

STANDARD CUTTING CONDITIONS

09 type

ISO	Workpiece material	Hardness	Priority	Entry angle symbol	Chip-breaker	Grade	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
P	Carbon steel S45C, S55C, etc., C45, C55, etc.	- 300HB	First choice	ZER	MM	AH3135	100 - 300	0.5 - 1.5
			for wear resistance	UER	MM	AH3135	100 - 300	0.5 - 1.5
	Alloy steel SCM440, etc., 42CrMo4, 17Cr3, etc.	- 300HB	First choice	ZER	MM	AH3135	100 - 200	0.5 - 1.5
			for wear resistance	UER	MM	AH3135	100 - 200	0.5 - 1.5
Prehardened steel NAK80, PX5, etc.	30 - 40HRC	First choice	ZER	MM	AH3135	100 - 200	0.5 - 1.2	
		for wear resistance	UER	MM	AH3135	100 - 200	0.5 - 1.2	
M	Austenitic stainless steel SUS304, X5CrNi18-9, etc.	- 200HB	First choice	UER	MM	AH3135	100 - 150	0.5 - 1.2
			Low cutting load	ZER	MM	AH3135	100 - 150	0.5 - 1.2
	Precipitation hardening stainless steel SUS630, X20CrNiCuNb-16-4, etc.	28HRC - (H1150)	First choice	UER	MM	AH3135	80 - 150	0.3 - 1.2
			Low cutting load	ZER	MM	AH3135	80 - 150	0.3 - 1.2
		40HRC - (H900)	First choice	UER	MM	AH3135	80 - 120	0.3 - 0.8
			Low cutting load	ZER	MM	AH3135	80 - 120	0.3 - 0.8
K	Gray cast iron FC250, FC300, etc. 250, 300, etc., GG25, GG30, etc.	150 - 250HB	First choice	ZER	MM	AH3135	100 - 300	0.5 - 2
S	Ductile cast iron FCD600, etc., 600-3, etc., GGG40, etc.	150 - 250HB	First choice	ZER	MM	AH3135	80 - 200	0.5 - 2
S	Titanium alloys Ti-6Al-4V, etc.	- 40HRC	First choice	UER	MM	AH3135	30 - 60	0.3 - 0.7
			Low cutting load	ZER	MM	AH3135	30 - 60	0.3 - 0.7
	Heat-resistance alloys Inconel, Hastelloy, etc.	- 40HRC	First choice	UER	MM	AH3135	20 - 50	0.1 - 0.3
for wear resistance			ZER	MM	AH3135	20 - 50	0.1 - 0.3	
H	Hardened steel SKD61, etc. X40CrMoV5-1, etc.	40 - 50HRC	First choice	ZER	MM	AH3135	80 - 130	0.1 - 0.3

ACCELERATED MACHINING

Tool dia.: DC (mm), Number of revolutions: n (min^{-1}), Feed speed: Vf (mm/min), Number of inserts: z

$\varnothing 25, z = 3$		$\varnothing 32, z = 4$		$\varnothing 40, z = 5$		$\varnothing 50, z = 7$	
n	Vf	n	Vf	n	Vf	n	Vf
2,550	7,650	1,990	7,960	1,590	7,950	1,270	8,890
Vc = 200 m/min, fz = 1.0 mm/t							
1,910	5,730	1,490	5,960	1,190	5,950	960	6,720
Vc = 150 m/min, fz = 1.0 mm/t							
1,910	4,580	1,490	4,770	1,190	4,760	960	5,380
Vc = 150 m/min, fz = 0.8 mm/t							
1,530	3,670	1,190	3,810	960	3,840	760	4,260
Vc = 120 m/min, fz = 0.8 mm/t							
1,530	3,670	1,190	3,810	960	3,840	760	4,260
Vc = 120 m/min, fz = 0.8 mm/t							
1,270	2,290	1,000	2,400	800	2,400	640	2,690
Vc = 100 m/min, fz = 0.6 mm/t							
2,550	9,180	1,990	9,550	1,590	9,540	1,270	10,670
Vc = 200 m/min, fz = 1.2 mm/t							
1,910	6,880	1,490	7,150	1,190	7,140	1,270	10,670
Vc = 150 m/min, fz = 1.2 mm/t							
510	770	400	800	320	800	250	880
Vc = 40 m/min, fz = 0.5 mm/t							
380	230	300	240	240	240	190	270
Vc = 30 m/min, fz = 0.2 mm/t							
1,270	760	1,000	800	800	800	640	900
Vc = 100 m/min, fz = 0.2 mm/t							

STANDARD CUTTING CONDITIONS

15 type

ISO	Workpiece material	Hardness	Priority	Entry angle symbol	Chip-breaker	Grade	Cutting speed Vc (m/min)	Feed per tooth fz (mm/t)
P	Carbon steel S45C, S55C, etc. C45, C55, etc.	- 300HB	First choice	ZER	MM	AH3135	100 - 300	0.5 - 1.5
			for wear resistance	ZER	MM	AH120	100 - 300	0.5 - 1.5
			for impact resistance	ZER	MJ	AH3135	100 - 300	0.5 - 2.0
	Alloy steel SCM440, etc. 42CrMo4, 17Cr3, etc.	- 300HB	First choice	ZER	MM	AH3135	100 - 200	0.5 - 1.5
			for wear resistance	ZER	MM	AH120	100 - 200	0.5 - 1.5
			for impact resistance	ZER	MJ	AH3135	100 - 200	0.5 - 2.0
	Prehardened steel NAK80, PX5, etc.	30 - 40HRC	First choice	ZER	MM	AH3135	100 - 200	0.5 - 1.2
			for wear resistance	ZER	MM	AH120	100 - 200	0.5 - 1.2
			for impact resistance	ZER	MJ	AH3135	100 - 200	0.5 - 1.5
M	Austenitic stainless steel SUS304, X5CrNi18-9, etc.	- 200HB	First choice	UER	MM	AH3135	100 - 150	0.5 - 1.2
			Low cutting load	ZER	MM	AH3135	100 - 150	0.5 - 1.2
	Precipitation hardening stainless steel SUS630, X20CrNiCuNb-16-4, etc.	28HRC - (H1150) 40HRC - (H900)	First choice	UER	MM	AH3135	80 - 150	0.3 - 1.2
			Low cutting load	ZER	MM	AH3135	80 - 150	0.3 - 1.2
			First choice	UER	MM	AH3135	80 - 120	0.3 - 0.8
			Low cutting load	ZER	MM	AH3135	80 - 120	0.3 - 0.8
K	Gray cast iron FC250, FC300, etc. 250, 300, etc. GG25, GG30, etc.	150 - 250HB	First choice	ZER	MJ	AH120	100 - 300	0.5 - 2.0
			for impact resistance	ZER	MJ	AH3135	100 - 300	0.5 - 2.0
			Low cutting load	ZER	MM	AH120	100 - 300	0.5 - 1.5
	Ductile cast iron FCD600, etc. 600-3, etc. GGG40, etc.	150 - 250HB	First choice	ZER	MJ	AH120	80 - 200	0.5 - 2.0
			for impact resistance	ZER	MJ	AH3135	80 - 200	0.5 - 2.0
			Low cutting load	ZER	MM	AH120	80 - 200	0.5 - 1.5
S	Titanium alloys Ti-6Al-4V, etc.	- 40HRC	First choice	UER	MM	AH3135	30 - 60	0.3 - 0.7
			Low cutting load	ZER	MM	AH3135	30 - 60	0.3 - 0.7
			for impact resistance	ZER	MJ	AH3135	30 - 60	0.3 - 0.7
	Heat-resistance alloys Inconel, Hastelloy, etc.	- 40HRC	First choice	UER	MM	AH3135	20 - 50	0.1 - 0.3
			for wear resistance	ZER	MM	AH120	20 - 50	0.1 - 0.3
			First choice	ZER	MJ	AH3135	80 - 130	0.1 - 0.3
H	Hardened steel	SKD61, etc. X40CrMoV5-1, etc. 40 - 50HRC	for wear resistance	ZER	MJ	AH120	80 - 130	0.1 - 0.3
			First choice	ZER	MJ	AH120	50 - 70	0.05 - 0.2
			SKD11, etc. X153CrMoV12, etc. 50 - 60HRC	First choice	ZER	MJ	AH120	50 - 70

ACCELERATED MACHINING

Tool dia.: DC (mm), Number of revolutions: n (min^{-1}), Feed speed: Vf (mm/min), Number of inserts: z

$\phi 50, z = 3$		$\phi 63, z = 4$		$\phi 80, z = 5$		$\phi 100, z = 6$		$\phi 125, z = 7$		$\phi 160, z = 8$	
n	Vf	n	Vf	n	Vf	n	Vf	n	Vf	n	Vf
1,270	3,810	1,010	4,040	800	4,000	640	3,840	510	3,570	400	3,200
Vc = 200 m/min, fz = 1.0 mm/t											
1,270	4,570	1,010	4,850	800	4,800	640	4,610	510	4,280	400	3,840
Vc = 200 m/min, fz = 1.2 mm/t											
960	2,880	760	3,040	600	3,000	480	2,880	380	2,660	300	2,400
Vc = 150 m/min, fz = 1.0 mm/t											
960	3,460	760	3,650	600	3,600	480	3,460	380	3,190	300	2,880
Vc = 150 m/min, fz = 1.2 mm/t											
960	2,300	760	2,430	600	2,400	480	2,300	380	2,130	300	1,920
Vc = 150 m/min, fz = 0.8 mm/t											
960	2,880	760	3,040	600	3,000	480	2,880	380	2,660	300	2,400
Vc = 150 m/min, fz = 1.0 mm/t											
760	1,820	610	1,950	480	1,920	380	1,820	310	1,740	240	1,540
Vc = 120 m/min, fz = 0.8 mm/t											
760	1,820	610	1,950	480	1,920	380	1,820	310	1,740	240	1,540
Vc = 120 m/min, fz = 0.8 mm/t											
640	1,150	510	1,220	400	1,200	320	1,150	250	1,050	200	960
Vc = 100 m/min, fz = 0.6 mm/t											
1,270	4,570	1,010	4,850	800	4,800	640	4,610	510	4,280	400	3,840
Vc = 200 m/min, fz = 1.2 mm/t											
1,270	3,810	1,010	4,040	800	4,000	640	3,840	510	3,570	400	3,200
Vc = 200 m/min, fz = 1.0 mm/t											
960	3,460	760	3,650	600	3,600	480	3,460	380	3,190	300	2,880
Vc = 150 m/min, fz = 1.2 mm/t											
960	2,880	760	3,040	600	3,000	480	2,880	380	2,660	300	2,400
Vc = 150 m/min, fz = 1.0 mm/t											
250	380	200	400	160	400	130	390	100	350	80	320
Vc = 40 m/min, fz = 0.5 mm/t											
200	120	150	120	120	120	100	120	80	110	60	100
Vc = 30 m/min, fz = 0.2 mm/t											
640	380	510	410	400	400	320	380	250	350	200	320
Vc = 100 m/min, fz = 0.2 mm/t											
380	140	300	140	240	140	190	140	150	130	120	120
Vc = 60 m/min, fz = 0.12 mm/t											