M213 Series Application Guide – Speed & Feed (metric)

ISO Code	Work Material	Type of Cut	Tool LC/ Dia.	Axial DOC	Radial DOC	Ramp Angle	Number of Flutes	Speed (SFM)	Feed (Inch per Tooth) 1/8	3/16	1/4	5/16	3/8	1/2	5/8	3/4	1
N	Aluminum alloys 2024, 6061, 7075 Magnesium alloys O-T6	Slotting	≤ 2	1 x D	1 x D	-	3	800	.0015	.0023	.0030	.0038	.0045	.0060	.0075	.0090	.0120
		Peripheral - Rough	≤ 2	1 x D	.75 x D	-	3	1000	.0020	.0030	.0040	.0050	.0060	.0080	.0100	.0120	.0160
		Peripheral - Rough	> 2 - 3	1 x D	.75 x D	-	3	1000	.0019	.0028	.0038	.0047	.0056	.0075	.0094	.0113	.0150
		Peripheral - Rough	> 3 - 4	1 x D	.75 x D	-	3	900	.0016	.0024	.0032	.0041	.0049	.0065	.0081	.0097	.0130
		Peripheral - Rough	> 4 - 5	1 x D	.75 x D	-	3	800	.0014	.0022	.0029	.0036	.0043	.0058	.0072	.0086	.0115
		Finish	≤ 2.5	2 x D	.015 x D	-	3	1200	.0007	.0010	.0014	.0017	.0020	.0027	.0034	.0041	.0054
		Helical Ramp	≤ 2	2 x D	1 x D	15 deg	3	800	.0015	.0023	.0030	.0038	.0045	.0060	.0075	.0090	.0120
		Straight Line Ramp	≤ 2	1 x D	1 x D	45 deg	3	800	.0010	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0080
	Aluminum alloys 2024, 6061, 7075 Hardened or Anodized	Slotting	≤ 2	1 x D	1 x D	-	3	780	.0014	.0020	.0027	.0034	.0041	.0055	.0068	.0082	.0109
		Peripheral - Rough	≤ 2	1 x D	.75 x D	-	3	950	.0020	.0029	.0039	.0049	.0059	.0078	.0098	.0117	.0156
		Peripheral - Rough	> 2 - 3	1 x D	.75 x D	-	3	950	.0018	.0027	.0037	.0046	.0055	.0073	.0092	.0110	.0147
		Peripheral - Rough	> 3 - 4	1 x D	.625 x D	-	3	855	.0016	.0024	.0032	.0039	.0047	.0063	.0079	.0095	.0126
		Peripheral - Rough	> 4 - 5	1 x D	.625 x D	-	3	760	.0014	.0021	.0028	.0035	.0042	.0056	.0070	.0084	.0112
		Finish	≤ 2.5	2 x D	.010 x D	-	3	1170	.0006	.0009	.0012	.0015	.0018	.0024	.0030	.0037	.0049
		Helical Ramp	≤ 2	2 x D	1 x D	15 deg	3	800	.0015	.0023	.0030	.0038	.0045	.0060	.0075	.0090	.0120
		Straight Line Ramp	≤ 2	1 x D	1 x D	45 deg	3	800	.0010	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0080
	High Silicon Aluminum Alloys A380, A390 Bhn 30-150 500kg	Slotting	≤ 2	.75 x D	1 x D	-	3	500	.0011	.0017	.0023	.0028	.0034	.0045	.0056	.0068	.0090
		Peripheral - Rough	≤ 2	1 x D	.5 x D	-	3	700	.0014	.0021	.0029	.0036	.0043	.0057	.0071	.0086	.0114
		Peripheral - Rough	> 2 - 3	1 x D	.5 x D	-	3	700	.0014	.0021	.0027	.0034	.0041	.0055	.0068	.0082	.0109
		Peripheral - Rough	> 3 - 4	1 x D	.4 x D	-	3	600	.0012	.0018	.0024	.0030	.0036	.0048	.0061	.0073	.0097
		Peripheral - Rough	> 4 - 5	1 x D	.4 x D	-	3	500	.0010	.0015	.0020	.0025	.0030	.0040	.0051	.0061	.0081
		Finish	≤ 2.5	2 x D	.015 x D	-	3	900	.0006	.0009	.0013	.0016	.0019	.0025	.0031	.0038	.0050
		Helical Ramp	≤ 2	2 x D	1 x D	15 deg	3	500	.0011	.0017	.0023	.0028	.0034	.0045	.0056	.0068	.0090
		Straight Line Ramp	≤ 2	1 x D	1 x D	45 deg	3	500	.0008	.0011	.0015	.0019	.0023	.0030	.0038	.0045	.0061
	High Silicon Aluminum alloys A380, A390 Anodized	Slotting	≤ 2	.75 x D	1 x D	-	3	488	.0010	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0080
		Peripheral - Rough	≤ 2	1 x D	.45 x D	-	3	690	.0014	.0021	.0029	.0036	.0043	.0057	.0071	.0086	.0114
		Peripheral - Rough	> 2 - 3	1 x D	.45 x D	-	3	690	.0014	.0021	.0027	.0034	.0041	.0055	.0068	.0082	.0109
		Peripheral - Rough	> 3 - 4	1 x D	.375 x D	-	3	621	.0012	.0018	.0024	.0030	.0036	.0048	.0061	.0073	.0097
		Peripheral - Rough	> 4 - 5	1 x D	.375 x D	-	3	552	.0010	.0015	.0020	.0025	.0030	.0040	.0051	.0061	.0081
		Finish	≤ 2.5	2 x D	.010 x D	-	3	878	.0006	.0008	.0011	.0014	.0017	.0022	.0028	.0034	.0045
		Helical Ramp	≤ 2	2 x D	1 x D	15 deg	3	488	.0010	.0015	.0020	.0025	.0030	.0040	.0050	.0060	.0080
		Straight Line Ramp	≤ 2	1 x D	1 x D	45 deg	3	488	.0007	.0010	.0013	.0017	.0020	.0027	.0033	.0040	.0053
	Copper, Brass 10-80 HRb	Slotting	≤ 2	.75 x D	1 x D	-	3	500	.0009	.0014	.0019	.0023	.0028	.0037	.0046	.0056	.0074
		Peripheral - Rough	≤ 2	1 x D	.75 x D	-	3	600	.0012	.0017	.0023	.0029	.0035	.0046	.0058	.0069	.0092
		Peripheral - Rough	> 2 - 3	1 x D	.75 x D	-	3	600	.0011	.0017	.0022	.0028	.0033	.0045	.0056	.0067	.0089
		Peripheral - Rough	> 3 - 4	1 x D	.75 x D	-	3	500	.0010	.0014	.0019	.0024	.0029	.0039	.0048	.0058	.0077
		Peripheral - Rough	> 4 - 5	1 x D	.75 x D	-	3	450	.0008	.0012	.0017	.0021	.0025	.0033	.0041	.0050	.0066
		Finish	≤ 2.5	2 x D	.015 x D	-	3	650	.0005	.0008	.0011	.0013	.0016	.0021	.0026	.0032	.0042
		Helical Ramp	≤ 2	2 x D	1 x D	15 deg	3	500	.0009	.0014	.0019	.0023	.0028	.0037	.0046	.0056	.0074
		Straight Line Ramp	≤ 2	1 x D	1 x D	25 deg	3	500	.0006	.0009	.0012	.0016	.0019	.0025	.0031	.0037	.0050
	Copper alloys, Brass Alloys 81-100 HRb	Slotting	≤ 2	.75 x D	1 x D	-	3	488	.0009	.0014	.0018	.0023	.0027	.0036	.0045	.0054	.0072
		Peripheral - Rough	≤ 2	1 x D	.75 x D	-	3	590	.0012	.0017	.0023	.0029	.0035	.0046	.0058	.0069	.0092
		Peripheral - Rough	> 2 - 3	1 x D	.75 x D	-	3	590	.0011	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088
		Peripheral - Rough	> 3 - 4	1 x D	.625 x D	-	3	492	.0009	.0014	.0019	.0024	.0028	.0038	.0047	.0057	.0075
		Peripheral - Rough	> 4 - 5	1 x D	.625 x D	-	3	443	.0008	.0012	.0016	.0020	.0024	.0032	.0040	.0048	.0064
		Finish	≤ 2.5	2 x D	.010 x D	-	3	634	.0005	.0007	.0010	.0012	.0015	.0020	.0024	.0029	.0039
		Helical Ramp	≤ 2	2 x D	1 x D	15 deg	3	488	.0009	.0014	.0018	.0023	.0027	.0036	.0045	.0054	.0072
		Straight Line Ramp	≤ 2	1 x D	1 x D	25 deg	3	488	.0006	.0009	.0012	.0015	.0018	.0024	.0030	.0036	.0048
	Bronze Bhn 166-186	Slotting	≤ 2	.75 x D	1 x D	-	3	500	.0009	.0013	.0018	.0022	.0026	.0035	.0044	.0053	.0070
		Peripheral - Rough	≤ 2	1 x D	.5 x D	-	3	600	.0011	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088
		Peripheral - Rough	> 2 - 3	1 x D	.5 x D	-	3	600	.0010	.0016	.0021	.0026	.0031	.0042	.0052	.0063	.0084
		Peripheral - Rough	> 3 - 4	1 x D	.4 x D	-	3	500	.0009	.0013	.0018	.0022	.0026	.0035	.0044	.0053	.0070
		Peripheral - Rough	> 4 - 5	1 x D	.4 x D	-	3	450	.0007	.0011	.0015	.0019	.0022	.0030	.0037	.0045	.0059
		Finish	≤ 2.5	2 x D	.015 x D	-	3	650	.0005	.0007	.0010	.0012	.0014	.0019	.0024	.0029	.0038
		Helical Ramp	≤ 2	2 x D	1 x D	12 deg	3	500	.0009	.0013	.0018	.0022	.0026	.0035	.0044	.0053	.0070
		Straight Line Ramp	≤ 2	1 x D	1 x D	20 deg	3	500	.0006	.0009	.0012	.0015	.0018	.0023	.0029	.0035	.0047
	Bronze High Tin Bronze, Manganese Bronze Work Hardened Bronze Bhn 187-212	Slotting	≤ 2	.75 x D	1 x D	-	3	488	.0009	.0013	.0017	.0021	.0026	.0034	.0043	.0051	.0068
		Peripheral - Rough	≤ 2	1 x D	.45 x D	-	3	590	.0011	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088
		Peripheral - Rough	> 2 - 3	1 x D	.45 x D	-	3	590	.0010	.0016	.0021	.0026	.0031	.0042	.0052	.0063	.0084
		Peripheral - Rough	> 3 - 4	1 x D	.375 x D	-	3	492	.0009	.0013	.0018	.0022	.0026	.0035	.0044	.0053	.0070
		Peripheral - Rough	> 4 - 5	1 x D	.375 x D	-	3	443	.0007	.0011	.0015	.0019	.0022	.0030	.0037	.0045	.0059
		Finish	≤ 2.5	2 x D	.010 x D	-	3	634	.0004	.0007	.0009	.0011	.0013	.0018	.0022	.0026	.0035
		Helical Ramp	≤ 2	2 x D	1 x D	12 deg	3	488	.0009	.0013	.0017	.0021	.0026	.0034	.0043	.0051	.0068
		Straight Line Ramp	≤ 2	1 x D	1 x D	20 deg	3	488	.0006	.0009	.0011	.0014	.0017	.0023	.0029	.0034	.0046
	Composites, Plastics, Fiberglass	Slotting	≤ 2	1 x D	1 x D	-	3	500	.0011	.0017	.0023	.0028	.0034	.0045	.0056	.0068	.0090
		Peripheral - Rough	≤ 2	1 x D	.75 x D	-	3	700	.0014	.0021	.0029	.0036	.0043	.0057	.0071	.0086	.0114
		Peripheral - Rough	> 2 - 3	1 x D	.75 x D	-	3	700	.0014	.0021	.0027	.0034	.0041	.0055	.0068	.0082	.0109
		Peripheral - Rough	> 3 - 4	1 x D	.75 x D	-	3	600	.0012	.0018	.0024	.0030	.0036	.0048	.0061	.0073	.0097
		Peripheral - Rough	> 4 - 5	1 x D	.75 x D	-	3	500	.0010	.0015	.0020	.0025	.0030	.0040	.0051	.0061	.0081
		Finish	≤ 2.5	2 x D	.015 x D	-	3	900	.0006	.0009	.0013	.0016	.0019	.0025	.0031	.0038	.0050
		Helical Ramp	≤ 2	2 x D	1 x D	15 deg	3	500	.0011	.0017	.0023	.0028	.0034	.0045	.0056	.0068	.0090
		Straight Line Ramp	≤ 2	1 x D	1 x D	45 deg	3	500	.0008	.0011	.0015	.0019	.0023	.0030	.0038	.0045	.0061

** D = Tool Diameter The M213 excels at plunge milling, please refer to page 11 for speed, feed and peck info. Tool LC/Dia equals amount of tool projection from the holder.**