Recommended Cutting Conditions

■ Dry Cutting

Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Grade	Width of Cut **ae** .5DC≥	.8DC≥	DC(Slot)
					Cutting Speed **vc** (SFM)		
P	Mild Steels	Hardness ≤180HB	●	MP6120	785(655—920)	720(590—850)	655(525—785)
			◐	MP6130	755(620—885)	690(560—820)	620(490—755)
			✣	MP6130,VP15TF	690(560—820)	620(490—755)	560(425—690)
	Carbon Steels Alloy Steels	Hardness 180—280HB	●	MP6120	690(560—820)	620(490—755)	560(425—690)
			◐	MP6130	655(525—785)	590(460—720)	525(395—655)
			✣	MP6130,VP15TF	590(460—720)	525(395—655)	460(330—590)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280—350HB ≤350HB (Annealing)	●	MP6120	655(525—785)	590(460—720)	525(395—655)
			◐	MP6130	620(490—755)	560(425—690)	490(360—620)
			✣	MP6130,VP15TF	560(425—690)	490(360—620)	425(295—560)
	Pre-hardened Steels	Hardness 35—45HRC	●	MP6120	460(395—525)	—	—
			◐	MP6130	395(330—460)	—	—
			✣	MP6130,VP15TF	360(295—425)	—	—
M	Austenitic Stainless Steels	Hardness ≤200HB	●	MP7130	590(525—655)	525(460—590)	—
			◐	MP7130,VP15TF	560(490—620)	490(425—560)	—
			✣	MP7130,VP15TF	490(425—560)	425(360—490)	—
	Austenitic Stainless Steels	Hardness >200HB	●	MP7130	560(490—620)	490(425—560)	—
			◐	MP7130,VP15TF	525(460—590)	460(395—525)	—
			✣	MP7130,VP15TF	460(395—525)	395(330—460)	—
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	●	MP7130	590(525—655)	525(460—590)	—
			◐	MP7130,VP15TF	560(490—620)	490(425—560)	—
			✣	MP7130,VP15TF	490(425—560)	425(360—490)	—
	Duplex Stainless Steels	Hardness ≤280HB	●	MP7130	525(460—590)	460(395—525)	—
			◐	MP7130,VP15TF	490(425—560)	425(360—490)	—
			✣	MP7130,VP15TF	425(360—490)	360(295—425)	—
	Precipitation Hardening Stainless Steels	Hardness <450HB	●	MP7130	460(395—525)	—	—
			◐	MP7130,VP15TF	425(360—490)	—	—
			✣	MP7130,VP15TF	360(295—425)	—	—
K	Gray Cast Irons	Tensile Strength ≤350MPa	●	MC5020	820(690—950)	755(620—885)	690(560—820)
			◐	MC5020	785(655—920)	720(590—850)	655(525—785)
			◐	VP15TF	785(655—920)	720(590—850)	—
			✣	MC5020,VP15TF	720(590—850)	655(525—785)	590(460—720)
	Ductile Cast Irons	Tensile Strength ≤450MPa	●	MC5020	720(590—525)	655(525—785)	590(460—720)
			◐	MC5020	690(560—820)	620(490—755)	560(425—690)
			◐	VP15TF	690(560—820)	620(490—755)	—
			✣	MC5020,VP15TF	620(490—755)	560(425—690)	490(360—620)
	Ductile Cast Irons	Tensile Strength ≤800MPa	●	MC5020	590(460—720)	525(395—655)	460(330—590)
			◐	MC5020	560(425—690)	490(360—620)	425(295—560)
			◐	VP15TF	560(425—690)	490(360—620)	—
			✣	MC5020,VP15TF	490(360—620)	425(295—560)	360(230—490)
H	Hardened Steels	Hardness 40—55HRC	●	VP15TF	165(100—230)	—	—
			◐	VP15TF	165(100—230)	—	—

Note 1) The recommended cutting speed has been calculated for a depth of cut .079 inch. Please reduce the cutting speed by an appropriate amount corresponding to the increase in cutting depth.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

■ Wet Cutting
Cutting Speed

(inch)

	Workpiece Material	Properties	Cutting Conditions	Grade	Width of Cut **ae** .5DC≥	.8DC≥	DC(Slot)
					Cutting Speed **vc** (SFM)		
P	Mild Steels	Hardness ≤180HB	●	MP6120	490(460—525)	425(395—460)	395(360—425)
			◐	MP6130	460(425—490)	395(360—425)	360(330—395)
			✠	MP6130,VP15TF	395(360—425)	330(295—360)	295(260—330)
	Carbon Steels Alloy Steels	Hardness 180—280HB	●	MP6120	490(460—525)	425(395—460)	395(360—425)
			◐	MP6130	460(425—490)	395(360—425)	360(330—395)
			✠	MP6130,VP15TF	395(360—425)	330(295—360)	295(260—330)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280—350HB ≤350HB (Annealing)	●	MP6120	460(425—490)	395(360—425)	360(330—395)
			◐	MP6130	425(395—460)	360(330—395)	330(295—360)
			✠	MP6130,VP15TF	360(330—395)	295(260—330)	260(230—295)
	Pre-hardened Steels	Hardness 35—45HRC	●	MP6120	360(330—395)	—	—
			◐	MP6130	330(295—360)	—	—
			✠	MP6130,VP15TF	260(230—295)	—	—
M	Austenitic Stainless Steels	Hardness ≤200HB	●	MP7130	425(395—460)	360(330—395)	—
			◐	MP7130,VP15TF	395(360—425)	330(295—360)	—
			✠	MP7130,VP15TF	330(295—360)	260(230—295)	—
	Austenitic Stainless Steels	Hardness >200HB	●	MP7130	425(395—460)	360(330—395)	—
			◐	MP7130,VP15TF	395(360—425)	330(295—360)	—
			✠	MP7130,VP15TF	330(295—360)	260(230—295)	—
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	●	MP7130	425(395—460)	360(330—395)	—
			◐	MP7130,VP15TF	395(360—425)	330(295—360)	—
			✠	MP7130,VP15TF	330(295—360)	260(230—295)	—
	Duplex Stainless Steels	Hardness ≤280HB	●	MP7130	395(360—425)	330(295—360)	—
			◐	MP7130,VP15TF	360(330—395)	295(260—330)	—
			✠	MP7130,VP15TF	295(260—330)	230(195—260)	—
	Precipitation Hardening Stainless Steels	Hardness <450HB	●	MP7130	395(360—425)	—	—
			◐	MP7130,VP15TF	360(330—395)	—	—
			✠	MP7130,VP15TF	295(260—330)	—	—
K	Gray Cast Irons	Tensile Strength ≤350MPa	●	MC5020	560(490—620)	490(425—560)	425(360—490)
			◐	MC5020	525(460—590)	460(395—525)	395(330—460)
			◐	VP15TF	525(460—590)	460(395—525)	—
			✠	MC5020,VP15TF	460(395—525)	395(330—460)	330(260—395)
	Ductile Cast Irons	Tensile Strength ≤450MPa	●	MC5020	560(490—620)	490(425—560)	425(360—490)
			◐	MC5020	525(460—590)	460(395—525)	395(330—460)
			◐	VP15TF	525(460—590)	460(395—525)	—
			✠	MC5020,VP15TF	460(395—525)	395(330—460)	330(260—395)
	Ductile Cast Irons	Tensile Strength ≤800MPa	●	MC5020	525(490—560)	460(425—490)	395(360—425)
			◐	MC5020	490(460—525)	425(395—460)	360(330—395)
			◐	VP15TF	490(460—525)	425(395—460)	—
			✠	MC5020,VP15TF	425(395—460)	360(330—395)	295(260—330)
N	Aluminum Alloys	Content Si<5%	●	TF15	1640(985—2950)	1640(985—2950)	1640(985—2950)
			◐	TF15	1640(985—2950)	1640(985—2950)	1640(985—2950)
			✠	TF15	1310(655—2625)	1310(655—2625)	1310(655—2625)
S	Titanium Alloys	—	●	MP9120	260(195—330)	—	—
			◐	MP9120	230(165—295)	—	—
			✠	MP9130	195(130—260)	—	—
	Heat Resistant Alloys	—	●	MP9120	195(165—230)	—	—
			◐	MP9120	165(100—195)	—	—
			✠	MP9130	130(65—130)	—	—
H	Hardened Steels	Hardness 40—55HRC	●	VP15TF	165(100—230)	—	—
			◐	VP15TF	165(100—230)	—	—

Note 1) Refer to the above table and set up cutting conditions according to cutting applications.

Recommended Cutting Conditions

Depth of Cut / Feed per Tooth

	Workpiece Material	Properties	Cutting Conditions	Grade	Width of Cut **ae** .5DC≥ Breaker	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)
P	Mild Steels	Hardness ≤180HB	●	MP6120	L,M	≤.157	.005(.004–.006)
			◐	MP6130	L,M	≤.157	.005(.004–.006)
			◐		M,R	≤.157	.006(.004–.008)
			✚	MP6130,VP15TF	M,R	≤.157	.005(.004–.006)
	Carbon Steels Alloy Steels	Hardness 180–280HB	●	MP6120	L,M	≤.157	.005(.004–.006)
			◐	MP6130	L,M	≤.157	.005(.004–.006)
			◐		M,R	≤.157	.006(.004–.008)
			✚	MP6130,VP15TF	M,R	≤.157	.005(.004–.006)
	Carbon Steels Alloy Steels Alloy Tool Steels	Hardness 280–350HB ≤350HB (Annealing)	●	MP6120	L,M	≤.118	.005(.004–.006)
			◐	MP6130	L,M	≤.118	.005(.004–.006)
			◐		M,R	≤.118	.006(.004–.008)
			✚	MP6130,VP15TF	M,R	≤.118	.005(.004–.006)
	Pre-hardened Steels	Hardness 35–45HRC	●	MP6120	L,M	≤.079	.005(.004–.006)
			◐	MP6130	L,M	≤.079	.005(.004–.006)
			◐		M,R	≤.079	.006(.004–.008)
			✚	MP6130,VP15TF	M,R	≤.079	.005(.004–.006)
M	Austenitic Stainless Steels	Hardness ≤200HB	● ◐	MP7130	L,M	≤.157	.005(.004–.006)
			◐	VP15TF	M	≤.157	.006(.004–.008)
			✚	MP7130,VP15TF	M	≤.157	.005(.004–.006)
	Austenitic Stainless Steels	Hardness >200HB	●	MP7130	L,M	≤.157	.005(.004–.006)
			◐	MP7130	L,M	≤.118	.005(.004–.006)
			◐	VP15TF	M	≤.118	.006(.004–.008)
			✚	MP7130,VP15TF	M	≤.118	.005(.004–.006)
	Ferritic and Martensitic Stainless Steels	Hardness ≤200HB	● ◐	MP7130	L,M	≤.157	.005(.004–.006)
			◐	VP15TF	M	≤.157	.006(.004–.008)
			✚	MP7130,VP15TF	M	≤.118	.005(.004–.006)
	Duplex Stainless Steels	Hardness ≤280HB	● ◐	MP7130	L,M	≤.118	.005(.004–.006)
			● ◐	MP7130	L,M	≤.157	.005(.004–.006)
			◐	VP15TF	M	≤.118	.006(.004–.008)
			◐	VP15TF	M	≤.157	.006(.004–.008)
			✚	MP7130,VP15TF	M	≤.118	.005(.004–.006)
			✚	MP7130,VP15TF	M	≤.157	.005(.004–.006)
	Precipitation Hardening Stainless Steels	Hardness <450HB	●	MP7130	L,M	≤.079	.005(.004–.006)
			◐	MP7130	L,M	≤.079	.005(.004–.006)
			◐	VP15TF	M	≤.079	.006(.004–.008)
			✚	MP7130,VP15TF	M	≤.079	.005(.004–.006)
K	Gray Cast Irons	Tensile Strength ≤350MPa	● ◐	MC5020	L,M	≤.157	.005(.004–.006)
			◐	VP15TF	M,R	≤.157	.006(.004–.008)
			✚	MC5020,VP15TF	M,R	≤.157	.005(.004–.006)
	Ductile Cast Irons	Tensile Strength ≤800MPa	● ◐	MC5020	L,M	≤.157	.005(.004–.006)
			◐	VP15TF	M,R	≤.157	.006(.004–.008)
			✚	MC5020,VP15TF	M,R	≤.157	.005(.004–.006)
N	Aluminum Alloys	Content Si<5%	● ◐ ✚	TF15	L	≤.157	.005(.004–.006)
S	Titanium Alloys	–	● ◐	MP9120	L,M	≤.079	.004(.002–.005)
			✚	MP9130	L,M	≤.079	.004(.002–.005)
	Heat Resistant Alloys	–	● ◐	MP9120	L,M	≤.079	.004(.002–.005)
			✚	MP9130	L,M	≤.079	.004(.002–.005)
H	Hardened Steels	Hardness 40–55HRC	●	VP15TF	M	≤.079	.002(.002–.004)
			◐	VP15TF	M,R	≤.079	.002(.002–.004)

Note 1) Refer to the above table and set up cutting conditions according to cutting applications.

Cutting Conditions (Guide) :
● : Stable Cutting ◐ : General Cutting ✠ : Unstable Cutting

(inch)

	Width of Cut **ae**						Cutting Mode
	.8DC≥			DC(Slot)			
	Breaker	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	Breaker	Depth of Cut **ap**	Feed per Tooth **fz** (IPT)	
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
	M,R	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
	M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)	Dry, Wet
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
	M,R	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
	M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)	Dry, Wet
	L,M	≤.118	.005(.004–.006)	L,M	≤.118	.005(.004–.006)	Dry, Wet
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
	M,R	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
	M,R	≤.118	.005(.004–.006)	M	≤.079	.005(.004–.006)	Dry, Wet
	–	–	–	–	–	–	Dry, Wet
	–	–	–	–	–	–	Dry, Wet
	–	–	–	–	–	–	Dry, Wet
	–	–	–	–	–	–	Dry, Wet
	L,M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
	M	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
	M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
	L,M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
	L,M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
	M	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
	M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
	L,M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
	M	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
	M	≤.118	.005(.004–.006)	–	–	–	Dry, Wet
	L,M	≤.118	.005(.004–.006)	–	–	–	Dry
	L,M	≤.118	.005(.004–.006)	–	–	–	Wet
	M	≤.118	.006(.004–.008)	–	–	–	Dry
	M	≤.118	.006(.004–.008)	–	–	–	Wet
	M	≤.118	.006(.004–.008)	–	–	–	Dry
	M	≤.118	.005(.004–.006)	–	–	–	Wet
	–	–	–	–	–	–	Dry, Wet
	–	–	–	–	–	–	Dry, Wet
	–	–	–	–	–	–	Dry, Wet
	–	–	–	–	–	–	Dry, Wet
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
	M,R	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
	M,R	≤.118	.005(.004–.006)	M,R	≤.079	.005(.004–.006)	Dry, Wet
	L,M	≤.118	.005(.004–.006)	L,M	≤.079	.005(.004–.006)	Dry, Wet
	M,R	≤.118	.006(.004–.008)	–	–	–	Dry, Wet
	M,R	≤.118	.005(.004–.006)	M,R	≤.079	.005(.004–.006)	Dry, Wet
	L	≤.118	.005(.004–.006)	L	≤.079	.005(.004–.006)	Wet
	–	–	–	–	–	–	Wet
	–	–	–	–	–	–	Wet
	–	–	–	–	–	–	Wet
	–	–	–	–	–	–	Wet
	–	–	–	–	–	–	Dry, Wet
	–	–	–	–	–	–	Dry, Wet