
|---|---|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 1/8 | 3/8 | 1-1/2 | .015 | 4 | 1 | 7648675 | 7648697 |
| 1/8 | 0.1250 | 1/8 | 3/8 | 1-1/2 | .030 | 4 | 1 | 7648676 | 7648698 |
| 3/16 | 0.1875 | 3/16 | 7/16 | 2“ | .015 | 4 | 1 | 7648677 | 7648699 |
| 3/16 | 0.1875 | 3/16 | 7/16 | 2“ | .030 | 4 | 1 | 7648678 | 7648700 |
| 1/4 | 0.2500 | 1/4 | 5/8 | 2-1/2 | .015 | 4 | 1 | 7648679 | 7648701 |
| 1/4 | 0.2500 | 1/4 | 5/8 | 2-1/2 | .030 | 4 | 1 | 7648680 | 7648702 |
| 5/16 | 0.3125 | 1/4 | 1/2 | 2“ | .015 | 4 | 1 | 7648681 | 7648703 |
| 5/16 | 0.3125 | 1/4 | 1/2 | 2“ | .030 | 4 | 1 | 7648682 | 7648704 |
| 3/8 | 0.3750 | 3/8 | 7/8 | 2-1/2 | .015 | 4 | 1 | 7648683 | 7648705 |
| 3/8 | 0.3750 | 3/8 | 7/8 | 2-1/2 | .030 | 4 | 1 | 7648684 | 7648706 |
| 7/16 | 0.4375 | 7/16 | 5/8 | 2-1/2 | .020 | 4 | 1 | 7648685 | 7648707 |
| 7/16 | 0.4375 | 7/16 | 5/8 | 2-1/2 | .045 | 4 | 1 | 7648686 | 7648708 |
| 1/2 | 0.5000 | 1/2 | 1-1/4 | 3“ | .030 | 4 | 1 | 7648687 | 7648709 |
| 1/2 | 0.5000 | 1/2 | 1-1/4 | 3“ | .060 | 4 | 1 | 7648688 | 7648710 |
| 9/16 | 0.5625 | 9/16 | 1-1/8 | 3-1/2 | .045 | 4 | 1 | 7648689 | 7648711 |
| 9/16 | 0.5625 | 9/16 | 1-1/8 | 3-1/2 | .060 | 4 | 1 | 7648690 | 7648712 |
| 5/8 | 0.6250 | 5/8 | 1-1/4 | 3-1/2 | .060 | 4 | 1 | 7648691 | 7648713 |
| 5/8 | 0.6250 | 5/8 | 1-1/4 | 5“ | .090 | 4 | 1 | 7648692 * | 7648714 * |
| 3/4 | 0.7500 | 3/4 | 1-1/2 | 4“ | .030 | 4 | 1 | 7648693 | 7648715 |
| 3/4 | 0.7500 | 3/4 | 1-1/2 | 4“ | .060 | 4 | 1 | 7648694 | 7648716 |
| 1“ | 1.0000 | 1“ | 2-1/4 | 5“ | .030 | 4 | 1 | 7648695 * | 7648717 * |
| 1“ | 1.0000 | 1“ | 2-1/4 | 5“ | .090 | 4 | 1 | 7648696 * | 7648718 * |

* Will require a reduction of 30% - 60% in cutting speed.

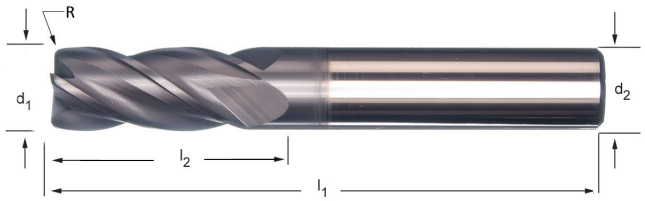
# Solid Carbide 5-Flute End Mill

DORMER

## Regular length, Corner Radius, Unequal Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | P4.3 | M1.1 | M1.2 | M2.1 | M2.2 | M2.3 | M3.3 | M3.3 |
| | 696 J | 778 J | 801 J | 594 J | 522 J | 463 I | 482 J | 387 I | 328 I | 285 I | 243 I | 197 I | 489 J | 413 J | 433 J | 358 I | 302 I | 400 I | 344 I | 308 I |
| S248HA | M4.1 | M4.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | S1.1 |
| S248HB | 302 I | 256 I | 456 J | 338 J | 253 J | 469 J | 381 J | 305 I | 417 J | 318 J | 256 I | 384 I | 292 I | 213 I | 184 I | 151 I | 436 I | 328 I | 253 I | 1017 I |
| | S1.2 | S1.3 | S2.1 | S2.2 | S3.1 | S3.2 | S4.1 | S4.2 | H1.1 | H2.1 | H2.2 | H3.1 | H3.2 | H4.1 | H4.2 | | | | | |
| | 902 I | 755 I | 699 I | 614 I | 525 I | 436 I | 410 I | 351 I | 673 I | 400 G | 341 E | 443 G | 364 G | 282 E | 240 B | | | | | |


ALTiN coating increases hardness, and improves tool life allowing higher metal removal rates. These unequal helix cutters with corner radii are designed for higher speeds and deeper cuts. Provides superior workpiece finishes by eliminating vibrations and harmonics. Excellent for milling tough alloys and hardened steels. **S248HB** has Weldon Shank




| S248HA | S248HB |
|---|---|
|  |  |
| 5/16 - 1" | 5/16 - 1" |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $d_2$ Ø Inch | $l_2$ Inch | $l_1$ Inch | R Radius | # of Flutes | Pack Qty | S248HA | S248HB |
|---|---|---|---|---|---|---|---|---|---|
| 5/16 | 0.3125 | 5/16 | 13/16 | 2-1/2 | .015 | 5 | 1 | 7648908 | 7648927 |
| 5/16 | 0.3125 | 5/16 | 13/16 | 2-1/2 | .030 | 5 | 1 | 7648909 | 7648928 |
| 3/8 | 0.3750 | 3/8 | 7/8 | 2-1/2 | .015 | 5 | 1 | 7648910 | 7648929 |
| 3/8 | 0.3750 | 3/8 | 7/8 | 2-1/2 | .030 | 5 | 1 | 7648911 | 7648930 |
| 7/16 | 0.4375 | 7/16 | 5/8 | 2-1/2 | .020 | 5 | 1 | 7648912 | 7648931 |
| 7/16 | 0.4375 | 7/16 | 5/8 | 2-1/2 | .045 | 5 | 1 | 7648913 | 7648932 |
| 1/2 | 0.5000 | 1/2 | 1 | 3 | .030 | 5 | 1 | 7648914 | 7648933 |
| 1/2 | 0.5000 | 1/2 | 1-1/4 | 3 | .030 | 5 | 1 | 7648915 | 7648934 |
| 1/2 | 0.5000 | 1/2 | 1-1/4 | 3 | .060 | 5 | 1 | 7648916 | 7648935 |
| 9/16 | 0.5625 | 9/16 | 1-1/8 | 3-1/2 | .020 | 5 | 1 | 7648917 | 7648936 |
| 9/16 | 0.5625 | 9/16 | 1-1/8 | 3-1/2 | .045 | 5 | 1 | 7648918 | 7648937 |
| 9/16 | 0.5625 | 9/16 | 1-1/8 | 3-1/2 | .060 | 5 | 1 | 7648919 | 7648938 |
| 5/8 | 0.6250 | 5/8 | 1-1/4 | 3-1/2 | .045 | 5 | 1 | 7648920 | 7648939 |
| 5/8 | 0.6250 | 5/8 | 1-1/4 | 3-1/2 | .060 | 5 | 1 | 7648921 | 7648940 |
| 5/8 | 0.6250 | 5/8 | 1-1/4 | 3-1/2 | .090 | 5 | 1 | 7648922 | 7648941 |
| 3/4 | 0.7500 | 3/4 | 1-1/2 | 4 | .030 | 5 | 1 | 7648923 | 7648942 |
| 3/4 | 0.7500 | 3/4 | 1-1/2 | 4 | .060 | 5 | 1 | 7648924 | 7648943 |
| 1 | 1.0000 | 1 | 2-1/4 | 5 | .030 | 5 | 1 | 7648925 * | 7648944 * |
| 1 | 1.0000 | 1 | 2-1/4 | 5 | .090 | 5 | 1 | 7648926 * | 7648945 * |

* Will require a reduction of 30% - 60% in cutting speed.

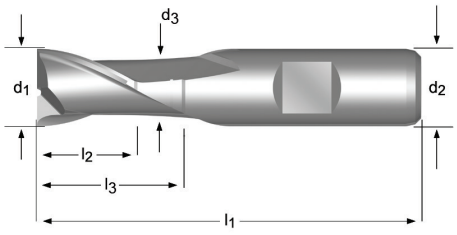
# HSS-PM 2-Flute End Mill

## Stub Length, Square End, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C110 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
| | ■ 174 E | ■ 194 E | ■ 200 E | ■ 148 E | ◪ 131 E | ◪ 121 E | ◪ 98 D | ◪ 72 D | ◪ 135 E | ◪ 115 E | ◪ 121 E | ◪ 98 D | ◪ 115 E | ◪ 85 E | ◪ 62 E | ◪ 203 E | ◪ 164 E | ◪ 131 D | ◪ 177 E | ◪ 138 E |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 |
| | ◪ 112 D | ◪ 164 D | ◪ 125 D | ◪ 92 D | ◪ 79 C | ◪ 66 C | ◪ 187 D | ◪ 141 D | ◪ 108 D | ◪ 312 G | ◪ 233 F | ◪ 157 F | ◪ 157 E | ◪ 141 E | ◪ 102 E | ■ 164 E | ■ 95 E | ■ 49 E | ◪ 164 E | ■ 115 D |
| | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | | | | | | | | |
| | ◪ 82 D | ◪ 66 C | ◪ 49 C | ◪ 39 C | | | | | | | | | | | | | | | | |

HSS-E PM | P9 | Z 2

Powdered Metal. P9 slotting tolerance.




C110

1.00 - 50.00

| $d_1$ Ø Inch | $d_1$ Ø mm | $d_2$ Ø$h_6$ mm | $l_2$ mm | $l_1$ mm | # of Flutes | $l_3$ mm | $d_3$ Ø mm | Pack Qty | C110 |
|---|---|---|---|---|---|---|---|---|---|
| | 1.00 | 6 | 2.5 | 47 | 2 | - | - | 1 | 0353165 |
| | 1.50 | 6 | 3 | 47 | 2 | - | - | 1 | 0353172 |
| 1/16 | 1.59 | 6 | 3 | 47 | 2 | - | - | 1 | 0639795 |
| | 1.80 | 6 | 4 | 48 | 2 | - | - | 1 | 0353189 |
| | 2.00 | 6 | 4 | 48 | 2 | - | - | 1 | 0353301 |
| 3/32 | 2.38 | 6 | 5 | 49 | 2 | - | - | 1 | 0639801 |
| | 2.50 | 6 | 5 | 49 | 2 | - | - | 1 | 0353318 |
| | 2.80 | 6 | 5 | 49 | 2 | - | - | 1 | 0353325 |
| | 3.00 | 6 | 5 | 49 | 2 | - | - | 1 | 0353370 |
| 1/8 | 3.18 | 6 | 6 | 50 | 2 | - | - | 1 | 0639818 |
| | 3.50 | 6 | 6 | 50 | 2 | - | - | 1 | 0353387 |
| | 3.80 | 6 | 7 | 51 | 2 | - | - | 1 | 0353394 |
| | 4.00 | 6 | 7 | 51 | 2 | - | - | 1 | 0353424 |
| | 4.50 | 6 | 7 | 51 | 2 | - | - | 1 | 0353431 |
| 3/16 | 4.76 | 6 | 8 | 52 | 2 | - | - | 1 | 0639825 |
| | 4.80 | 6 | 8 | 52 | 2 | - | - | 1 | 0353448 [1)2)] |
| | 5.00 | 6 | 8 | 52 | 2 | - | - | 1 | 0353455 |
| | 5.50 | 6 | 8 | 52 | 2 | - | - | 1 | 0353462 |
| | 5.75 | 6 | 8 | 52 | 2 | - | - | 1 | 0353479 [1)2)] |
| | 6.00 | 6 | 8 | 52 | 2 | - | - | 1 | 0353486 |
| 1/4 | 6.35 | 10 | 10 | 60 | 2 | - | - | 1 | 0639832 |
| | 6.50 | 10 | 10 | 60 | 2 | - | - | 1 | 0353493 |
| | 6.75 | 10 | 10 | 60 | 2 | - | - | 1 | 0629031 |
| | 7.00 | 10 | 10 | 60 | 2 | - | - | 1 | 0353509 |
| | 7.50 | 10 | 10 | 60 | 2 | - | - | 1 | 0353516 |
| | 7.75 | 10 | 11 | 61 | 2 | - | - | 1 | 0573495 [1)2)] |
| 5/16 | 7.94 | 10 | 11 | 61 | 2 | - | - | 1 | 0639849 |
| | 8.00 | 10 | 11 | 61 | 2 | - | - | 1 | 0353523 |
| | 8.50 | 10 | 11 | 61 | 2 | - | - | 1 | 0353530 |

[1)] Diameter tolerance h10
[2)] Slot not in P9 tolerance
[3)] Available in HSCo only

# HSS-PM 2-Flute End Mill

DORMER

| $d_1$ Ø Inch | $d_1$ Ø mm | $d_2$ Ø$h_6$ mm | $l_2$ mm | $l_1$ mm | # of Flutes | $l_3$ mm | $d_3$ Ø mm | Pack Qty | C110 |
|---|---|---|---|---|---|---|---|---|---|
| | 9.00 | 10 | 11 | 61 | 2 | - | - | 1 | 0353547 |
| | 9.50 | 10 | 11 | 61 | 2 | - | - | 1 | 0353554 |
| 3/8 | 9.52 | 10 | 13 | 63 | 2 | 22.5 | 9.5 | 1 | 0639856 |
| | 9.70 | 10 | 13 | 63 | 2 | 22.5 | 9.5 | 1 | 0573501 [1)2)] |
| | 10.00 | 10 | 13 | 63 | 2 | 22.5 | 9.5 | 1 | 0353196 |
| 13/32 | 10.32 | 12 | 13 | 70 | 2 | - | - | 1 | 0639863 |
| | 10.50 | 12 | 13 | 70 | 2 | - | - | 1 | 0353202 |
| | 11.00 | 12 | 13 | 70 | 2 | - | - | 1 | 0353219 |
| 7/16 | 11.11 | 12 | 13 | 70 | 2 | - | - | 1 | 0639870 |
| | 11.50 | 12 | 13 | 70 | 2 | - | - | 1 | 0573433 |
| | 11.70 | 12 | 16 | 73 | 2 | 27.5 | 11.5 | 1 | 0573440 [1)2)] |
| | 12.00 | 12 | 16 | 73 | 2 | 27.5 | 11.5 | 1 | 0353226 |
| | 12.50 | 12 | 16 | 73 | 2 | 27.5 | 11.5 | 1 | 0573457 |
| 1/2 | 12.70 | 12 | 16 | 73 | 2 | 27.5 | 11.5 | 1 | 0639887 |
| | 13.00 | 12 | 16 | 73 | 2 | 27.5 | 11.5 | 1 | 0353233 |
| 17/32 | 13.49 | 12 | 16 | 73 | 2 | 27.5 | 11.5 | 1 | 0639894 |
| | 13.70 | 12 | 16 | 73 | 2 | 27.5 | 11.5 | 1 | 0573464 [1)2)] |
| | 14.00 | 12 | 16 | 73 | 2 | 27.5 | 11.5 | 1 | 0353240 |
| 9/16 | 14.29 | 12 | 16 | 73 | 2 | 27.5 | 11.5 | 1 | 0639900 |
| | 15.00 | 12 | 16 | 73 | 2 | 27.5 | 11.5 | 1 | 0353257 |
| | 15.70 | 16 | 19 | 79 | 2 | 30.5 | 15.5 | 1 | 0573471 [1)2)] |
| 5/8 | 15.88 | 16 | 19 | 79 | 2 | 30.5 | 15.5 | 1 | 0639917 |
| | 16.00 | 16 | 19 | 79 | 2 | 30.5 | 15.5 | 1 | 0353264 |
| | 17.00 | 16 | 19 | 79 | 2 | 30.5 | 15.5 | 1 | 0353271 |
| 11/16 | 17.46 | 16 | 19 | 79 | 2 | 30.5 | 15.5 | 1 | 0639924 |
| | 17.70 | 16 | 19 | 79 | 2 | 30.5 | 15.5 | 1 | 0628942 |
| | 18.00 | 16 | 19 | 79 | 2 | 30.5 | 15.5 | 1 | 0353288 |
| | 19.00 | 16 | 19 | 79 | 2 | 30.5 | 15.5 | 1 | 0353295 |
| 3/4 | 19.05 | 20 | 22 | 88 | 2 | 37.5 | 18.5 | 1 | 0639931 |
| | 19.70 | 20 | 22 | 88 | 2 | 37.5 | 19.5 | 1 | 0628959 |
| | 20.00 | 20 | 22 | 88 | 2 | 37.5 | 19.5 | 1 | 0353332 |
| | 21.70 | 20 | 22 | 88 | 2 | 37.5 | 19.5 | 1 | 0628966 |
| | 22.00 | 20 | 22 | 88 | 2 | 37.5 | 19.5 | 1 | 0353349 |
| 7/8 | 22.22 | 20 | 22 | 88 | 2 | 37.5 | 19.5 | 1 | 0639948 |
| | 24.00 | 25 | 26 | 102 | 2 | 45.5 | 23.5 | 1 | 0573488 |
| | 24.70 | 25 | 26 | 102 | 2 | 45.5 | 24.5 | 1 | 0628973 |
| | 25.00 | 25 | 26 | 102 | 2 | 45.5 | 24.5 | 1 | 0353356 |
| 1‘‘ | 25.40 | 25 | 26 | 102 | 2 | 45.5 | 24.5 | 1 | 0621929 |
| | 26.00 | 25 | 26 | 102 | 2 | 45.5 | 24.5 | 1 | 0628980 |
| | 28.00 | 25 | 26 | 102 | 2 | 45.5 | 24.5 | 1 | 0353363 |
| 1.1/8 | 28.58 | 25 | 26 | 102 | 2 | 45.5 | 24.5 | 1 | 0639962 |
| | 30.00 | 25 | 26 | 102 | 2 | 45.5 | 24.5 | 1 | 0353400 |
| 1.1/4 | 31.75 | 32 | 32 | 112 | 2 | 51.5 | 31.5 | 1 | 0639979 |
| | 32.00 | 32 | 32 | 112 | 2 | 51.5 | 31.5 | 1 | 0353417 |
| | 35.00 | 32 | 32 | 112 | 2 | 51.5 | 31.5 | 1 | 0639986 [1)3)] |
| | 36.00 | 32 | 32 | 112 | 2 | 51.5 | 31.5 | 1 | 0628997 [1)3)] |
| | 40.00 | 40 | 38 | 130 | 2 | 59.5 | 39.0 | 1 | 0629000 [1)3)] |
| | 45.00 | 40 | 38 | 130 | 2 | 59.5 | 38.0 | 1 | 0629017 [1)3)] |
| | 50.00 | 50 | 45 | 147 | 2 | 66.5 | 48.0 | 1 | 0629024 [1)3)] |

[1)] Diameter tolerance h10
[2)] Slot not in P9 tolerance
[3)] Available in HSCo only

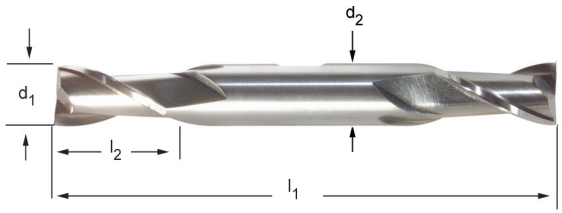
# HSS 2-Flute End Mill

## Regular Length, Square End, Weldon Shank, 30° Helix

| C600 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K3.1 | K3.2 | K4.1 | K4.2 | K5.1 | K5.2 | N1.1 | N1.2 | N1.3 | N2.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ■ 102 C | ■ 112 C | ■ 115 C | ■ 85 C | ◪ 75 C | ◪ 82 C | ◪ 62 C | ◪ 46 C | ◪ 102 C | ◪ 82 C | ◪ 89 C | ◪ 69 C | ◪ 82 B | ◪ 62 B | ◪ 95 B | ◪ 69 B | ◪ 180 E | ◪ 135 D | ◪ 92 D | ◪ 92 C |
| | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | |
| | ◪ 82 C | ◪ 59 C | ◪ 95 C | ◪ 56 C | ◪ 30 C | ◪ 95 C | ◪ 59 B | ◪ 49 B | ◪ 26 A | ◪ 20 A | ◪ 16 A | | | | | | | | | |

HSS | Z 2

Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft or non-ferrous materials.




C600

1/8 - 3/4

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C600 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 3.1/16 | 3/8 | 2 | 1 | 7647759 |
| 5/32 | 0.1562 | 7/16 | 3.1/8 | 3/8 | 2 | 1 | 7647820 |
| 3/16 | 0.1875 | 7/16 | 3.1/4 | 3/8 | 2 | 1 | 7647821 |
| 1/4 | 0.2500 | 1/2 | 3.3/8 | 3/8 | 2 | 1 | 7647822 |
| 9/32 | 0.2812 | 9/16 | 3.3/8 | 3/8 | 2 | 1 | 7647823 |
| 5/16 | 0.3125 | 9/16 | 3.1/2 | 3/8 | 2 | 1 | 7647824 |
| 11/32 | 0.3437 | 9/16 | 3.1/2 | 3/8 | 2 | 1 | 7647825 |
| 3/8 | 0.3750 | 9/16 | 3.1/2 | 3/8 | 2 | 1 | 7647826 |
| 13/32 | 0.4062 | 13/16 | 4.1/8 | 1/2 | 2 | 1 | 7647827 |
| 7/16 | 0.4375 | 13/16 | 4.1/8 | 1/2 | 2 | 1 | 7647828 |
| 1/2 | 0.5000 | 13/16 | 4.1/8 | 1/2 | 2 | 1 | 7647829 |
| 5/8 | 0.6250 | 1.1/8 | 5“ | 5/8 | 2 | 1 | 7647830 |
| 3/4 | 0.7500 | 1.5/16 | 5.5/8 | 3/4 | 2 | 1 | 7647831 |

# HSS 2-Flute End Mill

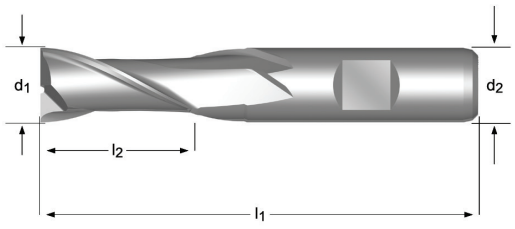
## Regular Length, Square End, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C601 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K3.1 | K3.2 | K4.1 | K4.2 | K5.1 | K5.2 | N1.1 | N1.2 | N1.3 | N2.1 |
| | ■102 D | ■112 D | ■115 D | ■85 D | ◪75 D | ◪82 D | ◪62 D | ◪46 D | ◪102 D | ◪82 D | ◪89 D | ◪69 D | ◪82 C | ◪62 C | ◪95 C | ◪69 C | ◪180 F | ◪135 E | ◪92 E | ◪92 D |
| | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | |
| | ◪82 D | ◪59 D | ◪95 D | ◪56 D | ◪30 D | ◪95 D | ◪59 C | ◪49 C | ◪26 B | ◪20 B | ◪16 B | | | | | | | | | |

HSS

Z 2

Bright finish improves chip flow in soft or non-ferrous materials.




C601

1/8 - 1/2

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C601 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 2.5/16 | 3/8 | 2 | 1 | 7647832 |
| 3/16 | 0.1875 | 7/16 | 2.3/8 | 3/8 | 2 | 1 | 7647833 |
| 1/4 | 0.2500 | 1/2 | 2.7/16 | 3/8 | 2 | 1 | 7647834 |
| 5/16 | 0.3125 | 9/16 | 2.1/2 | 3/8 | 2 | 1 | 7647835 |
| 3/8 | 0.3750 | 9/16 | 2.1/2 | 3/8 | 2 | 1 | 7647836 |
| 7/16 | 0.4375 | 13/16 | 2.11/16 | 3/8 | 2 | 1 | 7647837 |
| 1/2 | 0.5000 | 13/16 | 2.11/16 | 3/8 | 2 | 1 | 7647838 |
| 1/2 | 0.5000 | 1“ | 3.1/4 | 1/2 | 2 | 1 | 7647839 |
| 9/16 | 0.5625 | 1.1/8 | 3.3/8 | 1/2 | 2 | 1 | 7647840 |
| 5/8 | 0.6250 | 1.1/8 | 3.3/8 | 1/2 | 2 | 1 | 7647841 |
| 5/8 | 0.6250 | 1.5/16 | 3.3/4 | 5/8 | 2 | 1 | 7647844 |
| 11/16 | 0.6875 | 1.5/16 | 3.5/8 | 1/2 | 2 | 1 | 7647842 |
| 11/16 | 0.6875 | 1.5/16 | 3.3/4 | 5/8 | 2 | 1 | 7647845 |
| 3/4 | 0.7500 | 1.5/16 | 3.5/8 | 1/2 | 2 | 1 | 7647843 |
| 3/4 | 0.7500 | 1.5/16 | 3.3/4 | 5/8 | 2 | 1 | 7647846 |
| 3/4 | 0.7500 | 1.5/16 | 3.7/8 | 3/4 | 2 | 1 | 7647859 |
| 13/16 | 0.8125 | 1.1/2 | 4“ | 5/8 | 2 | 1 | 7647847 |
| 7/8 | 0.8750 | 1.1/2 | 4“ | 5/8 | 2 | 1 | 7647848 |
| 7/8 | 0.8750 | 1.1/2 | 4.1/8 | 3/4 | 2 | 1 | 7647860 |
| 7/8 | 0.8750 | 1.1/2 | 4.1/8 | 7/8 | 2 | 1 | 7647851 |
| 15/16 | 0.9375 | 1.1/2 | 4“ | 5/8 | 2 | 1 | 7647849 |
| 1“ | 1.0000 | 1.1/2 | 4“ | 5/8 | 2 | 1 | 7647850 |
| 1“ | 1.0000 | 1.1/2 | 4.1/8 | 3/4 | 2 | 1 | 7647861 |
| 1“ | 1.0000 | 1.1/2 | 4.1/8 | 7/8 | 2 | 1 | 7647852 |
| 1“ | 1.0000 | 1.5/8 | 4.1/2 | 1“ | 2 | 1 | 7647853 |
| 1.1/8 | 1.1250 | 1.5/8 | 4.1/4 | 3/4 | 2 | 1 | 7647862 |
| 1.1/8 | 1.1250 | 1.5/8 | 4.1/2 | 1“ | 2 | 1 | 7647854 |
| 1.1/4 | 1.2500 | 1.5/8 | 4.1/2 | 1“ | 2 | 1 | 7647855 |
| 1.1/4 | 1.2500 | 1.5/8 | 4.1/2 | 1.1/4 | 2 | 1 | 7647857 |
| 1.1/2 | 1.5000 | 1.5/8 | 4.1/4 | 3/4 | 2 | 1 | 7647863 |
| 1.1/2 | 1.5000 | 1.5/8 | 4.1/2 | 1“ | 2 | 1 | 7647856 |
| 1.1/2 | 1.5000 | 1.5/8 | 4.1/2 | 1.1/4 | 2 | 1 | 7647858 |

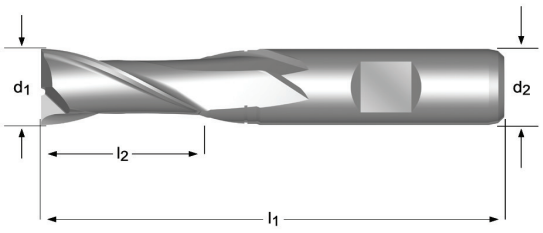
# HSS 2-Flute End Mill

## Regular Length, Square End, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C602 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K3.1 | K3.2 | K4.1 | K4.2 | K5.1 | K5.2 | N1.1 | N1.2 | N1.3 | N2.1 |
| | ■ 102 D | ■ 112 D | ■ 115 D | ■ 85 D | ◪ 75 D | ◪ 82 D | ◪ 62 D | ◪ 46 D | ◪ 102 D | ◪ 82 D | ◪ 89 D | ◪ 69 D | ◪ 82 C | ◪ 62 C | ◪ 95 C | ◪ 69 C | ◪ 180 F | ◪ 135 E | ◪ 92 E | ◪ 92 D |
| | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | |
| | ◪ 82 D | ◪ 59 D | ◪ 95 D | ◪ 56 D | ◪ 30 D | ◪ 95 D | ◪ 59 C | ◪ 49 C | ◪ 26 B | ◪ 20 B | ◪ 16 B | | | | | | | | | |

HSS | Z 2

Keyway cutter, close tolerance (+0.0000”/-0.0015”). Bright finish improves chip flow in soft or non-ferrous materials.




C602

1/8 - 1“

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C602 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 2.5/16 | 3/8 | 2 | 1 | 7647864 |
| 3/16 | 0.1875 | 7/16 | 2.3/8 | 3/8 | 2 | 1 | 7647865 |
| 1/4 | 0.2500 | 1/2 | 2.7/16 | 3/8 | 2 | 1 | 7647866 |
| 5/16 | 0.3125 | 9/16 | 2.1/2 | 3/8 | 2 | 1 | 7647867 |
| 3/8 | 0.3750 | 9/16 | 2.1/2 | 3/8 | 2 | 1 | 7647868 |
| 1/2 | 0.5000 | 1“ | 3.1/4 | 1/2 | 2 | 1 | 7647869 |
| 5/8 | 0.6250 | 1.5/16 | 3.3/4 | 5/8 | 2 | 1 | 7647870 |
| 3/4 | 0.7500 | 1.5/16 | 3.7/8 | 3/4 | 2 | 1 | 7647871 |
| 7/8 | 0.8750 | 1.1/2 | 4.1/8 | 7/8 | 2 | 1 | 7647872 |
| 1“ | 1.0000 | 1.5/8 | 4.1/2 | 1“ | 2 | 1 | 7647873 |

# Cobalt 2-Flute End Mill

DORMER

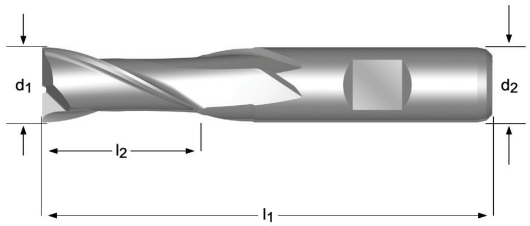
## Regular Length, Square End, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C603 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
| | ■ 151 D | ■ 171 D | ■ 177 D | ■ 131 D | ◪ 115 D | ◪ 105 D | ◪ 85 C | ◪ 62 C | ◪ 105 D | ◪ 89 D | ◪ 92 D | ◪ 75 C | ◪ 92 D | ◪ 69 D | ◪ 52 D | ◪ 161 D | ◪ 131 D | ◪ 105 C | ◪ 144 D | ◪ 108 D |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 |
| | ◪ 89 B | ◪ 131 C | ◪ 98 C | ◪ 72 C | ◪ 62 B | ◪ 52 B | ◪ 151 C | ◪ 112 C | ◪ 89 C | ◪ 266 F | ◪ 197 E | ◪ 135 E | ◪ 135 D | ◪ 121 D | ◪ 85 D | ■ 141 D | ■ 82 D | ■ 43 D | ◪ 141 D | ◪ 92 C |
| | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | | | | | | | | |
| | ◪ 75 C | ◪ 56 B | ◪ 43 B | ◪ 33 B | | | | | | | | | | | | | | | | |

HSS-E

Z 2

Bright finish improves chip flow in soft or non-ferrous materials.




C603

1/8 - 1“

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C603 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 2.5/16 | 3/8 | 2 | 1 | 7647874 |
| 3/16 | 0.1875 | 7/16 | 2.3/8 | 3/8 | 2 | 1 | 7647875 |
| 1/4 | 0.2500 | 1/2 | 2.7/16 | 3/8 | 2 | 1 | 7647876 |
| 5/16 | 0.3125 | 9/16 | 2.1/2 | 3/8 | 2 | 1 | 7647877 |
| 3/8 | 0.3750 | 9/16 | 2.1/2 | 3/8 | 2 | 1 | 7647878 |
| 1/2 | 0.5000 | 1“ | 3.1/4 | 1/2 | 2 | 1 | 7647879 |
| 5/8 | 0.6250 | 1.5/16 | 3.3/4 | 5/8 | 2 | 1 | 7647880 |
| 3/4 | 0.7500 | 1.5/16 | 3.7/8 | 3/4 | 2 | 1 | 7647881 |
| 1“ | 1.0000 | 1.5/8 | 4.1/2 | 1“ | 2 | 1 | 7647882 |

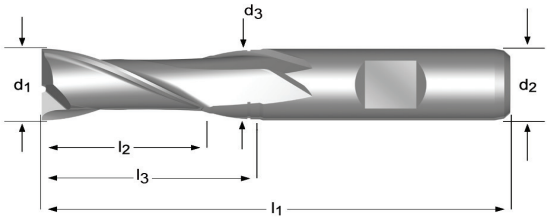
# HSS-PM 2-Flute End Mill

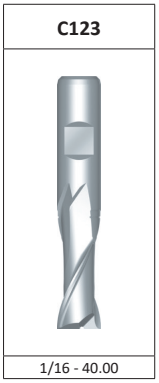
## Regular Length, Square End, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C123 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
| | ■ 174 D | ■ 194 D | ■ 200 D | ■ 148 D | ■ 131 D | ■ 121 D | ■ 98 C | ■ 72 C | ◪ 112 D | ◪ 95 D | ◪ 102 D | ◪ 82 C | ◪ 98 D | ◪ 72 D | ◪ 56 D | ◪ 180 D | ◪ 148 D | ◪ 118 C | ◪ 161 D | ◪ 121 D |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 |
| | ◪ 98 B | ◪ 148 C | ◪ 112 C | ◪ 82 C | ◪ 72 B | ◪ 59 B | ◪ 167 C | ◪ 128 C | ◪ 98 C | ◪ 312 F | ◪ 233 E | ◪ 157 E | ◪ 157 D | ◪ 141 D | ◪ 102 D | ■ 164 D | ■ 95 D | ■ 49 D | ◪ 164 D | ■ 98 C |
| | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | | | | | | | | |
| | ◪ 82 C | ◪ 66 B | ◪ 49 B | ◪ 39 B | | | | | | | | | | | | | | | | |

HSS-E PM | P9 | Z 2

Powdered Metal. P9 slotting tolerance.




| $d_1$ Ø Inch | $d_1$ Ø mm | $l_2$ mm | $l_1$ mm | $l_3$ mm | $d_3$ Ø mm | $d_2$ Øh$_6$ mm | # of Flutes | Pack Qty | C123 | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1/16 | 1.59 | 7 | 51 | — | — | 6 | 2 | 1 | 0640012 | 1) |
| | 2.00 | 7 | 51 | — | — | 6 | 2 | 1 | 0353646 | |
| | 2.50 | 8 | 52 | — | — | 6 | 2 | 1 | 0353653 | |
| | 3.00 | 8 | 52 | — | — | 6 | 2 | 1 | 0353714 | |
| 1/8 | 3.18 | 10 | 54 | — | — | 6 | 2 | 1 | 0640029 | 1) |
| | 3.50 | 10 | 54 | — | — | 6 | 2 | 1 | 0353721 | |
| 5/32 | 3.97 | 11 | 55 | — | — | 6 | 2 | 1 | 0640036 | 1) |
| | 4.00 | 11 | 55 | — | — | 6 | 2 | 1 | 0353769 | |
| | 4.50 | 11 | 55 | — | — | 6 | 2 | 1 | 0353776 | |
| 3/16 | 4.76 | 13 | 57 | — | — | 6 | 2 | 1 | 0640043 | 1) |
| | 5.00 | 13 | 57 | — | — | 6 | 2 | 1 | 0353790 | |
| | 5.50 | 13 | 57 | — | — | 6 | 2 | 1 | 0353806 | |
| | 6.00 | 13 | 57 | — | — | 6 | 2 | 1 | 0353813 | |
| 1/4 | 6.35 | 16 | 66 | — | — | 10 | 2 | 1 | 0640050 | 1) |
| | 6.50 | 16 | 66 | — | — | 10 | 2 | 1 | 0353820 | |
| | 7.00 | 16 | 66 | — | — | 10 | 2 | 1 | 0353837 | |
| | 7.50 | 16 | 66 | — | — | 10 | 2 | 1 | 0353844 | |
| 5/16 | 7.94 | 19 | 69 | — | — | 10 | 2 | 1 | 0640067 | 1) |
| | 8.00 | 19 | 69 | — | — | 10 | 2 | 1 | 0353851 | |
| | 8.50 | 19 | 69 | — | — | 10 | 2 | 1 | 0353868 | |
| | 9.00 | 19 | 69 | — | — | 10 | 2 | 1 | 0353875 | |
| | 9.50 | 19 | 69 | — | — | 10 | 2 | 1 | 0353882 | |
| 3/8 | 9.52 | 22 | 72 | 31.5 | 9.5 | 10 | 2 | 1 | 0640074 | 1) |
| | 10.00 | 22 | 72 | 31.5 | 9.5 | 10 | 2 | 1 | 0353561 | |
| | 11.00 | 22 | 79 | — | — | 12 | 2 | 1 | 0353578 | |
| | 12.00 | 26 | 83 | 37.5 | 11.5 | 12 | 2 | 1 | 0353585 | |
| 1/2 | 12.70 | 26 | 83 | 37.5 | 11.5 | 12 | 2 | 1 | 0640081 | 1) |
| | 13.00 | 26 | 83 | 37.5 | 11.5 | 12 | 2 | 1 | 0353592 | |
| | 14.00 | 26 | 83 | 37.5 | 11.5 | 12 | 2 | 1 | 0353608 | |

[1] Diameter tolerance -.0005 inches / -.0013 inches
[2] Diameter tolerance -.0005 inches / -.0015 inches
[3] Available in HSCo only

# HSS-PM 2-Flute End Mill

DORMER

| $d_1$ Ø Inch | $d_1$ Ø mm | $l_2$ mm | $l_1$ mm | $l_3$ mm | $d_3$ Ø mm | $d_2$ Ø$h_6$ mm | # of Flutes | Pack Qty | C123 |
|---|---|---|---|---|---|---|---|---|---|
| 9/16 | 14.29 | 26 | 83 | 37.5 | 11.5 | 12 | 2 | 1 | 0640098 [1] |
| | 15.00 | 26 | 83 | 37.5 | 11.5 | 12 | 2 | 1 | 0353615 |
| 5/8 | 15.88 | 32 | 92 | 43.5 | 15.5 | 16 | 2 | 1 | 0640104 [1] |
| | 16.00 | 32 | 92 | 43.5 | 15.5 | 16 | 2 | 1 | 0353622 |
| | 18.00 | 32 | 92 | 43.5 | 15.5 | 16 | 2 | 1 | 0353639 |
| 3/4 | 19.05 | 38 | 104 | 53.5 | 18.5 | 20 | 2 | 1 | 0640111 [2] |
| | 20.00 | 38 | 104 | 53.5 | 19.5 | 20 | 2 | 1 | 0353660 |
| | 22.00 | 38 | 104 | 53.5 | 19.5 | 20 | 2 | 1 | 0353677 |
| | 25.00 | 45 | 121 | 64.5 | 24.5 | 25 | 2 | 1 | 0353691 |
| 1‘‘ | 25.40 | 45 | 121 | 64.5 | 24.5 | 25 | 2 | 1 | 0640128 |
| | 30.00 | 45 | 121 | 64.5 | 24.5 | 25 | 2 | 1 | 0353738 |
| | 32.00 | 53 | 133 | 72.5 | 31.5 | 32 | 2 | 1 | 0353745 |
| | 36.00 | 53 | 133 | 72.5 | 31.5 | 32 | 2 | 1 | 0353752 [3] |
| | 40.00 | 63 | 155 | 84.5 | 39.0 | 40 | 2 | 1 | 0353783 [3] |

[1] Diameter tolerance -.0005 inches / -.0013 inches
[2] Diameter tolerance -.0005 inches / -.0015 inches
[3] Available in HSCo only

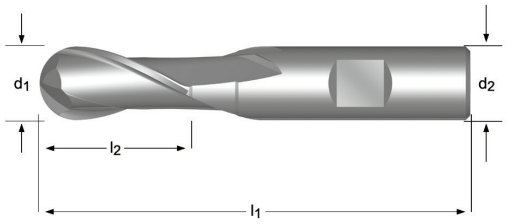
# HSS 2-Flute End Mill

## Regular Length, Ball Nose, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C604 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K3.1 | K3.2 | K4.1 | K4.2 | K5.1 | K5.2 | N1.1 | N1.2 | N1.3 | N2.1 |
| | ■ 105 D | ■ 118 D | ■ 121 D | ■ 89 D | ◪ 79 D | ◪ 89 D | ◪ 66 D | ◪ 49 D | ◪ 108 D | ◪ 89 D | ◪ 95 D | ◪ 72 D | ◪ 89 C | ◪ 69 C | ◪ 102 C | ◪ 75 C | ◪ 180 F | ◪ 135 E | ◪ 92 E | ◪ 92 D |
| | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | |
| | ◪ 82 D | ◪ 59 D | ◪ 95 D | ◪ 56 D | ◪ 30 D | ◪ 95 D | ◪ 62 C | ◪ 49 C | ◪ 26 B | ◪ 20 B | ◪ 16 B | | | | | | | | | |

HSS | Z 2

Ball nose for cutting internal radius. Bright finish improves chip flow in soft or non-ferrous materials.




C604

1/8 - 3/4

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C604 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 2.5/16 | 3/8 | 2 | 1 | 7647883 |
| 3/16 | 0.1875 | 1/2 | 2.3/8 | 3/8 | 2 | 1 | 7647884 |
| 1/4 | 0.2500 | 5/8 | 2.7/16 | 3/8 | 2 | 1 | 7647885 |
| 5/16 | 0.3125 | 3/4 | 2.1/2 | 3/8 | 2 | 1 | 7647886 |
| 3/8 | 0.3750 | 3/4 | 2.1/2 | 3/8 | 2 | 1 | 7647887 |
| 7/16 | 0.4375 | 1“ | 3.1/4 | 1/2 | 2 | 1 | 7647888 |
| 1/2 | 0.5000 | 1“ | 3.1/4 | 1/2 | 2 | 1 | 7647889 |
| 9/16 | 0.5625 | 1.1/8 | 3.3/8 | 1/2 | 2 | 1 | 7647890 |
| 5/8 | 0.6250 | 1.1/8 | 3.3/8 | 1/2 | 2 | 1 | 7647891 |
| 3/4 | 0.7500 | 1.5/16 | 3.5/8 | 1/2 | 2 | 1 | 7647892 |

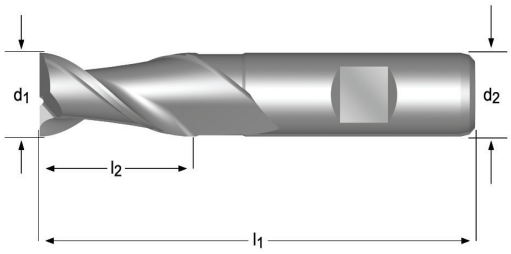
# HSS 2-Flute End Mill

## Regular Length, Square End, Weldon Shank, 37° Helix

| C605 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | M1.1 | M1.2 | M2.1 | M2.2 | M3.1 | M3.2 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.3 | N4.1 | S1.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ◪151 D | ◪171 D | ◪177 D | ◪131 D | ◪115 D | ◪105 D | ◪89 D | ◪92 D | ◪75 C | ◪72 C | ◪62 C | ■397 F | ■299 E | ■200 E | ■200 D | ■177 D | ■128 D | ■62 D | ◪210 D | ◪92 C |

HSS | Z 2

High Helix design for aluminum and other non-ferrous materials.




C605

1/4 - 1“

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C605 |
|---|---|---|---|---|---|---|---|
| 1/4 | 0.2500 | 5/8 | 2.7/16 | 3/8 | 2 | 1 | 7647893 |
| 5/16 | 0.3125 | 3/4 | 2.1/2 | 3/8 | 2 | 1 | 7647894 |
| 3/8 | 0.3750 | 3/4 | 2.1/2 | 3/8 | 2 | 1 | 7647895 |
| 1/2 | 0.5000 | 1.1/4 | 3.1/4 | 1/2 | 2 | 1 | 7647896 |
| 3/4 | 0.7500 | 1.5/8 | 3.7/8 | 3/4 | 2 | 1 | 7647897 |
| 1“ | 1.0000 | 2“ | 4.1/2 | 1“ | 2 | 1 | 7647898 |

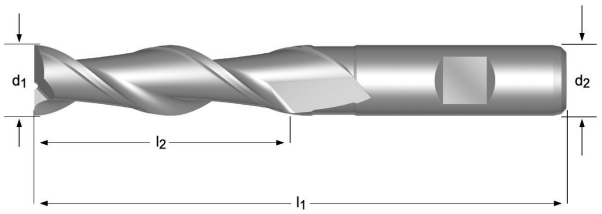
# HSS 2-Flute End Mill

## Long Length, Square End, Weldon Shank, 37° Helix

| C606 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | M1.1 | M1.2 | M2.1 | M2.2 | M3.1 | M3.2 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.3 | N4.1 | S1.1 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ◪135 C | ◪151 C | ◪157 C | ◪115 C | ◪102 C | ◪89 C | ◪75 C | ◪79 C | ◪66 B | ◪66 B | ◪56 B | ■374 E | ■282 D | ■190 D | ■190 C | ■167 C | ■121 C | ■59 C | ◪197 C | ◪82 B |

HSS | Z 2

High Helix design for aluminum and other non-ferrous materials.




C606

1/4 - 3/4

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C606 |
|---|---|---|---|---|---|---|---|
| 1/4 | 0.2500 | 1.1/4 | 3.1/16 | 3/8 | 2 | 1 | 7647899 |
| 5/16 | 0.3125 | 1.3/8 | 3.1/8 | 3/8 | 2 | 1 | 7647900 |
| 3/8 | 0.3750 | 1.1/2 | 3.1/4 | 3/8 | 2 | 1 | 7647901 |
| 1/2 | 0.5000 | 2“ | 4“ | 1/2 | 2 | 1 | 7647902 |
| 3/4 | 0.7500 | 3“ | 5.1/4 | 3/4 | 2 | 1 | 7647903 |

# HSS 3-Flute End Mill

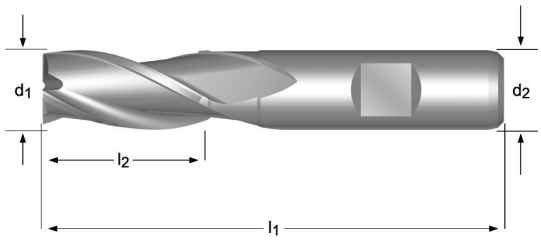
## Regular Length, Square End, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C607 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P2.3 | P3.1 | P3.2 | P3.3 | P4.1 | P4.2 | M3.1 | M3.2 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
| | ◪151 D | ◪171 D | ◪177 D | ◪131 D | ■115 D | ◪102 C | ◪95 D | ◪79 C | ◪66 C | ◪59 C | ◪49 C | ◪72 C | ◪62 C | ◪115 D | ◪85 D | ◪161 D | ◪131 D | ◪105 C | ◪144 D | ◪108 D |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N4.2 | S1.1 | S1.2 | S1.3 | S2.1 | S2.2 |
| | ◪89 B | ◪131 C | ◪98 C | ◪72 C | ◪62 B | ◪52 B | ◪151 C | ◪112 C | ◪89 C | ◪135 D | ◪121 D | ◪85 D | ■141 D | ■82 D | ◪52 D | ◪92 C | ■75 C | ◪33 B | ■56 B | ◪26 B |
| | S3.1 | S3.2 | S4.1 | S4.2 | | | | | | | | | | | | | | | | |
| | ■43 B | ◪20 B | ■33 B | ◪16 B | | | | | | | | | | | | | | | | |

HSS

Z 3

3-flute design for less chatter. Bright finish improves chip flow in soft or non-ferrous materials.




C607

1/8 - 1“

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C607 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 2.5/16 | 3/8 | 3 | 1 | 7647904 |
| 3/16 | 0.1875 | 1/2 | 2.3/8 | 3/8 | 3 | 1 | 7647905 |
| 1/4 | 0.2500 | 5/8 | 2.7/16 | 3/8 | 3 | 1 | 7647906 |
| 5/16 | 0.3125 | 3/4 | 2.1/2 | 3/8 | 3 | 1 | 7647907 |
| 3/8 | 0.3750 | 3/4 | 2.1/2 | 3/8 | 3 | 1 | 7647908 |
| 7/16 | 0.4375 | 1“ | 2.11/16 | 3/8 | 3 | 1 | 7647909 |
| 1/2 | 0.5000 | 1.1/4 | 3.1/4 | 1/2 | 3 | 1 | 7647910 |
| 9/16 | 0.5625 | 1.3/8 | 3.3/8 | 1/2 | 3 | 1 | 7658817 |
| 5/8 | 0.6250 | 1.5/8 | 3.3/4 | 5/8 | 3 | 1 | 7647912 |
| 3/4 | 0.7500 | 1.5/8 | 3.3/4 | 5/8 | 3 | 1 | 7647913 |
| 3/4 | 0.7500 | 1.5/8 | 3.7/8 | 3/4 | 3 | 1 | 7647916 |
| 1“ | 1.0000 | 1.7/8 | 4“ | 5/8 | 3 | 1 | 7647914 |
| 1“ | 1.0000 | 2“ | 4.1/2 | 1“ | 3 | 1 | 7647915 |

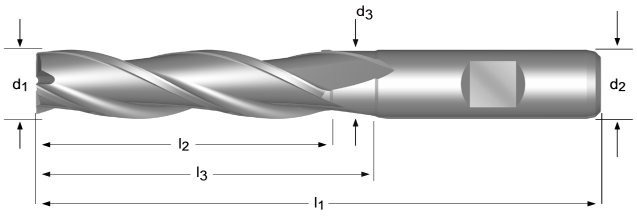
# Cobalt 3-Flute End Mill

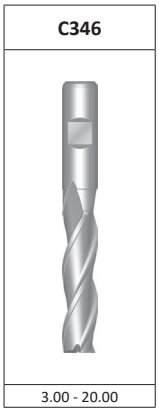
## Long Length, Square End, Weldon Shank, 30° Helix

| C346 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ■131 C | ■148 C | ■151 C | ■112 C | ◪98 C | ◪92 C | ◪72 B | ◪52 B | ◪89 C | ◪75 C | ◪79 C | ◪66 B | ◪82 C | ◪62 C | ◪46 C | ◪141 C | ◪115 C | ◪92 B | ◪125 C | ◪95 C |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 | S1.2 | S2.1 | S3.1 |
| | ◪79 A | ◪115 B | ◪89 B | ◪66 B | ◪56 A | ◪46 A | ◪131 B | ◪98 B | ◪75 B | ◪249 E | ◪187 D | ◪125 D | ■131 C | ■75 C | ■39 C | ◪131 C | ■82 B | ◪66 B | ◪43 A | ◪33 A |
| | S4.1 | | | | | | | | | | | | | | | | | | | |
| | ◪26 A | | | | | | | | | | | | | | | | | | | |

HSS-E | P9 | Z 3

P9 slotting tolerance. 3 flute design provides less chatter.




| $d_1$ Ø mm | $d_2$ Ø$h_6$ mm | $l_2$ mm | $l_1$ mm | # of Flutes | $l_3$ mm | $d_3$ Ø mm | Pack Qty | C346 |
|---|---|---|---|---|---|---|---|---|
| 3.00 | 6 | 12 | 56 | 3 | - | - | 1 | 0122297 |
| 4.00 | 6 | 19 | 63 | 3 | - | - | 1 | 0122303 |
| 5.00 | 6 | 24 | 68 | 3 | - | - | 1 | 0122310 |
| 6.00 | 6 | 24 | 68 | 3 | - | - | 1 | 0122327 |
| 7.00 | 10 | 30 | 80 | 3 | - | - | 1 | 0126325 |
| 8.00 | 10 | 38 | 88 | 3 | - | - | 1 | 0126332 |
| 9.00 | 10 | 38 | 88 | 3 | - | - | 1 | 0126349 |
| 10.00 | 10 | 45 | 95 | 3 | - | - | 1 | 0126233 |
| 11.00 | 12 | 45 | 102 | 3 | - | - | 1 | 0126240 |
| 12.00 | 12 | 53 | 110 | 3 | - | - | 1 | 0126257 |
| 13.00 | 12 | 53 | 110 | 3 | 64.5 | 11.5 | 1 | 0126264 |
| 15.00 | 12 | 53 | 110 | 3 | 64.5 | 11.5 | 1 | 0126288 |
| 16.00 | 16 | 63 | 123 | 3 | 74.5 | 15.5 | 1 | 0126295 |
| 20.00 | 20 | 75 | 141 | 3 | 90.5 | 19.5 | 1 | 0126318 |

# Cobalt 4-Flute End Mill

## Regular Length, Square End, Roughing, Weldon Shank, 30° Helix

| C608 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 151 F | 171 F | 177 F | 131 F | 115 F | 105 F | 85 E | 62 E | 105 F | 89 F | 92 F | 75 E | 92 F | 69 F | 52 F | 161 F | 131 F | 105 E | 144 F | 108 F |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 | S1.2 | S2.1 |
| | 89 E | 131 E | 98 E | 72 E | 62 D | 52 D | 151 E | 112 E | 89 E | 135 G | 135 F | 121 F | 85 F | 141 F | 82 F | 43 F | 141 F | 92 E | 75 E | 56 D |
| | S3.1 | S4.1 | | | | | | | | | | | | | | | | | | |
| | 543 D | 33 D | | | | | | | | | | | | | | | | | | |

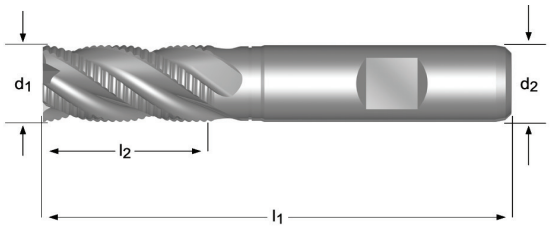
HSS-E | Z 4-8

Roughing, Fine Profile, provides a stronger edge and runs longer than conventional coarse profile roughers. Bright finish.

| C609 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 213 F | 240 F | 246 F | 184 F | 161 F | 148 F | 118 E | 89 E | 144 F | 121 F | 128 F | 105 E | 128 F | 95 F | 72 F | 226 F | 184 F | 148 E | 200 F | 154 F |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 | S1.2 | S2.1 |
| | 125 E | 184 E | 141 E | 102 E | 89 D | 72 D | 210 E | 157 E | 121 E | 161 G | 161 F | 144 F | 105 F | 167 F | 98 F | 49 F | 167 F | 128 E | 105 E | 79 D |
| | S3.1 | S4.1 | | | | | | | | | | | | | | | | | | |
| | 59 D | 46 D | | | | | | | | | | | | | | | | | | |

HSS-E | TiCN | Z 4-8

TiCN coating lowers the coefficient of friction and improves wear resistance on the end mill.




| C608 | C609 |
|---|---|
|  |  |
| 1/4 - 1“ | 1/4 - 1“ |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C608 | C609 |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 0.2500 | 5/8 | 2.7/16 | 3/8 | 4 | 1 | 7647917 | 7647927 |
| 5/16 | 0.3125 | 3/4 | 2.1/2 | 3/8 | 4 | 1 | 7647918 | 7647928 |
| 3/8 | 0.3750 | 3/4 | 2.1/2 | 3/8 | 4 | 1 | 7647919 | 7647929 |
| 7/16 | 0.4375 | 1.1/4 | 3.1/4 | 1/2 | 4 | 1 | 7647920 | 7647930 |
| 1/2 | 0.5000 | 1.1/4 | 3.1/4 | 1/2 | 4 | 1 | 7647921 | 7647931 |
| 9/16 | 0.5625 | 1.3/8 | 3.3/8 | 1/2 | 4 | 1 | 7647922 | — |
| 5/8 | 0.6250 | 1.5/8 | 3.3/4 | 5/8 | 4 | 1 | 7647923 | 7647932 |
| 3/4 | 0.7500 | 1.5/8 | 3.7/8 | 3/4 | 4 | 1 | 7647924 | 7647933 |
| 7/8 | 0.8750 | 1.7/8 | 4.1/8 | 3/4 | 5 | 1 | 7647925 | — |
| 1“ | 1.0000 | 2“ | 4.1/2 | 1“ | 5 | 1 | 7647926 | 7647934 |

# Cobalt Multi-Flute End Mill

## Regular Length, Square End, Roughing, Weldon Shank, 30° Helix

**C610**

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ 151 G | ■ 171 G | ■ 177 G | ■ 131 G | ■ 115 G | ◪ 105 G | ◪ 85 F | ◪ 62 F | ◪ 105 G | ◪ 89 G | ◪ 92 G | ◪ 75 F | ◪ 92 G | ◪ 69 G | ◪ 52 G | ◪ 161 G | ◪ 131 G | ◪ 105 F | ◪ 144 G | ◪ 108 G |
| **K3.3** | **K4.1** | **K4.2** | **K4.3** | **K4.4** | **K4.5** | **K5.1** | **K5.2** | **K5.3** | **N1.3** | **N2.1** | **N2.2** | **N2.3** | **N3.1** | **N3.2** | **N3.3** | **N4.1** | **S1.1** | **S1.2** | **S2.1** |
| ◪ 89 F | ◪ 131 F | ◪ 98 F | ◪ 72 F | ◪ 62 E | ◪ 52 E | ◪ 151 F | ◪ 112 F | ◪ 89 F | ◪ 135 H | ◪ 135 G | ◪ 121 G | ◪ 85 G | ■ 141 G | ■ 82 G | ◪ 43 G | ◪ 141 G | ◪ 92 F | ◪ 75 F | ◪ 56 E |
| **S3.1** | **S4.1** | | | | | | | | | | | | | | | | | | |
| ◪ 43 E | ◪ 33 E | | | | | | | | | | | | | | | | | | |

HSS-E | Z 4-8

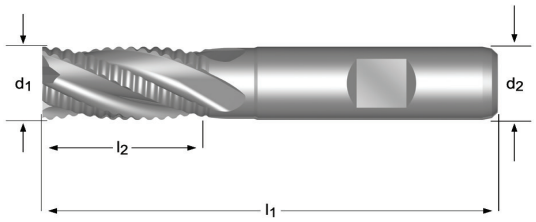
Roughing, Coarse Profile, for maximum metal removal in one pass. Bright finish.

**C611**

| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ■ 213 G | ■ 240 F | ■ 246 F | ■ 184 F | ■ 161 F | ◪ 148 G | ◪ 118 F | ◪ 89 F | ◪ 144 G | ◪ 121 G | ◪ 128 G | ◪ 105 F | ◪ 128 G | ◪ 95 G | ◪ 72 G | ◪ 226 G | ◪ 184 G | ◪ 148 F | ◪ 200 G | ◪ 154 G |
| **K3.3** | **K4.1** | **K4.2** | **K4.3** | **K4.4** | **K4.5** | **K5.1** | **K5.2** | **K5.3** | **N1.3** | **N2.1** | **N2.2** | **N2.3** | **N3.1** | **N3.2** | **N3.3** | **N4.1** | **S1.1** | **S1.2** | **S2.1** |
| ◪ 125 F | ◪ 184 F | ◪ 141 F | ◪ 102 F | ◪ 89 E | ◪ 72 E | ◪ 210 F | ◪ 157 F | ◪ 121 F | ◪ 161 H | ◪ 161 G | ◪ 144 G | ◪ 105 G | ■ 167 G | ■ 98 G | ◪ 49 G | ◪ 167 G | ◪ 128 F | ◪ 105 F | ◪ 79 E |
| **S3.1** | **S4.1** | | | | | | | | | | | | | | | | | | |
| ◪ 59 E | ◪ 46 E | | | | | | | | | | | | | | | | | | |

HSS-E | TiCN | Z 4-8

TiCN coating lowers the coefficient of friction and improves wear resistance on the end mill.




| C610 | C611 |
|---|---|
|  |  |
| 1/4 - 1“ | 1/4 - 1“ |

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C610 | C611 |
|---|---|---|---|---|---|---|---|---|
| 1/4 | 0.2500 | 5/8 | 2.7/16 | 3/8 | 4 | 1 | 7647935 | 7647945 |
| 5/16 | 0.3125 | 3/4 | 2.1/2 | 3/8 | 4 | 1 | 7647936 | 7647946 |
| 3/8 | 0.3750 | 3/4 | 2.1/2 | 3/8 | 4 | 1 | 7647937 | 7647947 |
| 7/16 | 0.4375 | 1.1/4 | 3.1/4 | 1/2 | 4 | 1 | 7647938 | 7647948 |
| 1/2 | 0.5000 | 1.1/4 | 3.1/4 | 1/2 | 4 | 1 | 7647939 | 7647949 |
| 9/16 | 0.5625 | 1.3/8 | 3.3/8 | 1/2 | 4 | 1 | 7647940 | — |
| 5/8 | 0.6250 | 1.5/8 | 3.3/4 | 5/8 | 4 | 1 | 7647941 | 7647950 |
| 3/4 | 0.7500 | 1.5/8 | 3.7/8 | 3/4 | 4 | 1 | 7647942 | 7647951 |
| 7/8 | 0.8750 | 1.7/8 | 4.1/8 | 3/4 | 5 | 1 | 7647943 | 7647952 |
| 1“ | 1.0000 | 2“ | 4.1/2 | 1“ | 5 | 1 | 7647944 | 7647953 |

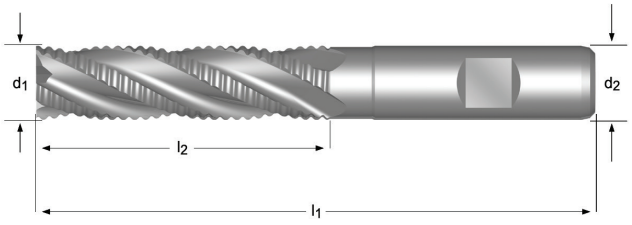
# Cobalt 4-Flute End Mill

## Long Length, Square End, Roughing, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C612 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
| | ■ 135 F | ■ 151 F | ■ 157 F | ■ 115 F | ■ 102 F | ◪ 92 F | ◪ 75 E | ◪ 56 E | ◪ 89 F | ◪ 75 F | ◪ 79 F | ◪ 66 E | ◪ 82 F | ◪ 62 F | ◪ 46 F | ◪ 144 F | ◪ 118 F | ◪ 95 E | ◪ 128 F | ◪ 98 F |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 | S1.2 | S2.1 |
| | ◪ 79 E | ◪ 118 E | ◪ 89 E | ◪ 66 E | ◪ 56 D | ◪ 46 D | ◪ 135 E | ◪ 102 E | ◪ 79 E | ◪ 125 G | ◪ 125 F | ◪ 112 F | ◪ 82 F | ■ 131 F | ■ 75 F | ◪ 39 F | ◪ 131 F | ◪ 82 E | ◪ 66 E | ◪ 49 D |
| | S3.1 | S4.1 | | | | | | | | | | | | | | | | | | |
| | ◪ 36 D | ◪ 30 D | | | | | | | | | | | | | | | | | | |

HSS-E | Z 4-8

Roughing, Coarse Profile, for maximum metal removal in one pass. Bright finish.




C612

1/4 - 1“

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C612 |
|---|---|---|---|---|---|---|---|
| 1/4 | 0.2500 | 1.1/4 | 3.1/8 | 3/8 | 4 | 1 | 7647954 |
| 3/8 | 0.3750 | 1.1/2 | 3.1/4 | 3/8 | 4 | 1 | 7647955 |
| 1/2 | 0.5000 | 2“ | 4“ | 1/2 | 4 | 1 | 7647956 |
| 5/8 | 0.6250 | 2.1/2 | 4.5/8 | 5/8 | 4 | 1 | 7647957 |
| 3/4 | 0.7500 | 3“ | 5.1/4 | 3/4 | 4 | 1 | 7647958 |
| 7/8 | 0.8750 | 3.1/2 | 5.3/4 | 3/4 | 6 | 1 | 7647959 |
| 1“ | 1.0000 | 4“ | 6.1/2 | 1“ | 5 | 1 | 7647960 |

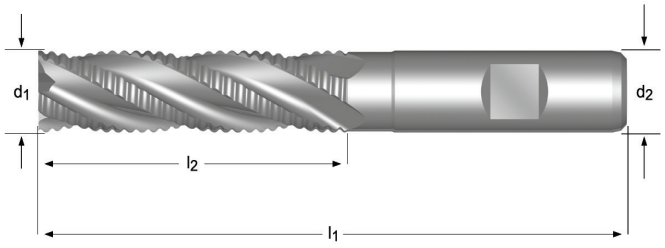
# Cobalt 4-Flute End Mill

## Long Length, Square End, Roughing, Weldon Shank, 30° Helix

| | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C613 | ■135 E | ■151 E | ■157 E | ■115 E | ■102 E | ◪92 E | ◪75 D | ◪56 D | ◪89 E | ◪75 E | ◪79 E | ◪66 D | ◪82 E | ◪62 E | ◪46 E | ◪144 E | ◪118 E | ◪95 D | ◪128 E | ◪98 E |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 | S1.2 | S2.1 |
| | ◪79 D | ◪118 D | ◪89 D | ◪66 D | ◪56 C | ◪46 C | ◪135 D | ◪102 D | ◪79 D | ◪125 F | ◪125 E | ◪112 E | ◪82 E | ■131 E | ■75 E | ◪39 E | ◪131 E | ◪82 D | ◪66 D | ◪49 C |
| | S3.1 | S4.1 | | | | | | | | | | | | | | | | | | |
| | ◪36 C | ◪30 C | | | | | | | | | | | | | | | | | | |

HSS-E | Z 4-8

Roughing, Fine Profile, provides a stronger edge and runs longer than conventional coarse profile roughers. Bright finish.




C613

1/4 - 3/4

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C613 |
|---|---|---|---|---|---|---|---|
| 1/4 | 0.2500 | 1.1/4 | 3.1/8 | 3/8 | 4 | 1 | 7647961 |
| 3/8 | 0.3750 | 1.1/2 | 3.1/4 | 3/8 | 4 | 1 | 7647962 |
| 1/2 | 0.5000 | 2“ | 4“ | 1/2 | 4 | 1 | 7647963 |
| 3/4 | 0.7500 | 3“ | 5.1/4 | 3/4 | 4 | 1 | 7647964 |

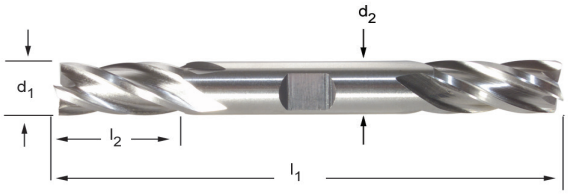
# HSS 4-Flute End Mill

## Regular Length, Square End, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C614 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
| | ■ 105 C | ■ 118 C | ■ 121 C | ■ 89 C | ■ 79 C | ◩ 72 C | ◩ 59 B | ◩ 43 B | ◩ 72 C | ◩ 62 C | ◩ 66 C | ◩ 52 B | ◩ 92 C | ◩ 69 C | ◩ 52 C | ◩ 112 C | ◩ 92 C | ◩ 72 B | ◩ 98 C | ◩ 75 C |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 | S1.2 | S2.1 |
| | ◩ 62 A | ◩ 92 B | ◩ 69 B | ◩ 52 B | ◩ 43 A | ◩ 36 A | ◩ 105 B | ◩ 79 B | ◩ 62 B | ◩ 92 D | ◩ 92 C | ◩ 82 C | ◩ 59 C | ■ 95 C | ■ 56 C | ■ 30 C | ◩ 95 C | ■ 62 B | ◩ 52 B | ◩ 26 A |
| | S3.1 | S4.1 | | | | | | | | | | | | | | | | | | |
| | ◩ 20 A | ◩ 16 A | | | | | | | | | | | | | | | | | | |

HSS-E | Z 4

Double end provides two cutting ends in one tool. Bright finish improves chip flow in soft or non-ferrous materials.




C614

1/8 - 3/4

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C614 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 3.1/16 | 3/8 | 4 | 1 | 7647965 |
| 3/16 | 0.1875 | 1/2 | 3.1/4 | 3/8 | 4 | 1 | 7647966 |
| 1/4 | 0.2500 | 5/8 | 3.3/8 | 3/8 | 4 | 1 | 7647967 |
| 5/16 | 0.3125 | 3/4 | 3.1/2 | 3/8 | 4 | 1 | 7647968 |
| 3/8 | 0.3750 | 3/4 | 3.1/2 | 3/8 | 4 | 1 | 7647969 |
| 1/2 | 0.5000 | 1“ | 4.1/8 | 1/2 | 4 | 1 | 7647970 |
| 5/8 | 0.6250 | 1.3/8 | 5“ | 5/8 | 4 | 1 | 7647971 |
| 3/4 | 0.7500 | 1.5/8 | 5.5/8 | 3/4 | 4 | 1 | 7647972 |

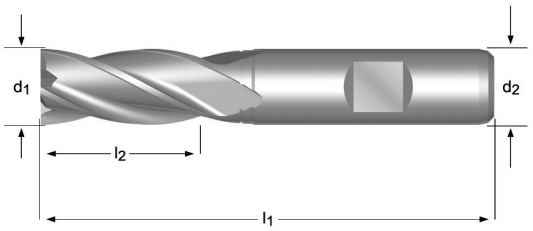
# HSS 4-Flute End Mill

## Regular Length, Square End, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C615 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
| | ■ 151 D | ■ 171 D | ■ 177 D | ■ 131 D | ■ 115 D | ◪ 105 D | ◪ 85 C | ◪ 62 C | ◪ 105 D | ◪ 89 D | ◪ 92 D | ◪ 75 C | ◪ 92 D | ◪ 69 D | ◪ 52 D | ◪ 161 D | ◪ 131 D | ◪ 105 C | ◪ 144 D | ◪ 108 D |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 |
| | ◪ 89 B | ◪ 131 C | ◪ 98 C | ◪ 72 C | ◪ 62 B | ◪ 52 B | ◪ 151 C | ◪ 112 C | ◪ 89 C | ◪ 266 F | ◪ 197 E | ◪ 135 E | ◪ 135 D | ◪ 121 D | ◪ 85 D | ■ 141 D | ■ 82 D | ■ 43 D | ◪ 141 D | ■ 92 C |
| | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | | | | | | | | |
| | ◪ 75 C | ◪ 56 B | ◪ 43 B | ◪ 33 B | | | | | | | | | | | | | | | | |

HSS-E | Z 4

Bright finish improves chip flow in soft or non-ferrous materials.




C615

1/8 - 1“

| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C615 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 2.5/16 | 3/8 | 4 | 1 | 7647973 |
| 3/16 | 0.1875 | 1/2 | 2.3/8 | 3/8 | 4 | 1 | 7647974 |
| 1/4 | 0.2500 | 5/8 | 2.7/16 | 3/8 | 4 | 1 | 7647975 |
| 5/16 | 0.3125 | 3/4 | 2.1/2 | 3/8 | 4 | 1 | 7647976 |
| 3/8 | 0.3750 | 3/4 | 2.1/2 | 3/8 | 4 | 1 | 7647977 |
| 1/2 | 0.5000 | 1.1/4 | 3.1/4 | 1/2 | 4 | 1 | 7647978 |
| 5/8 | 0.6250 | 1.5/8 | 3.3/4 | 5/8 | 4 | 1 | 7647979 |
| 11/16 | 0.6875 | 1.5/8 | 3.3/4 | 5/8 | 4 | 1 | 7647980 |
| 3/4 | 0.7500 | 1.5/8 | 3.7/8 | 3/4 | 4 | 1 | 7647981 |
| 7/8 | 0.8750 | 1.7/8 | 4.1/8 | 7/8 | 4 | 1 | 7647982 |
| 1“ | 1.0000 | 2“ | 4.1/2 | 1“ | 4 | 1 | 7647983 |

# HSS-PM Multi-Flute End Mill

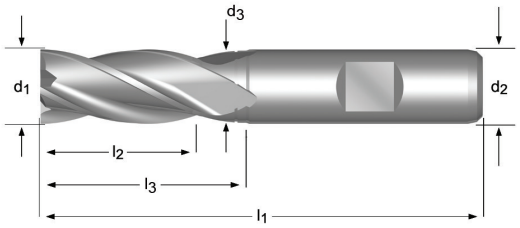
DORMER

## Regular Length, Square End, Weldon Shank, 30° Helix

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C247 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
| | ■ 174 D | ■ 194 D | ■ 200 D | ■ 148 D | ■ 131 D | ◪ 118 D | ◪ 95 C | ◪ 72 C | ◪ 112 D | ◪ 95 D | ◪ 102 D | ◪ 82 C | ◪ 98 D | ◪ 72 D | ◪ 56 D | ◪ 180 D | ◪ 148 D | ◪ 118 C | ◪ 161 D | ◪ 121 D |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 |
| | ◪ 98 B | ◪ 148 C | ◪ 112 C | ◪ 82 C | ◪ 72 B | ◪ 59 B | ◪ 167 C | ◪ 128 C | ◪ 98 C | ◪ 312 F | ◪ 233 E | ◪ 157 E | ◪ 157 D | ◪ 141 D | ◪ 102 D | ■ 164 D | ■ 95 D | ■ 49 D | ◪ 164 D | ■ 98 C |
| | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | | | | | | | | |
| | ◪ 82 C | ◪ 66 B | ◪ 49 B | ◪ 39 B | | | | | | | | | | | | | | | | |

HSS-E PM | Z 4-8

Powdered Metal. Bright finish improves chip flow in soft or non-ferrous materials.




C247

2.00 - 50.00

| $d_1$ Ø Inch | $d_1$ Ø mm | $d_2$ Ø$h_6$ mm | $l_2$ mm | $l_1$ mm | # of Flutes | $l_3$ mm | $d_3$ Ø mm | Pack Qty | C247 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2.00 | 6 | 7 | 51 | 4 | — | — | 1 | 0354667 | |
| | 2.50 | 6 | 8 | 52 | 4 | — | — | 1 | 0354674 | |
| | 3.00 | 6 | 8 | 52 | 4 | — | — | 1 | 0354728 | |
| 1/8 | 3.18 | 6 | 10 | 54 | 4 | — | — | 1 | 0640142 | 1) |
| | 3.50 | 6 | 10 | 54 | 4 | — | — | 1 | 0354735 | |
| | 4.00 | 6 | 11 | 55 | 4 | — | — | 1 | 0354766 | |
| | 4.50 | 6 | 11 | 55 | 4 | — | — | 1 | 0354773 | |
| 3/16 | 4.76 | 6 | 13 | 57 | 4 | — | — | 1 | 0640159 | 1) |
| | 5.00 | 6 | 13 | 57 | 4 | — | — | 1 | 0354780 | |
| | 5.50 | 6 | 13 | 57 | 4 | — | — | 1 | 0354797 | |
| | 6.00 | 6 | 13 | 57 | 4 | — | — | 1 | 0354803 | |
| 1/4 | 6.35 | 10 | 16 | 66 | 4 | — | — | 1 | 0640166 | 1) |
| | 6.50 | 10 | 16 | 66 | 4 | — | — | 1 | 0354810 | |
| | 7.00 | 10 | 16 | 66 | 4 | — | — | 1 | 0354827 | |
| | 7.50 | 10 | 16 | 66 | 4 | — | — | 1 | 0354834 | |
| 5/16 | 7.94 | 10 | 19 | 69 | 4 | — | — | 1 | 0640173 | 1) |
| | 8.00 | 10 | 19 | 69 | 4 | — | — | 1 | 0354841 | |
| | 8.50 | 10 | 19 | 69 | 4 | — | — | 1 | 0354858 | |
| | 9.00 | 10 | 19 | 69 | 4 | — | — | 1 | 0354865 | |
| | 9.50 | 10 | 19 | 69 | 4 | — | — | 1 | 0354872 | |
| 3/8 | 9.52 | 10 | 22 | 72 | 4 | 31.5 | 9.5 | 1 | 0640180 | 1) |
| | 10.00 | 10 | 22 | 72 | 4 | 31.5 | 9.5 | 1 | 0354582 | |
| | 11.00 | 12 | 22 | 79 | 4 | — | — | 1 | 0354599 | |
| | 12.00 | 12 | 26 | 83 | 4 | 37.5 | 11.5 | 1 | 0354605 | |
| 1/2 | 12.70 | 12 | 26 | 83 | 4 | 37.5 | 11.5 | 1 | 0640197 | 1) |
| | 13.00 | 12 | 26 | 83 | 4 | 37.5 | 11.5 | 1 | 0354612 | |
| | 14.00 | 12 | 26 | 83 | 4 | 37.5 | 11.5 | 1 | 0354629 | |
| 9/16 | 14.29 | 12 | 26 | 83 | 4 | 37.5 | 11.5 | 1 | 0640203 | 1) |
| | 15.00 | 12 | 26 | 83 | 4 | 37.5 | 11.5 | 1 | 0354636 | |

[1] Diameter tolerance +.0025 inches / -.0005 inches
[2] Not center Cutting
[3] Available in HSCo only

# HSS-PM Multi-Flute End Mill

| $d_1$ Ø Inch | $d_1$ Ø mm | $d_2$ Ø$h_6$ mm | $l_2$ mm | $l_1$ mm | # of Flutes | $l_3$ mm | $d_3$ Ø mm | Pack Qty | C247 | |
|---|---|---|---|---|---|---|---|---|---|---|
| 5/8 | 15.88 | 16 | 32 | 92 | 4 | 43.5 | 15.5 | 1 | 0640210 | 1) |
| | 16.00 | 16 | 32 | 92 | 4 | 43.5 | 15.5 | 1 | 0354643 | |
| | 17.00 | 16 | 32 | 92 | 4 | 43.5 | 15.5 | 1 | 0609316 | |
| | 18.00 | 16 | 32 | 92 | 4 | 43.5 | 15.5 | 1 | 0354650 | |
| | 19.00 | 16 | 32 | 92 | 4 | 43.5 | 15.5 | 1 | 0609323 | |
| 3/4 | 19.05 | 20 | 38 | 104 | 4 | 53.5 | 18.5 | 1 | 0640227 | 1) |
| | 20.00 | 20 | 38 | 104 | 4 | 53.5 | 19.5 | 1 | 0354681 | |
| | 21.00 | 20 | 38 | 104 | 4 | 53.5 | 19.5 | 1 | 0609330 | |
| | 22.00 | 20 | 38 | 104 | 5 | 53.5 | 19.5 | 1 | 0354698 | |
| 7/8 | 22.22 | 20 | 38 | 104 | 5 | 53.5 | 19.5 | 1 | 0640234 | 1) |
| | 23.00 | 20 | 38 | 104 | 5 | 53.5 | 19.5 | 1 | 0609347 | |
| | 24.00 | 25 | 45 | 121 | 5 | 64.5 | 23.5 | 1 | 0609354 | |
| | 25.00 | 25 | 45 | 121 | 5 | 64.5 | 24.5 | 1 | 0354704 | |
| 1‘‘ | 25.40 | 25 | 45 | 121 | 5 | 64.5 | 24.5 | 1 | 0640241 | 1) |
| | 26.00 | 25 | 45 | 121 | 6 | 64.5 | 24.5 | 1 | 0609361 | |
| | 28.00 | 25 | 45 | 121 | 6 | 64.5 | 24.5 | 1 | 0354711 | |
| | 30.00 | 25 | 45 | 121 | 6 | 64.5 | 24.5 | 1 | 0354742 | |
| | 32.00 | 32 | 53 | 133 | 6 | 72.5 | 31.5 | 1 | 0354759 | |
| | 36.00 | 32 | 53 | 133 | 6 | 72.5 | 31.5 | 1 | 0609378 | 2)3) |
| | 40.00 | 40 | 63 | 155 | 6 | 84.5 | 39.0 | 1 | 0609385 | 2)3) |
| | 50.00 | 50 | 75 | 177 | 8 | 96.5 | 48.0 | 1 | 0640258 | 2)3) |

[1] Diameter tolerance +.0025 inches / -.0005 inches
[2] Not center Cutting
[3] Available in HSCo only

# HSS-PM Multi-Flute End Mill

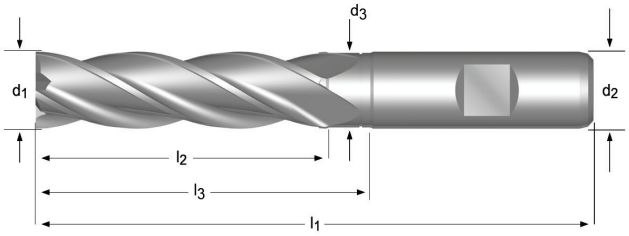
DORMER

## Long Length, Square End, Weldon Shank

| C273 | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.2 | K3.2 |
| ■151 C | ■171 C | ■177 C | ■131 C | ■115 C | ◪105 C | ◪85 B | ◪62 B | ◪46 C | ◪39 C | ◪39 C | ◪33 B | ◪82 C | ◪62 C | ◪46 C | ◪161 C | ◪131 C | ◪105 B | ◪144 C | ◪108 C |
| K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 |
| ◪89 A | ◪131 B | ◪98 B | ◪72 B | ◪62 A | ◪52 A | ◪151 B | ◪112 B | ◪89 B | ◪266 E | ◪197 D | ◪135 D | ◪135 C | ◪121 C | ◪85 C | ■141 C | ■82 C | ■43 C | ◪141 C | ■82 B |
| S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | | | | | | | | |
| ◪66 B | ◪43 A | ◪33 A | ◪26 A | | | | | | | | | | | | | | | | |

HSS-E PM | Z 4-8

Powdered Metal. Bright finish improves chip flow in soft or non-ferrous materials.




C273

2.00 - 40.00

| $d_1$ Ø Inch | $d_1$ Ø mm | $d_2$ Ø$h_6$ mm | $d_3$ Ø mm | $l_2$ mm | $l_1$ mm | $l_3$ mm | # of Flutes | Pack Qty | C273 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2.00 | 6 | — | 10 | 54 | — | 4 | 1 | 0354964 | |
| | 2.50 | 6 | — | 12 | 56 | — | 4 | 1 | 0354971 | |
| | 3.00 | 6 | — | 12 | 56 | — | 4 | 1 | 0355022 | |
| 1/8 | 3.18 | 6 | — | 15 | 59 | — | 4 | 1 | 0640265 | 1) |
| | 3.50 | 6 | — | 15 | 59 | — | 4 | 1 | 0355039 | |
| | 4.00 | 6 | — | 19 | 63 | — | 4 | 1 | 0355060 | |
| | 4.50 | 6 | — | 19 | 63 | — | 4 | 1 | 0355077 | |
| 3/16 | 4.76 | 6 | — | 24 | 68 | — | 4 | 1 | 0640272 | 1) |
| | 5.00 | 6 | — | 24 | 68 | — | 4 | 1 | 0355084 | |
| | 5.50 | 6 | — | 24 | 68 | — | 4 | 1 | 0355091 | |
| | 6.00 | 6 | — | 24 | 68 | — | 4 | 1 | 0355107 | |
| 1/4 | 6.35 | 10 | — | 30 | 80 | — | 4 | 1 | 0640289 | 1) |
| | 7.00 | 10 | — | 30 | 80 | — | 4 | 1 | 0355114 | |
| | 8.00 | 10 | — | 38 | 88 | — | 4 | 1 | 0355121 | |
| | 9.00 | 10 | — | 38 | 88 | — | 4 | 1 | 0355138 | |
| 3/8 | 9.52 | 10 | 9.5 | 45 | 95 | 54.5 | 4 | 1 | 0640296 | 1) |
| | 10.00 | 10 | 9.5 | 45 | 95 | 54.5 | 4 | 1 | 0354889 | |
| | 11.00 | 12 | — | 45 | 102 | — | 4 | 1 | 0354896 | |
| | 12.00 | 12 | 11.5 | 53 | 110 | 64.5 | 4 | 1 | 0354902 | |
| 1/2 | 12.70 | 12 | 11.5 | 53 | 110 | 64.5 | 4 | 1 | 0640302 | 1) |
| | 13.00 | 12 | 11.5 | 53 | 110 | 64.5 | 4 | 1 | 0354919 | |
| | 14.00 | 12 | 11.5 | 53 | 110 | 64.5 | 4 | 1 | 0354926 | |
| | 15.00 | 12 | 11.5 | 53 | 110 | 64.5 | 4 | 1 | 0354933 | |
| 5/8 | 15.88 | 16 | 15.5 | 63 | 123 | 74.5 | 4 | 1 | 0640319 | 1) |
| | 16.00 | 16 | 15.5 | 63 | 123 | 74.5 | 4 | 1 | 0354940 | |
| | 18.00 | 16 | 15.5 | 63 | 123 | 74.5 | 4 | 1 | 0354957 | |
| 3/4 | 19.05 | 20 | 18.5 | 75 | 141 | 90.5 | 4 | 1 | 0640326 | 1) |
| | 20.00 | 20 | 19.5 | 75 | 141 | 90.5 | 4 | 1 | 0354988 | |
| | 22.00 | 20 | 19.5 | 75 | 141 | 90.5 | 5 | 1 | 0354995 | |
| | 25.00 | 25 | 24.5 | 90 | 166 | 109.5 | 5 | 1 | 0355008 | |
| 1“ | 25.40 | 25 | 24.5 | 90 | 166 | 109.5 | 5 | 1 | 0640340 | 1) |
| | 28.00 | 25 | 24.5 | 90 | 166 | 109.5 | 6 | 1 | 0355015 | |
| | 30.00 | 25 | 24.5 | 90 | 166 | 109.5 | 6 | 1 | 0355046 | |
| | 32.00 | 32 | 31.5 | 106 | 186 | 125.5 | 6 | 1 | 0355053 | |
| | 40.00 | 40 | 39.0 | 125 | 217 | 146.5 | 6 | 1 | 0609309 | 2)3) |

[1] Diameter tolerance +.0025 inches / -.0005 inches • [2] Available in HSCo only • [3] Not Center Cutting

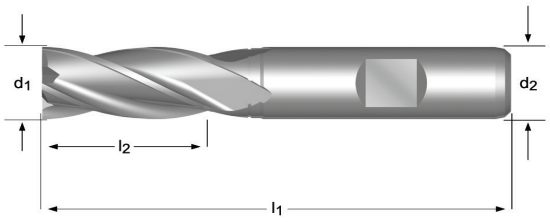
# HSS Multi-Flute End Mill

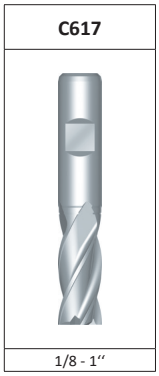
## Regular Length, Square End, Weldon Shank, 30° Helix

| C617 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ■ 105 D | ■ 118 D | ■ 121 D | ■ 89 D | ■ 79 D | ◪ 72 D | ◪ 59 C | ◪ 43 C | ◪ 72 D | ◪ 62 D | ◪ 66 D | ◪ 52 C | ◪ 92 D | ◪ 69 D | ◪ 52 D | ◪ 112 D | ◪ 92 D | ◪ 72 C | ◪ 98 D | ◪ 75 D |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 |
| | ◪ 62 B | ◪ 92 C | ◪ 69 C | ◪ 52 C | ◪ 43 B | ◪ 36 B | ◪ 105 C | ◪ 79 C | ◪ 62 C | ◪ 180 F | ◪ 135 E | ◪ 92 E | ◪ 92 D | ◪ 82 D | ◪ 59 D | ■ 95 D | ■ 56 D | ■ 30 D | ◪ 95 D | ■ 62 C |
| | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | | | | | | | | |
| | ◪ 52 C | ◪ 26 B | ◪ 20 B | ◪ 16 B | | | | | | | | | | | | | | | | |

HSS | Z 4-8

Multi-flute finishing. Bright finish improves chip flow in soft or non-ferrous materials.




| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C617 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 2.5/16 | 3/8 | 4 | 1 | 7647984 |
| 3/16 | 0.1875 | 1/2 | 2.3/8 | 3/8 | 4 | 1 | 7647985 |
| 1/4 | 0.2500 | 5/8 | 2.7/16 | 3/8 | 4 | 1 | 7647986 |
| 5/16 | 0.3125 | 3/4 | 2.1/2 | 3/8 | 4 | 1 | 7647987 |
| 3/8 | 0.3750 | 3/4 | 2.1/2 | 3/8 | 4 | 1 | 7647988 |
| 7/16 | 0.4375 | 1“ | 2.11/16 | 3/8 | 4 | 1 | 7647989 |
| 1/2 | 0.5000 | 1“ | 2.11/16 | 3/8 | 4 | 1 | 7647990 |
| 1/2 | 0.5000 | 1.1/4 | 3.1/4 | 1/2 | 4 | 1 | 7647991 |
| 9/16 | 0.5625 | 1.3/8 | 3.3/8 | 1/2 | 4 | 1 | 7647992 |
| 5/8 | 0.6250 | 1.3/8 | 3.3/8 | 1/2 | 4 | 1 | 7647993 |
| 5/8 | 0.6250 | 1.5/8 | 3.3/4 | 5/8 | 4 | 1 | 7647996 |
| 11/16 | 0.6875 | 1.5/8 | 3.5/8 | 1/2 | 4 | 1 | 7647994 |
| 11/16 | 0.6875 | 1.5/8 | 3.3/4 | 5/8 | 4 | 1 | 7647997 |
| 3/4 | 0.7500 | 1.5/8 | 3.5/8 | 1/2 | 4 | 1 | 7647995 |
| 3/4 | 0.7500 | 1.5/8 | 3.3/4 | 5/8 | 4 | 1 | 7647998 |
| 3/4 | 0.7500 | 1.5/8 | 3.7/8 | 3/4 | 4 | 1 | 7648005 |
| 13/16 | 0.8125 | 1.7/8 | 4“ | 5/8 | 6 | 1 | 7647999 |
| 7/8 | 0.8750 | 1.7/8 | 4“ | 5/8 | 6 | 1 | 7648000 |
| 7/8 | 0.8750 | 1.7/8 | 4.1/8 | 3/4 | 4 | 1 | 7648006 |
| 7/8 | 0.8750 | 1.7/8 | 4.1/8 | 7/8 | 4 | 1 | 7648002 |
| 1“ | 1.0000 | 1.7/8 | 4“ | 5/8 | 6 | 1 | 7648001 |
| 1“ | 1.0000 | 1.7/8 | 4.1/8 | 3/4 | 4 | 1 | 7648007 |
| 1“ | 1.0000 | 1.7/8 | 4.1/8 | 7/8 | 4 | 1 | 7648003 |
| 1“ | 1.0000 | 2“ | 4.1/2 | 1“ | 4 | 1 | 7648004 |

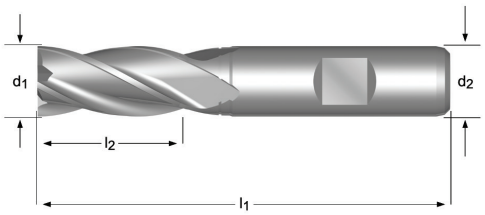
# Cobalt 4-Flute End Mill

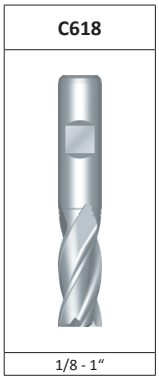
DORMER

## Long Length, Square End, Weldon Shank

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| C618 | P1.1 | P1.2 | P1.3 | P2.1 | P2.2 | P3.1 | P3.2 | P4.1 | M1.1 | M1.2 | M2.1 | M2.2 | K1.1 | K1.2 | K1.3 | K2.1 | K2.2 | K2.3 | K3.1 | K3.2 |
| | ■ 151 D | ■ 171 D | ■ 177 D | ■ 131 D | ■ 115 D | ◪ 105 D | ◪ 85 C | ◪ 62 C | ◪ 105 D | ◪ 89 D | ◪ 92 D | ◪ 75 C | ◪ 92 D | ◪ 69 D | ◪ 52 D | ◪ 161 D | ◪ 131 D | ◪ 105 C | ◪ 144 D | ◪ 108 D |
| | K3.3 | K4.1 | K4.2 | K4.3 | K4.4 | K4.5 | K5.1 | K5.2 | K5.3 | N1.1 | N1.2 | N1.3 | N2.1 | N2.2 | N2.3 | N3.1 | N3.2 | N3.3 | N4.1 | S1.1 |
| | ◪ 89 B | ◪ 131 C | ◪ 98 C | ◪ 72 C | ◪ 62 B | ◪ 52 B | ◪ 151 C | ◪ 112 C | ◪ 89 C | ◪ 266 F | ◪ 197 E | ◪ 135 E | ◪ 135 D | ◪ 121 D | ◪ 85 D | ■ 141 D | ■ 82 D | ■ 43 D | ◪ 141 D | ■ 92 C |
| | S1.2 | S2.1 | S3.1 | S4.1 | | | | | | | | | | | | | | | | |
| | ◪ 75 C | ◪ 56 B | ◪ 43 B | ◪ 33 B | | | | | | | | | | | | | | | | |


Cobalt finishing style for high strength heat resistant materials, stainless and alloy steels, super alloys, and titanium alloys.




| $d_1$ Ø Inch | $d_1$ decimal Inch | $l_2$ Inch | $l_1$ Inch | $d_2$ Ø Inch | # of Flutes | Pack Qty | C618 |
|---|---|---|---|---|---|---|---|
| 1/8 | 0.1250 | 3/8 | 2.5/16 | 3/8 | 4 | 1 | 7648008 |
| 3/16 | 0.1875 | 1/2 | 2.3/8 | 3/8 | 4 | 1 | 7648009 |
| 1/4 | 0.2500 | 5/8 | 2.7/16 | 3/8 | 4 | 1 | 7648010 |
| 5/16 | 0.3125 | 3/4 | 2.1/2 | 3/8 | 4 | 1 | 7648011 |
| 3/8 | 0.3750 | 3/4 | 2.1/2 | 3/8 | 4 | 1 | 7648012 |
| 1/2 | 0.5000 | 1.1/4 | 3.1/4 | 1/2 | 4 | 1 | 7648013 |
| 5/8 | 0.6250 | 1.5/8 | 3.3/4 | 5/8 | 4 | 1 | 7648014 |
| 3/4 | 0.7500 | 1.5/8 | 3.7/8 | 3/4 | 4 | 1 | 7648015 |
| 1“ | 1.0000 | 2“ | 4.1/2 | 1“ | 4 | 1 | 7648016 |

# EDP Conversion Table

| Previous Style | Previous Ecode | Previous EDP# | New Style | New Ecode | New EDP# |
|---|---|---|---|---|---|
| 905 | 9051/8X3/8 | 5110390 | C604 | C6041/8 | 7647883 |
| 905 | 9053/16X3/8 | 5110391 | C604 | C6043/16 | 7647884 |
| 905 | 9051/4X3/8 | 5110392 | C604 | C6041/4 | 7647885 |
| 905 | 9055/16X3/8 | 5110393 | C604 | C6045/16 | 7647886 |
| 905 | 9053/8X3/8 | 5110394 | C604 | C6043/8 | 7647887 |
| 905 | 9057/16X1/2 | 5110395 | C604 | C6047/16 | 7647888 |
| 905 | 9051/2X1/2 | 5110396 | C604 | C6041/2 | 7647889 |
| 905 | 9059/16X1/2 | 5110700 | C604 | C6049/16 | 7647890 |
| 905 | 9055/8X1/1 | 5110701 | C604 | C6045/8 | 7647891 |
| 905 | 9053/4X1/2 | 5110702 | C604 | C6043/4 | 7647892 |
| 920 | 9201/8X3/8 | 5110302 | C601 | C6011/8X3/8 | 7647832 |
| 920 | 9203/16X3/8 | 5110303 | C601 | C6013/16X3/8 | 7647833 |
| 920 | 9201/4X3/8 | 5110304 | C601 | C6011/4X3/8 | 7647834 |
| 920 | 9205/16X3/8 | 5110305 | C601 | C6015/16X3/8 | 7647835 |
| 920 | 9203/8X3/8 | 5110306 | C601 | C6013/8X3/8 | 7647836 |
| 920 | 9207/16X3/8 | 5110307 | C601 | C6017/16X3/8 | 7647837 |
| 920 | 9201/2X3/8 | 5110308 | C601 | C6011/2X3/8 | 7647838 |
| 920 | 9201/2X1/2 | 5110309 | C601 | C6011/2X1/2 | 7647839 |
| 920 | 9209/16X1/2 | 5110310 | C601 | C6019/16X1/2 | 7647840 |
| 920 | 9205/8X1/2 | 5110311 | C601 | C6015/8X1/2 | 7647841 |
| 920 | 92011/16X1/2 | 5110312 | C601 | C60111/16X1/2 | 7647842 |
| 920 | 9203/4X1/2 | 5110313 | C601 | C6013/4X1/2 | 7647843 |
| 920 | 9205/8X5/8 | 5110314 | C601 | C6015/8X5/8 | 7647844 |
| 920 | 92011/16X5/8 | 5110315 | C601 | C60111/16X5/8 | 7647845 |
| 920 | 9203/4X5/8 | 5110316 | C601 | C6013/4X5/8 | 7647846 |
| 920 | 92013/16X5/8 | 5110317 | C601 | C60113/16X5/8 | 7647847 |
| 920 | 9207/8X5/8 | 5110318 | C601 | C6017/8X5/8 | 7647848 |
| 920 | 92015/16X5/8 | 5110319 | C601 | C60115/16X5/8 | 7647849 |
| 920 | 9201X5/8 | 5110320 | C601 | C6011X5/8 | 7647850 |
| 920 | 9207/8X7/8 | 5110321 | C601 | C6017/8X7/8 | 7647851 |
| 920 | 9201X7/8 | 5110323 | C601 | C6011X7/8 | 7647852 |
| 920 | 9201X1 | 5110326 | C601 | C6011X1 | 7647853 |
| 920 | 9201.1/8X1 | 5110327 | C601 | C6011.1/8X1 | 7647854 |
| 920 | 9201.1/4X1 | 5110328 | C601 | C6011.1/4X1 | 7647855 |
| 920 | 9201.1/2X1 | 5110330 | C601 | C6011.1/2X1 | 7647856 |
| 920 | 9201.1/4X1.1/4 | 5110331 | C601 | C6011.1/4X1.1/4 | 7647857 |
| 920 | 9201.1/2X1.1/4 | 5110332 | C601 | C6011.1/2X1.1/4 | 7647858 |
| 920 | 9203/4X3/4 | 5110708 | C601 | C6013/4X3/4 | 7647859 |
| 920 | 9207/8X3/4 | 5110709 | C601 | C6017/8X3/4 | 7647860 |
| 920 | 9201X3/4 | 5110710 | C601 | C6011X3/4 | 7647861 |
| 920 | 9201.1/8X3/4 | 5111714 | C601 | C6011.1/8X3/4 | 7647862 |
| 920 | 9201.1/2X3/4 | 5111717 | C601 | C6011.1/2X3/4 | 7647863 |
| 923 | 9231/8 | 5110364 | C600 | C6001/8 | 7647759 |
| 923 | 9235/32 | 5110365 | C600 | C6005/32 | 7647820 |
| 923 | 9233/16 | 5110366 | C600 | C6003/16 | 7647821 |
| 923 | 9231/4 | 5110368 | C600 | C6001/4 | 7647822 |
| 923 | 9239/32 | 5110369 | C600 | C6009/32 | 7647823 |
| 923 | 9235/16 | 5110370 | C600 | C6005/16 | 7647824 |
| 923 | 92311/32 | 5110371 | C600 | C60011/32 | 7647825 |
| 923 | 9233/8 | 5110372 | C600 | C6003/8 | 7647826 |
| 923 | 92313/32 | 5110373 | C600 | C60013/32 | 7647827 |
| 923 | 9237/16 | 5110374 | C600 | C6007/16 | 7647828 |
| 923 | 9231/2 | 5110376 | C600 | C6001/2 | 7647829 |
| 923 | 9235/8 | 5110378 | C600 | C6005/8 | 7647830 |
| 923 | 9233/4 | 5110380 | C600 | C6003/4 | 7647831 |
| 930 | 9301/8X3/8 | 5110221 | C607 | C6071/8X3/8 | 7647904 |
| 930 | 9303/16X3/8 | 5110222 | C607 | C6073/16X3/8 | 7647905 |
| 930 | 9301/4X3/8 | 5110223 | C607 | C6071/4X3/8 | 7647906 |
| 930 | 9305/16X3/8 | 5110224 | C607 | C6075/16X3/8 | 7647907 |
| 930 | 9303/8X3/8 | 5110225 | C607 | C6073/8X3/8 | 7647908 |
| 930 | 9307/16X3/8 | 5110226 | C607 | C6077/16X3/8 | 7647909 |
| 930 | 9301/2X1/2 | 5110228 | C607 | C6071/2X1/2 | 7647910 |
| 930 | 9309/16X1/2 | 5110229 | C607 | C6079/16X1/2 | 7658817 |
| 930 | 9305/8X5/8 | 5110232 | C607 | C6075/8X5/8 | 7647912 |
| 930 | 9303/4X5/8 | 5110233 | C607 | C6073/4X5/8 | 7647913 |
| 930 | 9301X5/8 | 5110235 | C607 | C6071X5/8 | 7647914 |
| 930 | 9301X1 | 5110237 | C607 | C6071X1 | 7647915 |
| 930 | 9303/4X3/4 | 5110696 | C607 | C6073/4X3/4 | 7647916 |
| 940 | 9401/8X3/8 | 5110001 | C617 | C6171/8X3/8 | 7647984 |
| 940 | 9403/16X3/8 | 5110002 | C617 | C6173/16X3/8 | 7647985 |
| 940 | 9401/4X3/8 | 5110003 | C617 | C6171/4X3/8 | 7647986 |
| 940 | 9405/16X3/8 | 5110004 | C617 | C6175/16X3/8 | 7647987 |
| 940 | 9403/8X3/8 | 5110005 | C617 | C6173/8X3/8 | 7647988 |
| 940 | 9407/16X3/8 | 5110006 | C617 | C6177/16X3/8 | 7647989 |
| 940 | 9401/2X3/8 | 5110007 | C617 | C6171/2X3/8 | 7647990 |
| 940 | 9401/2X1/2 | 5110008 | C617 | C6171/2X1/2 | 7647991 |
| 940 | 9409/16X1/2 | 5110009 | C617 | C6179/16X1/2 | 7647992 |
| 940 | 9405/8X1/2 | 5110010 | C617 | C6175/8X1/2 | 7647993 |
| 940 | 94011/16X1/2 | 5110011 | C617 | C61711/16X1/2 | 7647994 |
| 940 | 9403/4X1/2 | 5110012 | C617 | C6173/4X1/2 | 7647995 |
| 940 | 9405/8X5/8 | 5110013 | C617 | C6175/8X5/8 | 7647996 |
| 940 | 94011/16X5/8 | 5110014 | C617 | C61711/16X5/8 | 7647997 |
| 940 | 9403/4X5/8 | 5110015 | C617 | C6173/4X5/8 | 7647998 |
| 940 | 94013/16X5/8 | 5110016 | C617 | C61713/16X5/8 | 7647999 |
| 940 | 9407/8X5/8 | 5110017 | C617 | C6177/8X5/8 | 7648000 |
| 940 | 9401X5/8 | 5110019 | C617 | C6171X5/8 | 7648001 |
| 940 | 9407/8X7/8 | 5110020 | C617 | C6177/8X7/8 | 7648002 |
| 940 | 9401X7/8 | 5110022 | C617 | C6171X7/8 | 7648003 |
| 940 | 9401X1 | 5110025 | C617 | C6171X1 | 7648004 |
| 940 | 9403/4X3/4 | 5110711 | C617 | C6173/4X3/4 | 7648005 |
| 940 | 9407/8X3/4 | 5110712 | C617 | C6177/8X3/4 | 7648006 |
| 940 | 9401X3/4 | 5110713 | C617 | C6171X3/4 | 7648007 |
| 945 | 9451/8 | 5110071 | C615 | C6151/8 | 7647973 |

| Previous Style | Previous Ecode | Previous EDP# | New Style | New Ecode | New EDP# |
|---|---|---|---|---|---|
| 945 | 9453/16 | 5110072 | C615 | C6153/16 | 7647974 |
| 945 | 9451/4 | 5110073 | C615 | C6151/4 | 7647975 |
| 945 | 9455/16 | 5110074 | C615 | C6155/16 | 7647976 |
| 945 | 9453/8 | 5110075 | C615 | C6153/8 | 7647977 |
| 945 | 9451/2 | 5110076 | C615 | C6151/2 | 7647978 |
| 945 | 9455/8 | 5110077 | C615 | C6155/8 | 7647979 |
| 945 | 94511/16 | 5110078 | C615 | C61511/16 | 7647980 |
| 945 | 9453/4 | 5110079 | C615 | C6153/4 | 7647981 |
| 945 | 9457/8 | 5110080 | C615 | C6157/8 | 7647982 |
| 945 | 9451 | 5110081 | C615 | C6151 | 7647983 |
| 948 | 9481/8 | 5110162 | C614 | C6141/8 | 7647965 |
| 948 | 9483/16 | 5110163 | C614 | C6143/16 | 7647966 |
| 948 | 9481/4 | 5110164 | C614 | C6141/4 | 7647967 |
| 948 | 9485/16 | 5110165 | C614 | C6145/16 | 7647968 |
| 948 | 9483/8 | 5110166 | C614 | C6143/8 | 7647969 |
| 948 | 9481/2 | 5110167 | C614 | C6141/2 | 7647970 |
| 948 | 9485/8 | 5110168 | C614 | C6145/8 | 7647971 |
| 948 | 9483/4 | 5110169 | C614 | C6143/4 | 7647972 |
| 960 | 9601/8X4 | 5110660 | C618 | C6181/8 | 7648008 |
| 960 | 9603/16X4 | 5110661 | C618 | C6183/16 | 7648009 |
| 960 | 9601/4X4 | 5110662 | C618 | C6181/4 | 7648010 |
| 960 | 9605/16X4 | 5110663 | C618 | C6185/16 | 7648011 |
| 960 | 9603/8X4 | 5110664 | C618 | C6183/8 | 7648012 |
| 960 | 9601/2X4 | 5110665 | C618 | C6181/2 | 7648013 |
| 960 | 9605/8X4 | 5110666 | C618 | C6185/8 | 7648014 |
| 960 | 9603/4X4 | 5110667 | C618 | C6183/4 | 7648015 |
| 960 | 9601X4 | 5110669 | C618 | C6181 | 7648016 |
| 963 | 9631/8 | 5110633 | C603 | C6031/8 | 7647874 |
| 963 | 9633/16 | 5110634 | C603 | C6033/16 | 7647875 |
| 963 | 9631/4 | 5110635 | C603 | C6031/4 | 7647876 |
| 963 | 9635/16 | 5110636 | C603 | C6035/16 | 7647877 |
| 963 | 9633/8 | 5110637 | C603 | C6033/8 | 7647878 |
| 963 | 9631/2 | 5110638 | C603 | C6031/2 | 7647879 |
| 963 | 9635/8 | 5110639 | C603 | C6035/8 | 7647880 |
| 963 | 9633/4 | 5110640 | C603 | C6033/4 | 7647881 |
| 963 | 9631 | 5110641 | C603 | C6031 | 7647882 |
| 980 | 9801/4 | 5110602 | C605 | C6051/4 | 7647893 |
| 980 | 9805/16 | 5110603 | C605 | C6055/16 | 7647894 |
| 980 | 9803/8 | 5110604 | C605 | C6053/8 | 7647895 |
| 980 | 9801/2 | 5110606 | C605 | C6051/2 | 7647896 |
| 980 | 9803/4 | 5110608 | C605 | C6053/4 | 7647897 |
| 980 | 9801 | 5110609 | C605 | C6051 | 7647898 |
| 981 | 9811/4 | 5110613 | C606 | C6061/4 | 7647899 |
| 981 | 9815/16 | 5110614 | C606 | C6065/16 | 7647900 |
| 981 | 9813/8 | 5110615 | C606 | C6063/8 | 7647901 |
| 981 | 9811/2 | 5110617 | C606 | C6061/2 | 7647902 |
| 981 | 9813/4 | 5110619 | C606 | C6063/4 | 7647903 |
| 9002 | 90021/4 | 5210014 | C608 | C6081/4 | 7647917 |
| 9002 | 90025/16 | 5210015 | C608 | C6085/16 | 7647918 |
| 9002 | 90023/8 | 5210016 | C608 | C6083/8 | 7647919 |
| 9002 | 90027/16 | 5210017 | C608 | C6087/16 | 7647920 |
| 9002 | 90021/2 | 5210018 | C608 | C6081/2 | 7647921 |
| 9002 | 90029/16 | 5210019 | C608 | C6089/16 | 7647922 |
| 9002 | 90025/8 | 5210020 | C608 | C6085/8 | 7647923 |
| 9002 | 90023/4 | 5210021 | C608 | C6083/4 | 7647924 |
| 9002 | 90027/8 | 5210022 | C608 | C6087/8 | 7647925 |
| 9002 | 90021 | 5210023 | C608 | C6081 | 7647926 |
| 9003 | 90031/4 | 5210028 | C610 | C6101/4 | 7647935 |
| 9003 | 90035/16 | 5210029 | C610 | C6105/16 | 7647936 |
| 9003 | 90033/8 | 5210030 | C610 | C6103/8 | 7647937 |
| 9003 | 90037/16 | 5210031 | C610 | C6107/16 | 7647938 |
| 9003 | 90031/2 | 5210032 | C610 | C6101/2 | 7647939 |
| 9003 | 90039/16 | 5210033 | C610 | C6109/16 | 7647940 |
| 9003 | 90035/8 | 5210034 | C610 | C6105/8 | 7647941 |
| 9003 | 90033/4 | 5210035 | C610 | C6103/4 | 7647942 |
| 9003 | 90037/8 | 5210036 | C610 | C6107/8 | 7647943 |
| 9003 | 90031 | 5210037 | C610 | C6101 | 7647944 |
| 9008 | 90081/4 | 5210078 | C613 | C6131/4 | 7647961 |
| 9008 | 90083/8 | 5210079 | C613 | C6133/8 | 7647962 |
| 9008 | 90081/2 | 5210080 | C613 | C6131/2 | 7647963 |
| 9008 | 90083/4 | 5210082 | C613 | C6133/4 | 7647964 |
| 9009 | 90091/4 | 5210089 | C612 | C6121/4 | 7647954 |
| 9009 | 90093/8 | 5210090 | C612 | C6123/8 | 7647955 |
| 9009 | 90091/2 | 5210091 | C612 | C6121/2 | 7647956 |
| 9009 | 90095/8 | 5210092 | C612 | C6125/8 | 7647957 |
| 9009 | 90093/4 | 5210093 | C612 | C6123/4 | 7647958 |
| 9009 | 90097/8 | 5210094 | C612 | C6127/8 | 7647959 |
| 9009 | 90091 | 5210095 | C612 | C6121 | 7647960 |
| 920K | 920K1/8 | 5110715 | C602 | C6021/8 | 7647864 |
| 920K | 920K3/16 | 5110716 | C602 | C6023/16 | 7647865 |
| 920K | 920K1/4 | 5110717 | C602 | C6021/4 | 7647866 |
| 920K | 920K5/16 | 5110718 | C602 | C6025/16 | 7647867 |
| 920K | 920K3/8 | 5110719 | C602 | C6023/8 | 7647868 |
| 920K | 920K1/2 | 5110720 | C602 | C6021/2 | 7647869 |
| 920K | 920K5/8 | 5110721 | C602 | C6025/8 | 7647870 |
| 920K | 920K3/4 | 5110722 | C602 | C6023/4 | 7647871 |
| 920K | 920K7/8 | 5110723 | C602 | C6027/8 | 7647872 |
| 920K | 920K1 | 5110724 | C602 | C6021 | 7647873 |
| E3302 | E33021/16 | 001000 | S108 | S1081/16 | 7648526 |
| E3302 | E33025/64 | 001001 | S108 | S1085/64 | 7648527 |
| E3302 | E33023/32 | 001002 | S108 | S1083/32 | 7648528 |
| E3302 | E33021/8 | 001004 | S108 | S1081/8 | 7648529 |
| E3302 | E33029/64 | 001005 | S108 | S1089/64 | 7648530 |

# EDP Conversion Table

| Previous Style | Previous Ecode | Previous EDP# | New Style | New Ecode | New EDP# |
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| E3302 | E33023/16 | 001008 | S108 | S1083/16 | 7648533 |
| E3302 | E33027/32 | 001010 | S108 | S1087/32 | 7648534 |
| E3302 | E33021/4 | 001012 | S108 | S1081/4 | 7648535 |
| E3302 | E33025/16 | 001016 | S108 | S1085/16 | 7648536 |
| E3302 | E33023/8 | 001017 | S108 | S1083/8 | 7648537 |
| E3302 | E33027/16 | 001018 | S108 | S1087/16 | 7648538 |
| E3302 | E33021/2 | 001019 | S108 | S1081/2 | 7648539 |
| E3302 | E33029/16 | 001020 | S108 | S1089/16 | 7648540 |
| E3302 | E33025/8 | 001021 | S108 | S1085/8 | 7648541 |
| E3302 | E33023/4 | 001023 | S108 | S1083/4 | 7648542 |
| E3302 | E33021 | 001025 | S108 | S1081 | 7648543 |
| E3302M | E3302M2.0 | 001028 | S109 | S1092.0 | 7648558 |
| E3302M | E3302M2.5 | 001029 | S109 | S1092.5 | 7648559 |
| E3302M | E3302M3.0 | 001030 | S109 | S1093.0 | 7648560 |
| E3302M | E3302M4.0 | 001032 | S109 | S1094.0 | 7648561 |
| E3302M | E3302M4.5 | 001033 | S109 | S1094.5 | 7648562 |
| E3302M | E3302M5.0 | 001034 | S109 | S1095.0 | 7648563 |
| E3302M | E3302M6.0 | 001035 | S109 | S1096.0 | 7648564 |
| E3302M | E3302M7.0 | 001036 | S109 | S1097.0 | 7648565 |
| E3302M | E3302M8.0 | 001037 | S109 | S1098.0 | 7648566 |
| E3302M | E3302M9.0 | 001038 | S109 | S1099.0 | 7648567 |
| E3302M | E3302M10.0 | 001039 | S109 | S10910.0 | 7648568 |
| E3302M | E3302M11.0 | 001040 | S109 | S10911.0 | 7648569 |
| E3302M | E3302M12.0 | 001041 | S109 | S10912.0 | 7648570 |
| E3302M | E3302M14.0 | 001043 | S109 | S10914.0 | 7648571 |
| E3302M | E3302M16.0 | 001044 | S109 | S10916.0 | 7648572 |
| E3302M | E3302M20.0 | 001046 | S109 | S10920.0 | 7648573 |
| E3302M | E3302M25.0 | 001047 | S109 | S10925.0 | 7648574 |
| E3302V | E3302V1/16 | 002850 | S208 | S2081/16 | 7648544 |
| E3302V | E3302V5/64 | 002851 | S208 | S2085/64 | 7648545 |
| E3302V | E3302V3/32 | 002852 | S208 | S2083/32 | 7648546 |
| E3302V | E3302V1/8 | 002854 | S208 | S2081/8 | 7648547 |
| E3302V | E3302V5/32 | 002856 | S208 | S2085/32 | 7648548 |
| E3302V | E3302V3/16 | 002858 | S208 | S2083/16 | 7648549 |
| E3302V | E3302V7/32 | 002860 | S208 | S2087/32 | 7648550 |
| E3302V | E3302V1/4 | 002862 | S208 | S2081/4 | 7648551 |
| E3302V | E3302V5/16 | 002863 | S208 | S2085/16 | 7648552 |
| E3302V | E3302V3/8 | 002864 | S208 | S2083/8 | 7648553 |
| E3302V | E3302V7/16 | 002865 | S208 | S2087/16 | 7648554 |
| E3302V | E3302V1/2 | 002866 | S208 | S2081/2 | 7648555 |
| E3302V | E3302V9/16 | 002867 | S208 | S2089/16 | 7648556 |
| E3302V | E3302V5/8 | 002868 | S208 | S2085/8 | 7648557 |
| E3303 | E33031/16 | 001050 | S121 | S1211/16 | 7648657 |
| E3303 | E33033/32 | 001052 | S121 | S1213/32 | 7648658 |
| E3303 | E33031/8 | 001054 | S121 | S1211/8 | 7648659 |
| E3303 | E33035/32 | 001056 | S121 | S1215/32 | 7648660 |
| E3303 | E33033/16 | 001058 | S121 | S1213/16 | 7648661 |
| E3303 | E33031/4 | 001062 | S121 | S1211/4 | 7648662 |
| E3303 | E33035/16 | 001066 | S121 | S1215/16 | 7648663 |
| E3303 | E33033/8 | 001067 | S121 | S1213/8 | 7648664 |
| E3303 | E33031/2 | 001069 | S121 | S1211/2 | 7648665 |
| E3303V | E3303V1/16 | 002920 | S221 | S2211/16 | 7648666 |
| E3303V | E3303V3/32 | 002921 | S221 | S2213/32 | 7648667 |
| E3303V | E3303V1/8 | 002922 | S221 | S2211/8 | 7648668 |
| E3303V | E3303V5/32 | 002923 | S221 | S2215/32 | 7648669 |
| E3303V | E3303V3/16 | 002924 | S221 | S2213/16 | 7648670 |
| E3303V | E3303V1/4 | 002926 | S221 | S2211/4 | 7648671 |
| E3303V | E3303V5/16 | 002927 | S221 | S2215/16 | 7648672 |
| E3303V | E3303V3/8 | 002928 | S221 | S2213/8 | 7648673 |
| E3303V | E3303V1/2 | 002930 | S221 | S2211/2 | 7648674 |
| E3304 | E33041/16 | 001100 | S134 | S1341/16 | 7648726 |
| E3304 | E33045/64 | 001101 | S134 | S1345/64 | 7648727 |
| E3304 | E33043/32 | 001102 | S134 | S1343/32 | 7648728 |
| E3304 | E33047/64 | 001103 | S134 | S1347/64 | 7648729 |
| E3304 | E33041/8 | 001104 | S134 | S1341/8 | 7648730 |
| E3304 | E33049/64 | 001105 | S134 | S1349/64 | 7648731 |
| E3304 | E33045/32 | 001106 | S134 | S1345/32 | 7648732 |
| E3304 | E330411/64 | 001107 | S134 | S13411/64 | 7648733 |
| E3304 | E33043/16 | 001108 | S134 | S1343/16 | 7648734 |
| E3304 | E330413/64 | 001109 | S134 | S13413/64 | 7648735 |
| E3304 | E33047/32 | 001110 | S134 | S1347/32 | 7648736 |
| E3304 | E33041/4 | 001112 | S134 | S1341/4 | 7648737 |
| E3304 | E33045/16 | 001116 | S134 | S1345/16 | 7648738 |
| E3304 | E33043/8 | 001117 | S134 | S1343/8 | 7648739 |
| E3304 | E33047/16 | 001118 | S134 | S1347/16 | 7648740 |
| E3304 | E33041/2 | 001119 | S134 | S1341/2 | 7648741 |
| E3304 | E33049/16 | 001120 | S134 | S1349/16 | 7648742 |
| E3304 | E33045/8 | 001121 | S134 | S1345/8 | 7648743 |
| E3304 | E330411/16 | 001122 | S134 | S13411/16 | 7648744 |
| E3304 | E33043/4 | 001123 | S134 | S1343/4 | 7648745 |
| E3304 | E33047/8 | 001124 | S134 | S1347/8 | 7648746 |
| E3304 | E33041 | 001125 | S134 | S1341 | 7648747 |
| E3304M | E3304M2.0 | 001128 | S135 | S1352.0 | 7648770 |
| E3304M | E3304M2.5 | 001129 | S135 | S1352.5 | 7648771 |
| E3304M | E3304M3.0 | 001130 | S135 | S1353.0 | 7648772 |
| E3304M | E3304M3.5 | 001131 | S135 | S1353.5 | 7648773 |
| E3304M | E3304M4.0 | 001132 | S135 | S1354.0 | 7648774 |
| E3304M | E3304M4.5 | 001133 | S135 | S1354.5 | 7648775 |
| E3304M | E3304M5.0 | 001134 | S135 | S1355.0 | 7648776 |
| E3304M | E3304M6.0 | 001135 | S135 | S1356.0 | 7648777 |
| E3304M | E3304M7.0 | 001136 | S135 | S1357.0 | 7648778 |
| E3304M | E3304M8.0 | 001137 | S135 | S1358.0 | 7648779 |

| Previous Style | Previous Ecode | Previous EDP# | New Style | New Ecode | New EDP# |
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| E3304M | E3304M10.0 | 001139 | S135 | S13510.0 | 7648781 |
| E3304M | E3304M11.0 | 001140 | S135 | S13511.0 | 7648782 |
| E3304M | E3304M12.0 | 001141 | S135 | S13512.0 | 7648783 |
| E3304M | E3304M14.0 | 001143 | S135 | S13514.0 | 7648784 |
| E3304M | E3304M16.0 | 001144 | S135 | S13516.0 | 7648785 |
| E3304M | E3304M18.0 | 001145 | S135 | S13518.0 | 7648786 |
| E3304M | E3304M20.0 | 001146 | S135 | S13520.0 | 7648787 |
| E3304M | E3304M25.0 | 001147 | S135 | S13525.0 | 7648788 |
| E3304MV | E3304MV2.0 | 004325 | S235 | S2352.0 | 7648789 |
| E3304MV | E3304MV2.5 | 004326 | S235 | S2352.5 | 7648790 |
| E3304MV | E3304MV3.0 | 004327 | S235 | S2353.0 | 7648791 |
| E3304MV | E3304MV3.5 | 004328 | S235 | S2353.5 | 7648792 |
| E3304MV | E3304MV4.0 | 004329 | S235 | S2354.0 | 7648793 |
| E3304MV | E3304MV4.5 | 004330 | S235 | S2354.5 | 7648794 |
| E3304MV | E3304MV5.0 | 004331 | S235 | S2355.0 | 7648795 |
| E3304MV | E3304MV6.0 | 004332 | S235 | S2356.0 | 7648796 |
| E3304MV | E3304MV7.0 | 004333 | S235 | S2357.0 | 7648797 |
| E3304MV | E3304MV8.0 | 004334 | S235 | S2358.0 | 7648798 |
| E3304MV | E3304MV9.0 | 004335 | S235 | S2359.0 | 7648799 |
| E3304MV | E3304MV10.0 | 004336 | S235 | S23510.0 | 7648800 |
| E3304MV | E3304MV11.0 | 004337 | S235 | S23511.0 | 7648801 |
| E3304MV | E3304MV12.0 | 004338 | S235 | S23512.0 | 7648802 |
| E3304MV | E3304MV14.0 | 004339 | S235 | S23514.0 | 7648803 |
| E3304MV | E3304MV16.0 | 004340 | S235 | S23516.0 | 7648804 |
| E3304MV | E3304MV18.0 | 004341 | S235 | S23518.0 | 7648805 |
| E3304MV | E3304MV20.0 | 004342 | S235 | S23520.0 | 7648806 |
| E3304V | E3304V1/16 | 002690 | S234 | S2341/16 | 7648748 |
| E3304V | E3304V5/64 | 002691 | S234 | S2345/64 | 7648749 |
| E3304V | E3304V3/32 | 002692 | S234 | S2343/32 | 7648750 |
| E3304V | E3304V7/64 | 002693 | S234 | S2347/64 | 7648751 |
| E3304V | E3304V1/8 | 002694 | S234 | S2341/8 | 7648752 |
| E3304V | E3304V9/64 | 002695 | S234 | S2349/64 | 7648753 |
| E3304V | E3304V5/32 | 002696 | S234 | S2345/32 | 7648754 |
| E3304V | E3304V11/64 | 002697 | S234 | S23411/64 | 7648755 |
| E3304V | E3304V3/16 | 002698 | S234 | S2343/16 | 7648756 |
| E3304V | E3304V13/64 | 002699 | S234 | S23413/64 | 7648757 |
| E3304V | E3304V7/32 | 002700 | S234 | S2347/32 | 7648758 |
| E3304V | E3304V1/4 | 002702 | S234 | S2341/4 | 7648759 |
| E3304V | E3304V5/16 | 002703 | S234 | S2345/16 | 7648760 |
| E3304V | E3304V3/8 | 002704 | S234 | S2343/8 | 7648761 |
| E3304V | E3304V7/16 | 002705 | S234 | S2347/16 | 7648762 |
| E3304V | E3304V1/2 | 002706 | S234 | S2341/2 | 7648763 |
| E3304V | E3304V9/16 | 002707 | S234 | S2349/16 | 7648764 |
| E3304V | E3304V5/8 | 002708 | S234 | S2345/8 | 7648765 |
| E3304V | E3304V11/16 | 002709 | S234 | S23411/16 | 7648766 |
| E3304V | E3304V3/4 | 002710 | S234 | S2343/4 | 7648767 |
| E3304V | E3304V7/8 | 002711 | S234 | S2347/8 | 7648768 |
| E3304V | E3304V1 | 002712 | S234 | S2341 | 7648769 |
| E4302 | E43021/8 | 002200 | S116 | S1161/8 | 7648650 |
| E4302 | E43025/32 | 002201 | S116 | S1165/32 | 7648651 |
| E4302 | E43023/16 | 002202 | S116 | S1163/16 | 7648652 |
| E4302 | E43021/4 | 002204 | S116 | S1161/4 | 7648653 |
| E4302 | E43025/16 | 002206 | S116 | S1165/16 | 7648654 |
| E4302 | E43023/8 | 002208 | S116 | S1163/8 | 7648655 |
| E4302 | E43021/2 | 002210 | S116 | S1161/2 | 7648656 |
| E4304 | E43041/8 | 002250 | S129 | S1291/8 | 7648719 |
| E4304 | E43045/32 | 002251 | S129 | S1295/32 | 7648720 |
| E4304 | E43043/16 | 002252 | S129 | S1293/16 | 7648721 |
| E4304 | E43041/4 | 002254 | S129 | S1291/4 | 7648722 |
| E4304 | E43045/16 | 002256 | S129 | S1295/16 | 7648723 |
| E4304 | E43043/8 | 002258 | S129 | S1293/8 | 7648724 |
| E4304 | E43041/2 | 002260 | S129 | S1291/2 | 7648725 |
| E5302 | E53021/8 | 000000 | S110 | S1101/8 | 7648575 |
| E5302 | E53023/16 | 000001 | S110 | S1103/16 | 7648576 |
| E5302 | E53021/4 | 000002 | S110 | S1101/4 | 7648577 |
| E5302 | E53023/8 | 000004 | S110 | S1103/8 | 7648578 |
| E5302 | E53021/2 | 000006 | S110 | S1101/2 | 7648579 |
| E5304 | E53041/8 | 000020 | S136 | S1361/8 | 7648807 |
| E5304 | E53043/16 | 000021 | S136 | S1363/16 | 7648808 |
| E5304 | E53041/4 | 000022 | S136 | S1361/4 | 7648809 |
| E5304 | E53045/16 | 000023 | S136 | S1365/16 | 7648810 |
| E5304 | E53043/8 | 000024 | S136 | S1363/8 | 7648811 |
| E5304 | E53047/16 | 000025 | S136 | S1367/16 | 7648812 |
| E5304 | E53041/2 | 000026 | S136 | S1361/2 | 7648813 |
| E5304 | E53045/8 | 000027 | S136 | S1365/8 | 7648814 |
| E5304 | E53043/4 | 000028 | S136 | S1363/4 | 7648815 |
| E5304V | E5304V1/8 | 000030 | S236 | S2361/8 | 7648816 |
| E5304V | E5304V3/16 | 000031 | S236 | S2363/16 | 7648817 |
| E5304V | E5304V1/4 | 000032 | S236 | S2361/4 | 7648818 |
| E5304V | E5304V5/16 | 000033 | S236 | S2365/16 | 7648819 |
| E5304V | E5304V3/8 | 000034 | S236 | S2363/8 | 7648820 |
| E5304V | E5304V7/16 | 000035 | S236 | S2367/16 | 7648821 |
| E5304V | E5304V1/2 | 000036 | S236 | S2361/2 | 7648822 |
| E5304V | E5304V5/8 | 000037 | S236 | S2365/8 | 7648823 |
| E5304V | E5304V3/4 | 000038 | S236 | S2363/4 | 7648824 |
| E6302 | E63021/8 | 004800 | S111 | S1111/8 | 7648580 |
| E6302 | E63023/16 | 004801 | S111 | S1113/16 | 7648581 |
| E6302 | E63021/4 | 004802 | S111 | S1111/4 | 7648582 |
| E6302 | E63025/16 | 004803 | S111 | S1115/16 | 7648583 |
| E6302 | E63023/8 | 004804 | S111 | S1113/8 | 7648584 |
| E6302 | E63021/2 | 004806 | S111 | S1111/2 | 7648585 |
| E6302V | E6302V1/8 | 003130 | S211 | S2111/8 | 7648586 |
| E6302V | E6302V3/16 | 003131 | S211 | S2113/16 | 7648587 |

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| Previous Style | Previous Ecode | Previous EDP# | New Style | New Ecode | New EDP# |
|---|---|---|---|---|---|
| E6302V | E6302V1/4 | 003132 | S211 | S2111/4 | 7648588 |
| E6302V | E6302V3/8 | 003134 | S211 | S2113/8 | 7648589 |
| E6302V | E6302V1/2 | 003136 | S211 | S2111/2 | 7648590 |
| E6304 | E63041/8 | 004900 | S137 | S1371/8 | 7648825 |
| E6304 | E63043/16 | 004901 | S137 | S1373/16 | 7648826 |
| E6304 | E63041/4 | 004902 | S137 | S1371/4 | 7648827 |
| E6304 | E63045/16 | 004903 | S137 | S1375/16 | 7648828 |
| E6304 | E63043/8 | 004904 | S137 | S1373/8 | 7648829 |
| E6304 | E63047/16 | 004905 | S137 | S1377/16 | 7648830 |
| E6304 | E63041/2 | 004906 | S137 | S1371/2 | 7648831 |
| E6304 | E63045/8 | 004907 | S137 | S1375/8 | 7648832 |
| E6304 | E63043/4 | 004908 | S137 | S1373/4 | 7648833 |
| E6304 | E63041 | 004909 | S137 | S1371 | 7648834 |
| E6304V | E6304V1/8 | 003165 | S237 | S2371/8 | 7648835 |
| E6304V | E6304V3/16 | 003166 | S237 | S2373/16 | 7648836 |
| E6304V | E6304V1/4 | 003167 | S237 | S2371/4 | 7648837 |
| E6304V | E6304V5/16 | 003168 | S237 | S2375/16 | 7648838 |
| E6304V | E6304V3/8 | 003169 | S237 | S2373/8 | 7648839 |
| E6304V | E6304V7/16 | 003170 | S237 | S2377/16 | 7648840 |
| E6304V | E6304V1/2 | 003171 | S237 | S2371/2 | 7648841 |
| E6304V | E6304V5/8 | 003172 | S237 | S2375/8 | 7648842 |
| E6304V | E6304V3/4 | 003173 | S237 | S2373/4 | 7648843 |
| E6304V | E6304V1 | 003174 | S237 | S2371 | 7648844 |
| EB3302 | EB33021/16 | 001200 | S112 | S1121/16 | 7648591 |
| EB3302 | EB33023/32 | 001202 | S112 | S1123/32 | 7648592 |
| EB3302 | EB33021/8 | 001204 | S112 | S1121/8 | 7648593 |
| EB3302 | EB33025/32 | 001206 | S112 | S1125/32 | 7648594 |
| EB3302 | EB33023/16 | 001208 | S112 | S1123/16 | 7648595 |
| EB3302 | EB33027/32 | 001210 | S112 | S1127/32 | 7648596 |
| EB3302 | EB33021/4 | 001212 | S112 | S1121/4 | 7648597 |
| EB3302 | EB33025/16 | 001216 | S112 | S1125/16 | 7648598 |
| EB3302 | EB33023/8 | 001217 | S112 | S1123/8 | 7648599 |
| EB3302 | EB33021/2 | 001219 | S112 | S1121/2 | 7648600 |
| EB3302M | EB3302M2.0 | 001228 | S113 | S1132.0 | 7648609 |
| EB3302M | EB3302M2.5 | 001229 | S113 | S1132.5 | 7648610 |
| EB3302M | EB3302M3.0 | 001230 | S113 | S1133.0 | 7648611 |
| EB3302M | EB3302M4.0 | 001232 | S113 | S1134.0 | 7648612 |
| EB3302M | EB3302M5.0 | 001234 | S113 | S1135.0 | 7648613 |
| EB3302M | EB3302M6.0 | 001235 | S113 | S1136.0 | 7648614 |
| EB3302M | EB3302M7.0 | 001236 | S113 | S1137.0 | 7648615 |
| EB3302M | EB3302M8.0 | 001237 | S113 | S1138.0 | 7648616 |
| EB3302M | EB3302M9.0 | 001238 | S113 | S1139.0 | 7648617 |
| EB3302M | EB3302M10.0 | 001239 | S113 | S11310.0 | 7648618 |
| EB3302M | EB3302M12.0 | 001241 | S113 | S11312.0 | 7648619 |
| EB3302M | EB3302M16.0 | 001243 | S113 | S11316.0 | 7648620 |
| EB3302M | EB3302M20.0 | 001245 | S113 | S11320.0 | 7648621 |
| EB3302MV | EB3302MV3.0 | 004402 | S213 | S2133.0 | 7648622 |
| EB3302MV | EB3302MV4.0 | 004404 | S213 | S2134.0 | 7648623 |
| EB3302MV | EB3302MV5.0 | 004406 | S213 | S2135.0 | 7648624 |
| EB3302MV | EB3302MV6.0 | 004407 | S213 | S2136.0 | 7648625 |
| EB3302MV | EB3302MV7.0 | 004408 | S213 | S2137.0 | 7648626 |
| EB3302MV | EB3302MV8.0 | 004409 | S213 | S2138.0 | 7648627 |
| EB3302MV | EB3302MV9.0 | 004410 | S213 | S2139.0 | 7648628 |
| EB3302MV | EB3302MV10.0 | 004411 | S213 | S21310.0 | 7648629 |
| EB3302MV | EB3302MV12.0 | 004413 | S213 | S21312.0 | 7648630 |
| EB3302V | EB3302V1/16 | 002630 | S212 | S2121/16 | 7648601 |
| EB3302V | EB3302V1/8 | 002634 | S212 | S2121/8 | 7648602 |
| EB3302V | EB3302V3/16 | 002638 | S212 | S2123/16 | 7648603 |
| EB3302V | EB3302V7/32 | 002640 | S212 | S2127/32 | 7648604 |
| EB3302V | EB3302V1/4 | 002642 | S212 | S2121/4 | 7648605 |
| EB3302V | EB3302V5/16 | 002643 | S212 | S2125/16 | 7648606 |
| EB3302V | EB3302V3/8 | 002644 | S212 | S2123/8 | 7648607 |
| EB3302V | EB3302V1/2 | 002646 | S212 | S2121/2 | 7648608 |
| EB3304 | EB33041/16 | 001300 | S138 | S1381/16 | 7648845 |
| EB3304 | EB33043/32 | 001302 | S138 | S1383/32 | 7648846 |
| EB3304 | EB33041/8 | 001304 | S138 | S1381/8 | 7648847 |
| EB3304 | EB33045/32 | 001306 | S138 | S1385/32 | 7648848 |
| EB3304 | EB33043/16 | 001308 | S138 | S1383/16 | 7648849 |
| EB3304 | EB33041/4 | 001312 | S138 | S1381/4 | 7648850 |
| EB3304 | EB33045/16 | 001316 | S138 | S1385/16 | 7648851 |
| EB3304 | EB33043/8 | 001317 | S138 | S1383/8 | 7648852 |
| EB3304 | EB33047/16 | 001318 | S138 | S1387/16 | 7648853 |
| EB3304 | EB33041/2 | 001319 | S138 | S1381/2 | 7648854 |
| EB3304 | EB33045/8 | 001321 | S138 | S1385/8 | 7648855 |
| EB3304 | EB33043/4 | 001323 | S138 | S1383/4 | 7648856 |
| EB3304M | EB3304M12.0 | 001331 | S139 | S13912.0 | 7648869 |
| EB3304M | EB3304M10.0 | 001333 | S139 | S13910.0 | 7648870 |
| EB3304M | EB3304M8.0 | 001335 | S139 | S1398.0 | 7648871 |
| EB3304M | EB3304M6.0 | 001337 | S139 | S1396.0 | 7648872 |
| EB3304M | EB3304M5.0 | 001338 | S139 | S1395.0 | 7648873 |
| EB3304M | EB3304M4.5 | 001339 | S139 | S1394.5 | 7648874 |
| EB3304M | EB3304M4.0 | 001340 | S139 | S1394.0 | 7648875 |
| EB3304M | EB3304M3.0 | 001342 | S139 | S1393.0 | 7648876 |
| EB3304M | EB3304M2.0 | 001344 | S139 | S1392.0 | 7648877 |
| EB3304MV | EB3304MV2.0 | 004750 | S239 | S2392.0 | 7648878 |
| EB3304MV | EB3304MV3.0 | 004752 | S239 | S2393.0 | 7648879 |
| EB3304MV | EB3304MV4.0 | 004754 | S239 | S2394.0 | 7648880 |
| EB3304MV | EB3304MV5.0 | 004756 | S239 | S2395.0 | 7648881 |
| EB3304MV | EB3304MV6.0 | 004757 | S239 | S2396.0 | 7648882 |
| EB3304MV | EB3304MV8.0 | 004759 | S239 | S2398.0 | 7648883 |
| EB3304MV | EB3304MV10.0 | 004761 | S239 | S23910.0 | 7648884 |
| EB3304MV | EB3304MV12.0 | 004763 | S239 | S23912.0 | 7648885 |
| EB3304V | EB3304V1/16 | 003070 | S238 | S2381/16 | 7648857 |
| EB3304V | EB3304V3/32 | 003072 | S238 | S2383/32 | 7648858 |

| Previous Style | Previous Ecode | Previous EDP# | New Style | New Ecode | New EDP# |
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| EB3304V | EB3304V5/32 | 003076 | S238 | S2385/32 | 7648860 |
| EB3304V | EB3304V3/16 | 003078 | S238 | S2383/16 | 7648861 |
| EB3304V | EB3304V1/4 | 003082 | S238 | S2381/4 | 7648862 |
| EB3304V | EB3304V5/16 | 003083 | S238 | S2385/16 | 7648863 |
| EB3304V | EB3304V3/8 | 003084 | S238 | S2383/8 | 7648864 |
| EB3304V | EB3304V7/16 | 003085 | S238 | S2387/16 | 7648865 |
| EB3304V | EB3304V1/2 | 003086 | S238 | S2381/2 | 7648866 |
| EB3304V | EB3304V5/8 | 003088 | S238 | S2385/8 | 7648867 |
| EB3304V | EB3304V3/4 | 003090 | S238 | S2383/4 | 7648868 |
| EB5302 | EB53021/8 | 000040 | S114 | S1141/8 | 7648631 |
| EB5302 | EB53023/16 | 000041 | S114 | S1143/16 | 7648632 |
| EB5302 | EB53021/4 | 000042 | S114 | S1141/4 | 7648633 |
| EB5302 | EB53025/16 | 000043 | S114 | S1145/16 | 7648634 |
| EB5302 | EB53023/8 | 000044 | S114 | S1143/8 | 7648635 |
| EB5302 | EB53021/2 | 000046 | S114 | S1141/2 | 7648636 |
| EB5302 | EB53025/8 | 000047 | S114 | S1145/8 | 7648637 |
| EB5304 | EB53041/4 | 000062 | S146 | S1461/4 | 7648886 |
| EB5304 | EB53043/8 | 000064 | S146 | S1463/8 | 7648887 |
| EB5304 | EB53041/2 | 000066 | S146 | S1461/2 | 7648888 |
| EB5304 | EB53045/8 | 000067 | S146 | S1465/8 | 7648889 |
| EB5304V | EB5304V1/4 | 000072 | S246 | S2461/4 | 7648890 |
| EB5304V | EB5304V3/8 | 000074 | S246 | S2463/8 | 7648891 |
| EB5304V | EB5304V1/2 | 000076 | S246 | S2461/2 | 7648892 |
| EB5304V | EB5304V5/8 | 000077 | S246 | S2465/8 | 7648893 |
| EB6302 | EB63021/8 | 005400 | S115 | S1151/8 | 7648638 |
| EB6302 | EB63023/16 | 005401 | S115 | S1153/16 | 7648639 |
| EB6302 | EB63021/4 | 005402 | S115 | S1151/4 | 7648640 |
| EB6302 | EB63025/16 | 005403 | S115 | S1155/16 | 7648641 |
| EB6302 | EB63023/8 | 005404 | S115 | S1153/8 | 7648642 |
| EB6302 | EB63021/2 | 005406 | S115 | S1151/2 | 7648643 |
| EB6302V | EB6302V1/8 | 003700 | S215 | S2151/8 | 7648644 |
| EB6302V | EB6302V3/16 | 003701 | S215 | S2153/16 | 7648645 |
| EB6302V | EB6302V1/4 | 003702 | S215 | S2151/4 | 7648646 |
| EB6302V | EB6302V5/16 | 003703 | S215 | S2155/16 | 7648647 |
| EB6302V | EB6302V3/8 | 003704 | S215 | S2153/8 | 7648648 |
| EB6302V | EB6302V1/2 | 003706 | S215 | S2151/2 | 7648649 |
| EB6304 | EB63041/8 | 005700 | S147 | S1471/8 | 7648894 |
| EB6304 | EB63043/16 | 005701 | S147 | S1473/16 | 7648895 |
| EB6304 | EB63041/4 | 005702 | S147 | S1471/4 | 7648896 |
| EB6304 | EB63045/16 | 005703 | S147 | S1475/16 | 7648897 |
| EB6304 | EB63043/8 | 005704 | S147 | S1473/8 | 7648898 |
| EB6304 | EB63041/2 | 005706 | S147 | S1471/2 | 7648899 |
| EB6304 | EB63045/8 | 005707 | S147 | S1475/8 | 7648900 |
| EB6304V | EB6304V1/8 | 003745 | S247 | S2471/8 | 7648901 |
| EB6304V | EB6304V3/16 | 003746 | S247 | S2473/16 | 7648902 |
| EB6304V | EB6304V1/4 | 003747 | S247 | S2471/4 | 7648903 |
| EB6304V | EB6304V5/16 | 003748 | S247 | S2475/16 | 7648904 |
| EB6304V | EB6304V3/8 | 003749 | S247 | S2473/8 | 7648905 |
| EB6304V | EB6304V1/2 | 003751 | S247 | S2471/2 | 7648906 |
| EB6304V | EB6304V5/8 | 003752 | S247 | S2475/8 | 7648907 |
| TC9002 | TC90021/4 | 5270014 | C609 | C6091/4 | 7647927 |
| TC9002 | TC90025/16 | 5270015 | C609 | C6095/16 | 7647928 |
| TC9002 | TC90023/8 | 5270016 | C609 | C6093/8 | 7647929 |
| TC9002 | TC90027/16 | 5270017 | C609 | C6097/16 | 7647930 |
| TC9002 | TC90021/2 | 5270018 | C609 | C6091/2 | 7647931 |
| TC9002 | TC90025/8 | 5270020 | C609 | C6095/8 | 7647932 |
| TC9002 | TC90023/4 | 5270021 | C609 | C6093/4 | 7647933 |
| TC9002 | TC90021 | 5270023 | C609 | C6091 | 7647934 |
| TC9003 | TC90031/4 | 5270028 | C611 | C6111/4 | 7647945 |
| TC9003 | TC90035/16 | 5270029 | C611 | C6115/16 | 7647946 |
| TC9003 | TC90033/8 | 5270030 | C611 | C6113/8 | 7647947 |
| TC9003 | TC90037/16 | 5270031 | C611 | C6117/16 | 7647948 |
| TC9003 | TC90031/2 | 5270032 | C611 | C6111/2 | 7647949 |
| TC9003 | TC90035/8 | 5270034 | C611 | C6115/8 | 7647950 |
| TC9003 | TC90033/4 | 5270035 | C611 | C6113/4 | 7647951 |
| TC9003 | TC90037/8 | 5270036 | C611 | C6117/8 | 7647952 |
| TC9003 | TC90031 | 5270037 | C611 | C6111 | 7647953 |

# SIMPLY RELIABLE

As a professional you can judge the quality of work by just looking at the chip. Our chip is a clean and uncomplicated shape that in itself tells a story. It is a clear and consistent signal and that's why we use it as a symbol for being **Simply Reliable**.


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