

Roughing

ISO	Material No.	Material	Condition	Cutting Speed Recommendations V <sub>c</sub> (SFM)	Hardness HB	Cutting Diameter Feed (IPT)								Roughing		
						3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	a <sub>p</sub>	a <sub>e</sub>	
P	1	Non-alloy steel and cast steel, free cutting steel	<.25%C	Annealed	890-960	125	.0008-.0015	.001-.002	.0013-.0025	.0015-.003	.002-.004	.0025-.005	.003-.006	.004-.008	3xD	.12xD
	2		>=.25%C	Annealed	710-815	190	.0008-.0015	.001-.002	.0013-.0025	.0015-.003	.002-.004	.0025-.005	.003-.006	.004-.008	3xD	.12xD
	3		<.55%C	Quenched & tempered	570-780	250	.0008-.0015	.001-.002	.0013-.0025	.0015-.003	.002-.004	.0025-.005	.003-.006	.004-.008	3xD	.12xD
	4		>=.55%C	Annealed	570-780	220	.0008-.0015	.001-.002	.0013-.0025	.0015-.003	.002-.004	.0025-.005	.003-.006	.004-.008	3xD	.12xD
	5		>=.55%C	Quenched & tempered	500-635	300	.0008-.0015	.001-.002	.0013-.0025	.0015-.003	.002-.004	.0025-.005	.003-.006	.004-.008	3xD	.12xD
	6	Low alloy & cast steel (less than 5% of alloying elements)	Annealed	570-780	200	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
	7		Quenched & tempered	425-635	275	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
	8		Quenched & tempered	450-635	300	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
	9		Quenched & tempered	500-635	350	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
	10	High alloyed steel, cast steel and tool steel	Annealed	450-635	200	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
	11		Quenched & tempered	240-425	325	.0009-.0016	.0012-.0022	.0015-.0028	.0018-.0032	.0024-.0044	.003-.0056	.0036-.0064	.0048-.0088	3xD	.07xD	
	12	Stainless steel and cast steel	Ferritic/martensitic	280-570	200	.0009-.0016	.0012-.0022	.0015-.0028	.0018-.0032	.0024-.0044	.003-.0056	.0036-.0064	.0048-.0088	3xD	.07xD	
	13		Martensitic	210-530	240	.0009-.0016	.0012-.0022	.0015-.0028	.0018-.0032	.0024-.0044	.003-.0056	.0036-.0064	.0048-.0088	3xD	.07xD	
M	14	Stainless steel and cast steel	Austenitic	210-425	180	.0008-.0015	.0011-.0021	.0013-.0025	.0016-.003	.0022-.0042	.0025-.005	.0032-.006	.0044-.0084	3xD	.08xD	
K	15	Grey cast iron (GG)	Pearlitic/ferritic	280-890	180	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
	16		Pearlitic/martensitic	450-850	260	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
	17	Nodular cast iron (GGG)	Ferritic	530-960	160	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
	18		Pearlitic	530-960	250	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
	19	Malleable cast iron	Ferritic	530-960	130	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
	20		Pearlitic	500-850	230	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
S	31	Fe based	Annealed	125-200	200	.0009-.0016	.0012-.0022	.0015-.0028	.0018-.0032	.0024-.0044	.003-.0056	.0036-.0064	.0048-.0088	3xD	.07xD	
	32		Cured	125-200	280	.0009-.0016	.0012-.0022	.0015-.0028	.0018-.0032	.0024-.0044	.003-.0056	.0036-.0064	.0048-.0088	3xD	.07xD	
	33	High temp. alloys	Annealed	70-125	250	.001-.0018	.0013-.0024	.0013-.0025	.002-.0036	.0026-.0048	.0025-.005	.004-.0072	.0052-.0096	3xD	.06xD	
	34		Ni or Co based	Cured	70-125	350	.001-.0018	.0013-.0024	.0013-.0025	.002-.0036	.0026-.0048	.0025-.005	.004-.0072	.0052-.0096	3xD	.06xD
	35		Cast	70-125	320	.001-.0018	.0013-.0024	.0013-.0025	.002-.0036	.0026-.0048	.0025-.005	.004-.0072	.0052-.0096	3xD	.06xD	
	36	Titanium Ti alloys	Pure	325	310	.001-.0018	.0013-.0024	.0013-.0025	.002-.0036	.0026-.0048	.0025-.005	.004-.0072	.0052-.0096	3xD	.06xD	
	37		Alpha + beta alloys cured	165-325	310	.0007-.0014	.001-.0019	.0013-.0023	.0014-.0028	.002-.0038	.0026-.0046	.0028-.0056	.004-.0076	3xD	.10xD	
H	38	Hardened steel	Hardened	110-210	55 HRC	.0012-.0021	.0016-.0029	.002-.0036	.0024-.0042	.0032-.0058	.004-.0072	.0048-.0084	.0064-.0116	3xD	.04xD	
	39		Hardened	110-145	60 HRC	.0016-.003	.0022-.004	.0028-.005	.0032-.006	.0044-.008	.0056-.010	.0064-.012	.0088-.016	3xD	.02xD	
	40	Chilledcastiron	Cast	250-320	400	.001-.0019	.0014-.0026	.0018-.0032	.002-.0038	.0028-.0052	.0036-.0064	.004-.0076	.0056-.0104	3xD	.05xD	
	41	Cast iron	Hardened	110-210	55 HRC	.0012-.0021	.0016-.0029	.002-.0036	.0024-.0042	.0032-.0058	.004-.0072	.0048-.0084	.0064-.0116	3xD	.04xD	

Finishing

ISO	Material No.	Material	Condition	Cutting Speed	Hardness HB	Cutting Diameter Feed (IPT)								Finishing		
						3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	a <sub>p</sub>	a <sub>e</sub>	
P	1	Non-alloy steel and cast steel, free cutting steel	<.25%C	Annealed	1020-1100	125	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD
	2		>=.25%C	Annealed	820-940	190	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD
	3		<.55%C	Quench and tempered	650-890	250	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD
	4		>=.55%C	Annealed	650-890	220	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD
	5		>=.55%C	Quenched & tempered	570-730	300	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD
	6	Low alloy & cast steel (less than 5% of alloying elements)	Annealed	650-890	200	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	7		Quenched & tempered	490-730	275	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	8		Quenched & tempered	520-730	300	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	9		Quenched & tempered	570-730	350	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	10	High alloyed steel, cast steel and tool steel	Annealed	520-730	200	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	11		Quenched & tempered	280-490	325	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	12	Stainless steel and cast steel	Ferritic/martensitic	320-650	200	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	13		Martensitic	240-610	240	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
M	14	Stainless steel and cast steel	Austenitic	240-490	180	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
K	15	Grey cast iron (GG)	Pearlitic/ferritic	320-1020	180	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	16		Pearlitic/martensitic	520-980	260	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	17	Nodular cast iron (GGG)	Ferritic	610-1100	160	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	18		Pearlitic	610-1100	250	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	19	Malleable cast iron	Ferritic	610-1100	130	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	20		Pearlitic	570-980	230	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
S	31	Fe based	Annealed	80-160	200	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	32		Cured	80-120	280	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	33	Ni or Co based	Annealed	80-120	250	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	34		Cured	80-120	350	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	35		Cast	80-120	320	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	36	Titanium Ti alloys	Pure	120-390	310	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	37		Alpha + beta alloys cured	300-390	310	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
H	38	Hardened steel	Hardened	120-240	55HRC	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	39		Hardened	120-160	60HRC	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	40	Chilledcastiron	Cast	290-370	400	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	
	41	Cast iron	Hardened	120-240	55HRC	.0017	.0022	.0028	.0033	.0044	.0055	.0066	.0088	Full	.02xD	