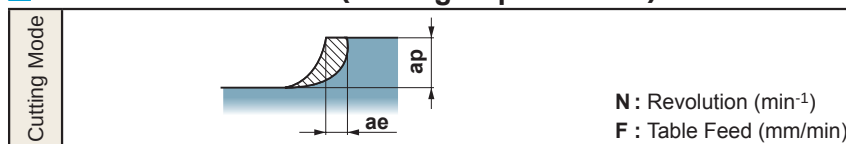
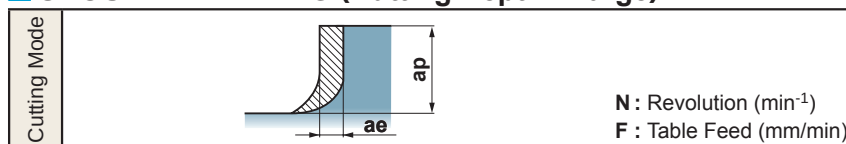


SHOULDER MILLING (Cutting Depth : Small)



Cutting Mode	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	φ16				φ20				φ25				φ30			
						N	F	ap	ae	N	F	ap	ae	N	F	ap	ae	N	F	ap	ae
P	Carbon Steel Alloy Steel	180~280HB	200 (160~250)	VP15TF	Standard	3979	796	4	6	3183	955	5	8	2546	1273	6	10	2122	1273	7.5	10
				Low Resistance Type	Long Neck	3979	637	4	4	3183	637	5	6	2546	1273	6	7.5	2122	1273	7.5	7.5
				Extra Long	—	—	—	—	—	3183	382	5	4	2546	1019	6	5	2122	637	7.5	3
		280~350HB	160 (120~200)	VP15TF	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
				Low Resistance Type	Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	509	7.5	7.5
				Extra Long	—	—	—	—	—	2546	306	5	4	2037	489	6	5	1698	407	7.5	3
	Pre-Hardened Steel	35~45HRC	160 (120~200)	VP15TF	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
				Low Resistance Type	Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	679	7.5	7.5
				Extra Long	—	—	—	—	—	2546	306	5	4	2037	489	6	5	1698	509	7.5	3
	Alloy Tool Steel	≤350HB	160 (120~200)	VP15TF	Standard	3183	509	4	6	2546	509	5	8	2037	815	6	10	1698	849	7.5	10
				Low Resistance Type	Long Neck	3183	382	4	4	2546	407	5	6	2037	611	6	7.5	1698	509	7.5	7.5
				Extra Long	—	—	—	—	—	2546	306	5	4	2037	489	6	2.5	1698	407	7.5	1.5
M	Stainless Steel	≤270HB	200 (100~250)	VP15TF	Standard	3979	477	4	6	3183	509	5	8	2546	764	6	10	2122	849	7.5	10
K	Cast Iron	≤350MPa	200 (150~300)	VP15TF	Standard	3979	1592	4	8	3183	1592	5	10	2546	1528	6	10	2122	1485	7.5	10
				Low Resistance Type	Long Neck	3979	1194	4	6	3183	1273	5	8	2546	1528	6	10	2122	1485	7.5	6
				Extra Long	—	—	—	—	—	3183	955	5	6	2546	1273	6	7.5	2122	1061	7.5	3
	Ductile Cast Iron	≤500MPa	200 (150~280)	VP15TF	Standard	3979	1592	4	8	3183	1592	5	10	2546	1528	6	10	2122	1273	7.5	10
				Low Resistance Type	Long Neck	3979	1194	4	6	3183	1273	5	8	2546	1528	6	10	2122	1273	7.5	6
				Extra Long	—	—	—	—	—	3183	955	5	6	2546	1273	6	7.5	2122	1061	7.5	3
		≤800MPa	180 (150~250)	VP15TF	Standard	3581	1432	4	8	2865	1433	5	10	2292	1375	6	10	1910	1146	7.5	10
				Low Resistance Type	Long Neck	3581	1074	4	6	2865	1146	5	8	2292	1375	6	10	1910	1146	7.5	6
				Extra Long	—	—	—	—	—	2865	860	5	6	2292	1146	6	7.5	1910	955	7.5	3
	Hardened Steel	45~50HRC	100 (60~120)	VP15TF	Standard	1989	239	4	4	1591	191	5	5	1273	255	6	7.5	1061	212	7.5	3
				Strong Cutting Edge Type	Long Neck	1989	239	4	2	1591	191	5	3	1273	255	6	4	1061	212	7.5	1.5
				Extra Long	—	—	—	—	—	1591	191	5	2	1273	204	6	1.5	1061	170	7.5	1
H	Hardened Steel	50~60HRC	60 (40~100)	VP15TF	Standard	1194	143	4	4	955	115	5	5	764	153	6	7.5	637	127	7.5	3
				Strong Cutting Edge Type	Long Neck	1194	143	4	2	955	115	5	3	764	153	6	4	637	127	7.5	1.5
				Extra Long	—	—	—	—	—	955	115	5	2	764	122	6	1.5	637	102	7.5	1

SHOULDER MILLING (Cutting Depth : Large)



(Note) Machining Stainless Steels

When up-cut milling stainless steels at large depths and widths of cut, the machined surface is liable to burrs and welding due to chip jamming. For stainless steels, down-cutting (climb milling) is recommended.

Cutting Mode	Work Material	Hardness	Cutting Speed (m/min)	Insert Grade, Type	Holder Type	φ16				φ20				φ25				φ30			
						N	F	ap	ae	N	F	ap	ae	N	F	ap	ae	N	F	ap	ae
P	Carbon Steel Alloy Steel	180~280HB	200 (160~250)	VP15TF	Standard	3979	637	8	4	3183	764	10	4	2546	1273	12.5	5	2122	1273	15	4.5
				Low Resistance Type	Long Neck	3979	477	8	3	3183	509	10	3	2546	1019	12.5	4	2122	849	15	3
				Extra Long	—	—	—	—	—	3183	382	10	2	2546	764	12.5	2.5	2122	849	15	1.5
		280~350HB	160 (120~200)	VP15TF	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
				Low Resistance Type	Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	4	1698	509	15	3
				Extra Long	—	—	—	—	—	2546	306	10	2	2037	489	12.5	2.5	1698	407	15	1.5
	Pre-Hardened Steel	35~45HRC	160 (120~200)	VP15TF	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
				Low Resistance Type	Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	4	1698	509	15	3
				Extra Long	—	—	—	—	—	2546	306	10	2	2037	489	12.5	2.5	1698	407	15	1.5
	Alloy Tool Steel	≤350HB	160 (120~200)	VP15TF	Standard	3183	382	8	4	2546	509	10	4	2037	815	12.5	5	1698	849	15	4.5
				Low Resistance Type	Long Neck	3183	382	8	3	2546	306	10	3	2037	611	12.5	2.5	1698	509	15	3
				Extra Long	—	—	—	—	—	2546	306	10	2	2037	489	12.5	1.5	1698	407	15	1.5
M	Stainless Steel	≤270HB	200 (100~250)	VP15TF	Standard	3979	477	8	4	3183	509	10	4	2546	764	12.5	10	2122	849	15	10
K	Cast Iron	≤350MPa	200 (150~300)	VP15TF	Standard	3979	1194	8	8	3183	1273	10	8	2546	1273	12.5	10	2122	1485	15	10
				Low Resistance Type	Long Neck	3979	955	8	5	3183	955	10	4	2546	1273	12.5	7.5	2122	1061	15	4.5
				Extra Long	—	—	—	—	—	3183	764	10	2	2546	1019	12.5	1.5	2122	849	15	3
	Ductile Cast Iron	≤500MPa	200 (150~280)	VP15TF	Standard	3979	1194	8	8	3183	1273	10	8	2546	1273	12.5	10	2122	1273	15	10
				Low Resistance Type	Long Neck	3979	955	8	5	3183	955	10	4	2546	1273	12.5	7.5	2122	849	15	4.5
				Extra Long	—	—	—	—	—	3183	764	10	2	2546	1019	12.5	5	2122	849	15	1.5
		≤800MPa	180 (150~250)	VP15TF	Standard	3581	1074	8	8	2865	1146	10	8	2292	1146	12.5	10	1910	1146	15	10
				Low Resistance Type	Long Neck	3581	859	8	5	2865	860	10	4	2292	1146	12.5	7.5	1910	764	15	4.5
				Extra Long	—	—	—	—	—	2865	688	10	2	2292	917	12.5	5	1910	764	15	1.5
	Hardened Steel	45~50HRC	100 (60~120)	VP15TF	Standard	1989	239	8	2	1591	191	10	3	1273	255	12.5	4	1061	212	15	3
				Strong Cutting Edge Type	Long Neck	1989	239	8	1	1591	191	10	2	1273	204	12.5	1.5	1061	106	15	1.5
				Extra Long	—	—	—	—	—	1591	191	10	1	—	—	—	—	—	—	—	—
H	Hardened Steel	50~60HRC	60 (40~100)	VP15TF	Standard	1194	143	8	2	955	115	10	3	764	153	12.5	4	637	127	15	3
				Strong Cutting Edge Type	Long Neck	1194	143	8	1	955	115	10	2	764	122	12.5	1.5	637	64	15	1.5
				Extra Long	—	—	—	—	—	955	115	10	1	—	—	—	—	—	—	—	—