



Premium Hot Work

Tool Steels

Survey of Hot Work Tool Steels

Martensitic steels															
Brand name	Material no.	AISI	Reference analysis									As-supplied condition HB	Hardening temperature °C	Tempering temperature °C	Hardness range HRC
			C	Si	Mn	Cr	Mo	Ni	V	Co	W				
CR7V-L	Special	-	0.42	0.50	0.40	6.50	1.30	-	0.80	-	-	≤ 240	1030 - 1040	500 - 700	56 - 34
CS1	Special	-	0.50	0.30	0.40	5.00	1.90	-	0.55	Nb+	-	≤ 230	1010 - 1040	540 - 680	57 - 34
FTCo	Special	-	0.53	0.35	0.40	4.00	2.00	-	1.10	0.90	1.50	≤ 300	1120 - 1140	560 - 600	58 - 42
GSF	Special	-	0.28	0.30	0.70	2.80	0.60	1.00	0.40	-	-	≤ 230	920 - 940	400 - 650	48 - 30
HMoD	1.2889	H19A	0.45	0.30	0.40	4.50	3.00	-	2.00	4.50	-	≤ 240	1120 - 1150	580 - 750	54 - 32
HP1	Special	-	0.35	0.20	0.30	5.20	1.40	-	0.55	-	-	≤ 220	1015 - 1025	540 - 680	54 - 32
HTR	Special	-	0.32	0.20	0.30	2.20	1.20	-	0.50	-	3.80	≤ 230	1050 - 1070	600 - 700	52 - 34
HWD	1.2678	H19	0.40	0.30	0.40	4.50	0.50	-	2.10	4.50	4.50	≤ 240	1130 - 1180	580 - 750	54 - 30
N400	1.2767		0.45	0.25	0.40	1.35	0.25	4.00	-	-	-	≤ 260	840 - 870	100 - 400	56 - 30
PWM	1.2714	L6	0.55	0.30	0.80	1.10	0.45	1.70	0.10	-	-	≤ 250	850 - 880	400 - 700	50 - 28
Q10/TQ1	Special	-	0.36	0.25	0.40	5.20	1.90	-	0.55	-	-	≤ 220	1010 - 1020	540 - 680	54 - 34
RM10Co	1.2888	-	0.20	0.20	0.50	9.50	2.00	-	-	10.00	5.50	≤ 320	1100 - 1150	600 - 750	54 - 40
RP	1.2365	H10	0.32	0.40	0.40	3.00	2.80	-	0.50	-	-	≤ 220	1020 - 1050	580 - 700	52 - 34
RPCo	1.2885	H10A	0.32	0.40	0.40	3.00	2.80	-	0.60	3.00	-	≤ 240	1040 - 1060	560 - 700	52 - 34
RPU	1.2367	-	0.38	0.40	0.40	5.00	3.00	-	0.60	-	-	≤ 220	1030 - 1050	520 - 700	55 - 36
USD	1.2344	H13	0.40	1.00	0.40	5.20	1.30	-	1.00	-	-	≤ 220	1020 - 1040	520 - 700	55 - 32
USN	1.2343	H11	0.37	1.00	0.40	5.20	1.30	-	0.40	-	-	≤ 220	1000 - 1020	520 - 700	54 - 30

Corrosion-resistant martensitic steels															
CMR	1.2316	-	0.40	≤ 1.00	≤ 1.00	16.00	1.20	≤ 1.00	-	-	-	approx. 300	1020 - 1050	580 - 620	35 - 29
FAM	1.2787	~4314	0.20	≤ 1.00	≤ 1.00	17.00	-	1.70	-	-	-	approx. 310	980 - 1030	680 - 720	37 - 30
RF	1.2083	~ 420	0.42	0.40	0.30	13.00	-	-	-	-	-	≤ 240	1000 - 1030	100 - 400	55 - 53

Austenitic steels															
Brand name	Material no.	AISI	Reference analysis									Delivery condition MPa	Solution annealing temperature °C	Aging temperature °C	
			C	Si	Mn	Cr	Mo	Ni	V	Co	W				
HWF	1.2779	A286	≤ 0.08	≤ 1.00	1.10	15.00	1.50	26.00	-	-	Ti 2.10	950 - 1150	970 - 990	710 - 730	
MA-Rekord	1.2758	-	0.55	1.40	0.70	4.00	0.60	11.50	1.10	1.50	12.00	1350 - 1550	Solution annealed	860 - 880	
ZF2	1.2782	-	0.12	2.00	0.90	25.00	-	20.00	-	-	-	550 - 800	1050 - 1100		

Nickel-Based alloys															
SA50Ni	2.4973	R41	≤ 0.12	≤ 0.50	≤ 0.10	19.00	9.50	Rest	Al 1.60	Co 11.00	Ti 3.00	~ 1250	1080	760	
SA718	2.4668	UNS 7718	0.05	≤ 0.35	≤ 0.35	19.00	3.00	53.00	Al 0.5	Nb 5.0	Ti 0.9	~ 1300	980	720	



Fields of application for Hot Work Tool Steels

Die Casting						
Brand name	Material No.	AISI	Characteristics	Application	Toughness	Resistance to thermal shock
HP1*	–	–	Special hot-work tool steel which exemplifies advanced toughness levels, while maintaining good high temperature strength and high resistance to thermal shock	High-performance die casting inserts, especially suitable for large die casting dies	●●●●●	●●●○○
HTR*	–	–	Special hot-work tool steel with very high thermal shock resistance, advanced thermal conductivity and exceptional high temperature strength	Die casting max. 42 HRC, special inserts	●●○○○	●●●●○
USD*	1.2344	H 13	Standard hot-work tool steel with good high temperature strength, average toughness and resistance to thermal shock	Die casting and inserts of small and medium size	●●●○○	●●●○○
USN*	1.2343	H 11	Standard hot-work tool steel with very good toughness, good high temperature strength and average resistance to thermal shock	Universally useable steel with balanced properties, die casting inserts	●●●●○	●●○○○
RPU*	1.2367	–	Hot-work tool steel with advanced high temperature strength and high resistance to thermal shock	Die casting inserts of small and medium size	●●●○○	●●●●○
TQ1*	–	–	Special hot-work tool steel with excellent toughness, advanced high temperature strength and very high resistance to thermal shock	High-performance die casting inserts, especially suitable for large die casting dies	●●●●●	●●●●○

* ESR quality as a standard



Extrusion							
Brand name	Material No.	AISI	Characteristics	Application	Toughness	High temperature strength	Hot wear resistance
CS1*	Special	–	Special hot-work tool steel with advanced toughness, excellent high temperature strength and very high resistance to wear	Extrusion dies: Specific pressure > 1000 MPa, press stems with very high loads, dummy blocks and inner liners	●●●●●	●●●●○	●●●●○
HMoD	1.2889	H19A	Hot-work tool steel with excellent high temperature strength, advanced tempering resistance and very good hot wear resistance	Extrusion dies and die rings for the processing of heavy metal alloys	●○○○○	●●●●○	●●●●●
HP1*	Special	–	Special hot-work tool steel which exemplifies advanced toughness levels, while maintaining good high temperature strength and good resistance to wear	Intermediate liners and press stems with high loads, mandrels and extrusion dies	●●●●●	●●●●○	●●○○○
HTR*	Special	–	Special hot-work tool steel with advanced thermal conductivity and exceptional high temperature strength	Intermediate liners for heavy metal extrusion and also for high temperature light metal extrusions, dummy blocks and mandrels	●●○○○	●●●●●	●●●○○
HWD	1.2678	H19	Hot-work tool steel with advanced high temperature strength and very good hot wear resistance	Extrusion dies and die rings for the processing of heavy metal alloys	●○○○○	●●●●○	●●●●○
PWM	1.2714	~ L6	Low-alloyed hot-work tool steel with good toughness and low high temperature strength	Container mantles with low loads	●●●●○	●○○○○	●○○○○
Q10 TQ1*	Special	–	Special hot-work tool steel with excellent toughness, advanced high temperature strength and high resistance to wear	Intermediate inner liners and press stems with high loads, mandrels and extrusion dies	●●●●●	●●●●○	●●●○○
RM-10Co	1.2888	–	Cobalt-alloyed hot-work tool steel with maximum high temperature strength in the family of martensitic grades and high hot wear resistance	Extrusion dies and die holders and inner liners for the processing of heavy metal alloys	●○○○○	●●●●●	●●●●●
RP	1.2365	H10	Hot-work tool steel with advanced high temperature strength and good wear resistance	Inner liners, press stems, mandrels and sealing plates	●●○○○	●●●●○	●●●○○
RPCo	1.2885	H10A	Cobalt-alloyed hot-work tool steel with very good high temperature strength and high hot wear resistance	Dies and die holders and inner liners for the processing of heavy metal alloys	●●○○○	●●●●○	●●●●○
RPU**	1.2367	–	Hot-work tool steel with advanced high temperature strength and high resistance to wear	Container mantles, intermediate and inner liners at high load, press stems, mandrels, extrusion dies, sealing plates and die holders	●●●●○	●●●●○	●●●○○
USD**	1.2344	H13	Standard hot-work tool steel with good high temperature strength and good resistance to wear	Container mantles, intermediate and inner liners, press stems, mandrels, extrusion dies and sealing plates	●●●○○	●●●○○	●●●○○
USN**	1.2343	H11	Standard hot-work tool steel with very good toughness, good high temperature strength and average resistance to wear	Container mantles with high loads, intermediate and inner liners, press stems, mandrels, extrusion dies, sealing plates and die holders	●●●●○	●●○○○	●●○○○

Austenitic steels							
HWF	1.2779	A286	Austenitic age-hardening steel	Container mantles with a high thermal load and inner liners for the processing of heavy metal alloys			
MA-Rekord	1.2758	–	Special austenitic hot-work tool steel	Extrusion dies for the processing of heavy metal alloys			

Nickel-based alloys							
SA50Ni	2.4973	R41	Age-hardening nickel-based alloy with very high temperature strength	Inner liners, dies and die holders for heavy metal alloys and mandrel tips			
SA718	2.4668	UNS 7718	Age-hardening nickel-based alloy with high temperature strength	Inner liners, dies and die holders for heavy metal alloys and mandrel tips			

* ESR quality as a standard ** also available in ESR quality, depending on the requirements

Fields of application for Hot Work Tool Steels

Glass Moulds							
Brand name	Material No.	AISI	Characteristics	Application	Resistance to scale	Thermal conductivity	
FAM*	1.2787	431	Corrosion and oxidation-resistant hot-work tool steel for glass moulds	Glass moulds for high demands on the glass quality, suitable for hard and technical glass and large production lots	●●●●○	●●●●○	
USN*	1.2343	H11	Standard hot-work tool steel with good polishing properties and good thermal conductivity	Glass moulds for small to medium production lots, utility glasses and technical glassware	●●○○○	●●●●●	
USD*	1.2344	H13					
ZF2*	1.2782	314	Austenitic steel for glass moulds with high corrosion and oxidation-resistance	Glass moulds for maximum glass quality, suitable for glasses with crystal gloss and for hard glass and very large production lots	●●●●●	●●●○○	

* only available in ESR quality

Die Forging							
Brand name	Material No.	AISI	Characteristics	Application	Toughness	High temperature strength	Hot wear resistance
CR7V-L	Special	–	Special hot-work tool steel with advanced high temperature strength and high wear resistance	High-performance dies for closed die forging, hot stamping, piercing mandrels, straightening rollers and semi-cold forming	●●●○○	●●●●○	●●●●○
CS1*	Special	–	Special hot-work tool steel with advanced toughness, excellent high temperature strength and very high resistance to wear	High-performance hammer forging dies, small and large press dies with deep cavities	●●●●●	●●●●○	●●●●○
FTCo*	Special	–	Special hot-work tool steel with very high temperature strength and excellent wear resistance	Dies for high-speed forging machines, punches and warm forging tools	●●○○○	●●●●●	●●●●●
GSF	Special	–	Special die forging steel with high toughness, good high temperature strength and good weldability	Hammer forging dies subject to high loads, overlay welded press dies, large hammer forging dies and finisher for hydraulic presses	●●●●○	●●○○○	●○○○○
HTR	Special	–	Special hot-work tool steel with advanced thermal conductivity and exceptional high temperature strength	Dies with an extremely high tempering resistance	●●●○○	●●●●○	●●●○○
PWM	1.2714	L6	Low-alloyed die forging steel with good toughness	Hammer forging dies, die frames and base plates	●●●●○	●○○○○	●○○○○
Q10	Special	–	Special hot-work tool steel with excellent toughness, advanced high temperature strength and high resistance to wear	High-performance hammer forging dies, small and large press dies with deep cavities and multi-stage forging presses with intensive cooling	●●●●●	●●●●○	●●●○○
RP	1.2365	H10	Hot-work tool steel with advanced high temperature strength and good wear resistance	Smaller press dies, punches and dies for high-speed forging machines	●●●○○	●●●●○	●●●○○
RPCo	1.2885	H10A	Cobalt-alloyed hot-work tool steel with very good high temperature strength and high hot wear resistance	Small press dies, especially for heavy metal processing and punches	●●○○○	●●●●○	●●●●○
RPU	1.2367	–	Hot-work tool steel with advanced high temperature strength and high resistance to wear	Larger high-performance press dies	●●●●○	●●●●○	●●●●○
USD	1.2344	H13	Standard hot-work tool steel with good high temperature strength and good resistance to wear	Hammer forging dies subject to high strain, small and large press dies	●●●●○	●●●○○	●●●○○
USN	1.2343	H11	Standard hot-work tool steel with very good toughness, good high temperature strength and average resistance to wear	Hammer forging dies subject to high strain, small and large press dies	●●●●○	●●○○○	●●○○○

* only available in ESR quality



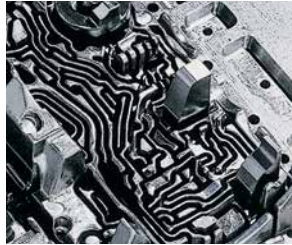
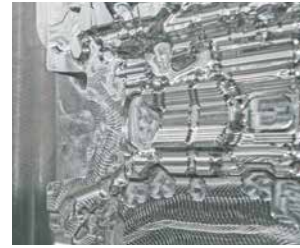
Plastic Moulds – Corrosion-Resistant Steels

Brand name	Material No.	AISI	Characteristics	Application	Resistance to scale	Thermal conductivity
CMR**	1.2316	–	Corrosion-resistant plastic mould steel, pre-hardened and tempered, good polishing properties	Moulds for plastic precision parts under corrosive conditions	●●●●●●	●●●●○
RF**	1.2083	420	Corrosion-resistant, through-hardening plastic mould steel, high hardness, very good polishing properties and high wear resistance	Moulds for plastic precision parts under corrosive conditions with high surface level requirements	●●●●○	●●●●●●

Plastic Moulds – Through-Hardening Steels

Brand name	Material No.	AISI	Characteristics	Application	Resistance to scale	Thermal conductivity
GSF*	Special	–	Special mould steel with high toughness, etchability and good weldability	From medium to large moulds with a thickness up to 400-450mm or moulds with high requirements on etchability and polishability, e.g. car light reflectors	●●●●○	●●●●●●
N400	1.2767	–	Nickel-alloyed plastic mould steel with high hardness and toughness, very good polishing and etching properties	Moulds for a wide range of applications with extreme stresses, injection moulding of transparent melts	●●●●○	●●●●●●
TQ1*	Special	–	Special steel grade for application at high hardness, suitable for mirror finish polishing, good etching properties, high toughness and high wear resistance	Moulds of any size for plastic precision parts, suitable for large production lots, also for mirror finish	●●●●●●	●●●●●●
USD**	1.2344	H13	Steel grade for application with high hardness, good polishing and etching properties and high wear resistance	Moulds of any size for plastic precision parts, suitable for large production lots. For mirror finish we recommend ESR quality	●●●●●●	●●●●○
USN**	1.2343	H11	Standard steel grade for application with high hardness, good polishing and etching properties and high toughness	Moulds of any size for plastic precision parts, suitable for large production lots. For mirror finish we recommend ESR quality	●●●●○	●●●●○

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Service

Tool Steels
Melting
Forging
Heat Treatment
Machining
Surface Treatment

Products

Hot Work Tool Steels
Cold Work Tool Steels
Die Forging Steel
Steel for Plastic Moulds

Industries

Punching
Cutting
Forming
Bending
Rolling



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