



MATERIAL GROUPS

According to DIN / ISO 513 and VDI 3323

ISO	Material	Condition	Tensile Strength [Kpsi]	Hardness [HB]	Material Group No.	V [sfm]	MM HCD...60° Chamfering					
							D= .314 - .389	D= .394 - .508	D= .512 - .626	D= .629 - .705	D= .708 - .999	
							F _z (inch/tooth)					
P	non-alloy steel and cast steel, free cutting steel	<0.25% C	annealed	61	125	1	320-525-720	.001 .002 .003	.002 .003 .004	.002 .003 .005	.002 .003 .007	.002 .004 .007
		≥0.25% C	annealed	94	190	2						
		<0.55% C	quenched and tempered	123	250	3						
		≥0.55% C	annealed	109	220	4						
			quenched and tempered	145	300	5						
	low alloy and cast steel (less than 5% of alloying elements)	annealed	87	200	6	265-430-590	.001 .002 .003	.002 .003 .004	.002 .003 .004	.002 .003 .005	.002 .003 .007	
			quenched and tempered	135	275							7
			quenched and tempered	145	300							8
		quenched and tempered	174	350	9							
		annealed	99	200	10							
high alloyed steel, cast steel and tool steel	annealed	99	200	10	265-430-590	.001 .0016 .002	.001 .002 .003	.001 .002 .003	.001 .002 .004	.001 .003 .004		
	quenched and tempered	160	325	11								
stainless steel and cast steel	ferritic / martensitic	99	200	12	265-430-590	.001 .0016 .002	.001 .002 .003	.001 .002 .003	.001 .002 .004	.001 .003 .004		
	martensitic	119	240	13								
M	stainless steel and cast steel	austenitic, duplex	87	180	14	265-430-590	.001 .002	.001 .003	.001 .003	.001 .004	.001 .004	
		ferritic / pearlitic		180	15							
K	gray cast iron (GG)	pearlitic / martensitic		260	16	330-525-755	.0008 .002 .0024	.001 .002 .003	.001 .002 .003	.001 .002 .004	.001 .003 .004	
		ferritic	160	17								
nodular cast iron (GGG)	ferritic	160	17	330-525-755	.0008 .002 .0024	.001 .002 .003	.001 .002 .003	.001 .002 .004	.001 .003 .004			
		pearlitic	250							18		
malleable cast iron	ferritic	130	19	330-525-755	.0008 .002 .0024	.001 .002 .003	.001 .002 .003	.001 .002 .004	.001 .003 .004			
	pearlitic	230	20									

Recommended cutting data

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							D= .314 - .389	D= .394 - .508	D= .512 - .626	D= .629 - .705	D= .708 - .999	
							F _{rev} (inch/rev)					
P	non-alloy steel and cast steel, free cutting steel	<0.25% C	annealed	61	125	1	320-525-720	.001 .002 .003	.002 .003 .004	.002 .003 .005	.002 .003 .007	.002 .004 .007
		≥0.25% C	annealed	94	190	2						
		<0.55% C	quenched and tempered	123	250	3						
		≥0.55% C	annealed	109	220	4						
			quenched and tempered	145	300	5						
	low alloy and cast steel (less than 5% of alloying elements)	annealed	87	200	6	265-430-590	.001 .002 .003	.002 .003 .004	.002 .003 .004	.002 .003 .005	.002 .003 .007	
			quenched and tempered	135	275							7
			quenched and tempered	145	300							8
		quenched and tempered	174	350	9							
		annealed	99	200	10							
high alloyed steel, cast steel and tool steel	annealed	99	200	10	265-430-590	.001 .002 .003	.001 .002 .003	.001 .002 .003	.001 .002 .004	.001 .003 .004		
	quenched and tempered	160	325	11								
stainless steel and cast steel	ferritic / martensitic	99	200	12	265-430-590	.0008 .0015 .002	.001 .002 .003	.001 .002 .003	.001 .002 .004	.001 .003 .004		
	martensitic	119	240	13								
M	stainless steel and cast steel	austenitic, duplex	87	180	14	265-430-590	.001 .002	.001 .003	.001 .003	.001 .004	.001 .004	
		ferritic / pearlitic		180	15							
K	gray cast iron (GG)	pearlitic / martensitic		260	16	330-525-755	.001 .002 .0024	.001 .002 .003	.001 .002 .003	.001 .002 .004	.001 .003 .004	
		ferritic	160	17								
nodular cast iron (GGG)	ferritic	160	17	330-525-755	.001 .002 .0024	.001 .002 .003	.001 .002 .003	.001 .002 .004	.001 .003 .004			
		pearlitic	250							18		
malleable cast iron	ferritic	130	19	330-525-755	.001 .002 .0024	.001 .002 .003	.001 .002 .003	.001 .002 .004	.001 .003 .004			
	pearlitic	230	20									

Recommended cutting data

MATERIAL GROUPS

According to DIN / ISO 513 and VDI 3323

ISO	Material	Condition	Tensile Strength [Kpsi]	Hardness [HB]	Material Group No.	V [sfm]	MM HCD...80° - 90° Chamfering					
							D= .314 - .389	D= .394 - .508	D= .512 - .626	D= .629 - .705	D= .708 - .999	
							F _z (inch/tooth)					
P	non-alloy steel and cast steel, free cutting steel	<0.25% C	annealed	61	125	1	330-525-720	.0016 .0028 .0039	.002 .0031 .0047	.002 .0031 .0059	.002 .0039 .0071	.002 .0047 .0079
		≥0.25% C	annealed	94	190	2						
		<0.55% C	quenched and tempered	123	250	3						
		≥0.55% C	annealed	109	220	4						
			quenched and tempered	145	300	5						
	low alloy and cast steel (less than 5% of alloying elements)	annealed	87	200	6	265-430-590	.0016 .0024 .0031	.002 .003 .0039	.002 .0031 .0047	.002 .0031 .0059	.002 .0039 .0071	
			quenched and tempered	135	275							7
			quenched and tempered	145	300							8
		quenched and tempered	174	350	9							
		annealed	99	200	10							
high alloyed steel, cast steel and tool steel	annealed	99	200	10	265-430-590	.001 .002 .003	.0016 .0024 .0031	.0016 .0028 .0035	.0016 .0028 .0039	.0016 .0031 .0047		
	quenched and tempered	160	325	11								
stainless steel and cast steel	ferritic / martensitic	99	200	12	265-430-590	.001 .002 .003	.0016 .0024 .0031	.0016 .0028 .0035	.0016 .0028 .0039	.0016 .0031 .0047		
	martensitic	119	240	13								
M	stainless steel and cast steel	austenitic, duplex	87	180	14	265-430-590	.001 .002	.0016 .0024 .0031	.0016 .0028 .0035	.0016 .0028 .0039	.0016 .0031 .0047	
		ferritic / pearlitic		180	15							
K	gray cast iron (GG)	pearlitic / martensitic		260	16	330-525-755	.001 .002 .0028	.0016 .0024 .0031	.0016 .0028 .0035	.0016 .0028 .0039	.0016 .0031 .0047	
		ferritic	160	17								
nodular cast iron (GGG)	ferritic	160	17	330-525-755	.001 .002 .0028	.0016 .0024 .0031	.0016 .0028 .0035	.0016 .0028 .0039	.0016 .0031 .0047			
		pearlitic	250							18		
malleable cast iron	ferritic	130	19	330-525-755	.001 .002 .0028	.0016 .0024 .0031	.0016 .0028 .0035	.0016 .0028 .0039	.0016 .0031 .0047			
	pearlitic	230	20									

Recommended cutting data

MATERIAL GROUPS

According to DIN / ISO 513 and VDI 3323

ISO	Material	Condition	Tensile Strength [Kpsi]	Hardness [HB]	Material Group No.	V [sfm]	MM HCD...80° - 90° Drilling & Countersinking					
							D= .314 - .389	D= .394 - .508	D= .512 - .626	D= .629 - .705	D= .708 - .999	
							F _{rev} (inch/rev)					
P	non-alloy steel and cast steel, free cutting steel	<0.25% C	annealed	61	125	1	330-525-720	.002 .003 .004	.002 .003 .005	.002 .003 .006	.002 .004 .007	.002 .005 .008
		≥0.25% C	annealed	94	190	2						
		<0.55% C	quenched and tempered	123	250	3						
		≥0.55% C	annealed	109	220	4						
			quenched and tempered	145	300	5						
	low alloy and cast steel (less than 5% of alloying elements)	annealed	87	200	6	265-430-590	.002 .0024 .003	.002 .003 .004	.002 .003 .005	.002 .003 .006	.002 .004 .007	
			quenched and tempered	135	275							7
			quenched and tempered	145	300							8
		quenched and tempered	174	350	9							
		annealed	99	200	10							
high alloyed steel, cast steel and tool steel	annealed	99	200	10	265-430-590	.002 .0024 .003	.002 .003 .004	.002 .003 .005	.002 .003 .006	.002 .004 .007		
	quenched and tempered	160	325	11								
stainless steel and cast steel	ferritic / martensitic	99	200	12	265-430-590	.001 .002 .003	.002 .002 .003	.002 .003 .0035	.002 .003 .004	.002 .003 .005		
	martensitic	119	240	13								
M	stainless steel and cast steel	austenitic, duplex	87	180	14	265-430-590	.001 .002	.002 .002 .003	.002 .003 .0035	.002 .003 .004	.002 .003 .005	
		ferritic / pearlitic		180	15							
K	gray cast iron (GG)	pearlitic / martensitic		260	16	330-525-755	.001 .002 .003	.002 .0024 .003	.002 .003 .0035	.002 .003 .004	.002 .003 .005	
		ferritic	160	17								
nodular cast iron (GGG)	ferritic	160	17	330-525-755	.001 .002 .003	.002 .0024 .003	.002 .003 .0035	.002 .003 .004	.002 .003 .005			
		pearlitic	250							18		
malleable cast iron	ferritic	130	19	330-525-755	.001 .002 .003	.002 .0024 .003	.002 .003 .0035	.002 .003 .004	.002 .003 .005			
	pearlitic	230	20									

Recommended cutting data

MATERIAL GROUPS

According to DIN / ISO 513 and VDI 3323

ISO	Material	Condition	Tensile Strength [Kpsi]	Hardness [HB]	Material Group No.	V [sfm]	MM HCD...100° - 120° Chamfering					
							D= .314 - .389	D= .394 - .508	D= .512 - .626	D= .629 - .705	D= .708 - .999	
							F _z (inch/tooth)					
P	non-alloy steel and cast steel, free cutting steel	<0.25% C	annealed	61	125	1	330-525-720	.002 .0031 .0043	.0024 .0035 .0051	.0024 .0035 .0063	.0024 .0043 .0075	.0024 .0051 .0083
		≥0.25% C	annealed	94	190	2						
		<0.55% C	quenched and tempered	123	250	3						
		≥0.55% C	annealed	109	220	4						
			quenched and tempered	145	300	5						
	low alloy and cast steel (less than 5% of alloying elements)	annealed	87	200	6	265-430-590	.002 .0028 .0035	.0024 .0039 .0043	.0024 .0039 .0051	.0024 .0039 .0063	.0024 .0043 .0075	
			quenched and tempered	135	275							7
			quenched and tempered	145	300							8
		quenched and tempered	174	350	9							
		annealed	99	200	10							
high alloyed steel, cast steel and tool steel	annealed	99	200	10	265-430-590	.002 .0028 .0035	.0024 .0039 .0043	.0024 .0039 .0051	.0024 .0039 .0063	.0024 .0043 .0075		
	quenched and tempered	160	325	11								
stainless steel and cast steel	ferritic / martensitic	99	200	12	265-430-590	.0016 .0024 .0031	.002 .0028 .0035	.002 .0031 .0039	.002 .0031 .0043	.002 .0039 .0051		
	martensitic	119	240	13								
M	stainless steel and cast steel	austenitic, duplex	87	180	14	265-430-590	.0016 .0024 .0031	.002 .0028 .0035	.002 .0031 .0039	.002 .0031 .0043		