HARVEY TOOL

Speeds & Feeds

Product Table: Miniature End Mills - Tapered - Ball
Characteristics: 11°-15° Angle per Side, 9x & 10x Length of Cut
Series: 9161xx

MATERIAL	SFM	Chip Load (IPT) By Cutter Dia	.015	.031	.047	Depth of Cut Radial	Depth of Cut Axial	Chip Load (IPT) By Cutter Dia .062	.078	.093	.125	.187	.250	Depth of Cut Radial	Depth of Cut Axial
Hardness: ≤ 28 Rc (≤ 271 HBn)															
ALUMINUM ALLOYS															
Casting (2xx, 5xx, 7xx, 8xx)	750	Finishing	.00005	.00011	.00017	.03 x Dia	10 x Dia	.00020	.00025	.00029	.00039	.00059	.00079	.06 x Dia	10 x Dia
Wrought (1xxx, 2xxx, 3xxx, 5xxx, 6xxx, 7xxx, 8xxx)	1000														
Casting - 3%-5% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	750	Finishing	.00005	.00010	.00015	.03 x Dia	10 x Dia	.00018	.00022	.00026	.00035	.00053	.00071	.06 x Dia	10 x Dia
Casting - 5%-8% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	700														
Casting - 8%-12% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	650														
Casting - 12%-16% Si (3xx, A3xx, C3xx, 4xx, A4xx, B4xx)	475														
Wrought - 5%-8% Si (4xxx)	1000														
Wrought - 8%-12% Si (4xxx)	800														
MAGNESIUM ALLOYS	1500	Finishing	.00005	.00011	.00017	.03 x Dia	10 x Dia	.00020	.00025	.00029	.00039	.00059	.00079	.06 x Dia	10 x Dia
ZINC ALLOYS	800														
COPPER ALLOYS															
High Coppers - 90%+ (C1xxxx)	225	Finishing	.00004	.00009	.00014	.03 x Dia	10 x Dia	.00016	.00020	.00023	.00032	.00047	.00063	.06 x Dia	10 x Dia
Brass (Copper Zinc alloys, C2xxxx, C3xxxx, C4xxxx, C66400-C69800)	500														
Phosphor Bronzes (Copper Tin alloys, C5xxxx)	225														
Aluminum Bronzes (Copper Aluminum alloys, C60600-C64200)	500														
Silicon Bronzes (Copper Silicon alloys, C64700-C66100)	500														
Copper Nickels, Nickel Silvers (Copper Nickel alloys, C7xxxx)	225														
Cast Copper Alloys (C83300-C86200, C86400-C87900, C92200-C95800, C97300-C97800, C99400-C99700)	550														

Product Notes:
Use the end diameter of the tool to select the correct Chip Load (IPT)

General Notes:
All posted speed and feed parameters are suggested starting values that may be increased given optimal setup conditions. Chip loads reflect uncoated cutters and may be increased 10%-20% if coated. For ferrous materials with hardness ≤ 28 Rc, chip loads can be increased 10%-20%.

If you require additional information, Harvey Tool has a team of technical experts available to assist you through even the most challenging applications. Please contact us at **800-645-5609** or **Harveytech@harveyperformance.com**

WARNING: Cutting tools may shatter under improper use. Government regulations require use of safety glasses and other appropriate safety equipment in the vicinity of use.

MATERIAL	SFM	Chip Load (IPT) By Cutter Dia	.015	.031	.047	Depth of Cut Radial	Depth of Cut Axial	Chip Load (IPT) By Cutter Dia .062	.078	.093	.125	.187	.250	Depth of Cut Radial	Depth of Cut Axial
Hardness: 29-37 Rc (279-344 HBn)															
CARBON STEELS															
Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	600	Finishing	.00002	.00004	.00005	.03 x Dia	10 x Dia	.00006	.00008	.00009	.00012	.00018	.00025	.06 x Dia	10 x Dia
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	200	Finishing	.00002	.00003	.00005	.03 x Dia	10 x Dia	.00006	.00007	.00008	.00011	.00017	.00023	.06 x Dia	10 x Dia
STAINLESS STEELS															
203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	450	Finishing	.00002	.00004	.00005	.03 x Dia	10 x Dia	.00006	.00008	.00009	.00012	.00018	.00025	.06 x Dia	10 x Dia
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	200	Finishing	.00002	.00003	.00005	.03 x Dia	10 x Dia	.00006	.00007	.00008	.00011	.00017	.00023	.06 x Dia	10 x Dia
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	150	Finishing	.00001	.00002	.00003	.03 x Dia	10 x Dia	.00003	.00004	.00005	.00007	.00011	.00014	.06 x Dia	10 x Dia
TOOL STEELS															
A, L, O, P, W series	200	Finishing	.00002	.00003	.00005	.03 x Dia	10 x Dia	.00006	.00007	.00008	.00011	.00017	.00023	.06 x Dia	10 x Dia
D, H, M, T, S series	150	Finishing	.00001	.00002	.00003	.03 x Dia	10 x Dia	.00003	.00004	.00005	.00007	.00011	.00014	.06 x Dia	10 x Dia
TITANIUM ALLOYS	150	Finishing	.00001	.00002	.00003	.03 x Dia	10 x Dia	.00003	.00004	.00005	.00007	.00011	.00014	.06 x Dia	10 x Dia
HIGH TEMP ALLOYS															
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	70	Finishing	.00001	.00002	.00003	.03 x Dia	10 x Dia	.00003	.00004	.00005	.00007	.00011	.00014	.06 x Dia	10 x Dia

MATERIAL	SFM	Chip Load (IPT) By Cutter Dia	.015	.031	.047	Depth of Cut Radial	Depth of Cut Axial	Chip Load (IPT) By Cutter Dia .062	.078	.093	.125	.187	.250	Depth of Cut Radial	Depth of Cut Axial
Hardness: 38-45 Rc (353-421 HBn)															
CARBON STEELS															
Free-Machining/Low Carbon steels, 10xx - 1029 & all 10Lxx, 11xx - 1139 & all 11Lxx, 12xx - 1215 & all 12Lxx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1030 - 1095, 1140 - 1151, 13xx, 15xx, 2xxx, 3xxx, 4xxx & 4xLxx, 5xxx & 5xLxx, 50xxx & 50Lxxx, 51xxx & 51Lxxx, 52xxx & 52Lxxx, 6xxx, 8xxx, 9xxx	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
STAINLESS STEELS															
203 EZ, 303 (all types), 416, 416Se, 416 Plus X, 420F, 420FSe, 430F, 430FSe, 440F, 440FSe	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
201, 202, 203, 205, 301, 302, 304, 304L, 308, 309, 310, 314, 316, 316L, 317, 321, 329, 330, 347, 348, 385, 403, 405, 409, 410, 413, 420, 429, 430, 434, 436, 442, 446, 501, 502	100	Finishing	.00001	.00002	.00002	.03 x Dia	10 x Dia	.00003	.00004	.00004	.00006	.00009	.00011	.06 x Dia	10 x Dia
414, 431, 440A, 440B, 440C, 13-8, 15-5, 15-7, 17-4, 17-7	90	Finishing	.00000	.00001	.00002	.03 x Dia	10 x Dia	.00002	.00002	.00003	.00004	.00005	.00007	.06 x Dia	10 x Dia
TOOL STEELS															
A, L, O, P, W series	100	Finishing	.00001	.00002	.00002	.03 x Dia	10 x Dia	.00003	.00004	.00004	.00006	.00009	.00011	.06 x Dia	10 x Dia
D, H, M, T, S series	90	Finishing	.00000	.00001	.00002	.03 x Dia	10 x Dia	.00002	.00002	.00003	.00004	.00005	.00007	.06 x Dia	10 x Dia
TITANIUM ALLOYS	75	Finishing	.00000	.00001	.00002	.03 x Dia	10 x Dia	.00002	.00002	.00003	.00004	.00005	.00007	.06 x Dia	10 x Dia
HIGH TEMP ALLOYS															
Inconel, Hastelloy, Waspalloy, Monel, Nimonic, Haynes, Discoloy, Incoloy	50	Finishing	.00000	.00001	.00002	.03 x Dia	10 x Dia	.00002	.00002	.00003	.00004	.00005	.00007	.06 x Dia	10 x Dia