

Plastic mould steels

Classification	Brand	Chemical composition in weight-%								Designations		Working hardness	Machinability	Polishability	Texturing properties	Corrosion resistance	Homogeneity	Through hardenability	Applications
		C	Si	Mn	S	Cr	Mo	Ni	Additions	DIN EN ISO 4957	AISI								
Non-sulphurised	Formadur 2311	0.40	0.30	1.50	-	1.90	0.20	-	-	40CrMnMo7	P20	280 - 325 HB*	••	•	••	○	••	•	Plastic moulds, mould frames for plastic moulds and die casting moulds
	Formadur 2738	0.40	0.30	1.50	-	1.90	0.20	1.00	-	40CrMnNiMo8-6-4	P20+Ni	280 - 325 HB*	•	•	••	○	•	••	Large plastic moulds, mould frames for plastic moulds and die casting moulds
	Formadur 320	0.34	0.40	0.80	-	1.70	0.40	0.50	-	-	-	310 - 355 HB*	••	••	•••	○	•••	••••	Large-format plastic injection and extrusion moulds with deep engraving and high demands on core strength, large mould frames
	Formadur 320 Superclean	0.34	0.40	0.80	-	1.70	0.40	0.50	-	-	-	310 - 355 HB*	••	•••	••••	○	••••	••••	As Formadur 320 with highest demands on polishability
	Formadur 400	0.36	0.40	0.90	-	1.90	0.50	0.50	+	-	-	365 - 410 HB*	•	•••	•••	○	•••	••••	Plastic injection and extrusion moulds for all dimensions and deep engraving with high demands on polishability, wear resistance and core strength
	Formadur 400 Superclean	0.36	0.40	0.90	-	1.90	0.50	0.50	+	-	-	365 - 410 HB*	•	••••	••••	○	••••	••••	As Formadur 400 with highest demands on polishability
	Formadur PH 42 Superclean	0.15	0.30	1.50	-	-	-	3.00	1.00 Al + 1.00 Cu	-	-	36 - 40 HRC*	•••	••••	••••	○	••••	•••	Suitable for all kinds of tools in plastic processing with high demands on strength, such as highly stressed plastic injection moulds, compression moulds, hot-runner
Sulphurised	Formadur 2312	0.40	0.30	1.50	0.05	1.90	0.20	-	-	40CrMnMoS8-6	P20+S	280 - 325 HB*	••••	○	○	○	○	•	Mould frames for plastic and die casting moulds, press brake dies, plastic moulds without special requirements on surface quality
Corrosion resistant, non-sulphurised	Formadur 2083	0.40	0.35	0.90	-	13.50	-	-	-	X40Cr14	420	48 - 52 HRC	••	••		••	••	•••	Moulds and inserts for processing corrosive acting plastics
	Formadur 2083 Superclean	0.40	0.35	0.90	-	13.50	-	-	-	X40Cr14	420	48 - 52 HRC	••	•••		••	•••	•••	Moulds and inserts for processing corrosive acting plastics
	Formadur 2190 Superclean	0.37	0.90	0.50	-	13.60	-	-	0.30 V	-	-	48 - 52 HRC	••	•••		••	•••	•••	Moulds and inserts for processing corrosive acting plastics
	Formadur 2316	0.36	0.40	0.90	-	16.00	1.20	-	-	X38CrMo16	420mod	265 - 310 HB*	•	•		•••	•	••••	Moulds for processing plastics with higher demands on corrosion resistance, tools for plastic extrusion
	Formadur 2316 Superclean	0.36	0.40	0.90	-	16.00	1.20	-	-	X38CrMo16	420mod	265 - 310 HB*	•	••		•••	••	••••	As Formadur 2316 with highest demands on polishability
	Formadur PH X Superclean	0.05	0.30	0.30	-	15.00	-	4.50	3.50 Cu + Nb	-	-	38 - 42 HRC*	•	••••		••••	••••	••••	High polished tools and moulds for processing of high corrosive plastics, tools for plastic extrusion
Corrosion resistant, sulphurised	Formadur 2085	0.33	0.30	1.20	0.05	16.00	-	0.50	-	(X33CrS16)	420FM	280 - 325 HB*	•••	○	○	•		•••	Mould frames, plastic moulds without special demands on surface quality
	Corroplast	0.05	0.40	1.30	0.15	12.50	-	-	+	-	-	280 - 325 HB*	•••	○	○	•	•	•••	Base plates, mould bases and plastic moulds without special requirements on polishability, as well as being resistant to condensation and cooling water (All-Stainless-Concept)
	Corroplast FM	0.22	0.25	1.60	0.12	12.80	-	-	+	-	-	270 - 315 HB*	••••	○	○	•	••	•••	Complex base plates and mould frames with highest demands on machinability and resistance to condensation and cooling water (All-Stainless-Concept), plastic moulds without special requirements on polishability

*pre-hardened Superclean = ESR

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Hot work tool steels

Brand	Chemical composition in weight-%								Designations		Working hardness	High-temperature strength	Toughness	Thermal shock resistance	Temperature wear resistance	Thermal conductivity	Polishability	Applications
	C	Si	Mn	Cr	Mo	V	Ni	Additions	DIN EN ISO 4957	AISI								
Thermodur 2329	0.45	0.70	0.80	1.80	0.30	0.20	0.60	-	(46CrSiMoV7)	-	46 - 52 HRC	○	●●	○	○	●●●		Forging dies, extrusion press tools, compression moulding dies
Thermodur 2714	0.56	0.25	0.75	1.10	0.50	0.10	1.70	-	55NiCrMoV7	L6	355 - 410 HB*	●	●●	●	●	●●●	●●	Standard steel for forging dies, press dies, auxiliary tools for extrusion, die holders, armoured trim dies, hot shear blades
Thermodur 2343 EFS	0.38	1.00	0.40	5.30	1.30	0.40	-	-	X37CrMoV5-1	H11	42 - 52 HRC	●●	●●●	●●	●●	●●	●●●	Universally usable e.g. die casting dies and moulds for light metal processing, mandrel bars, forging dies and inserts, shrink rings, hot shear blades, ejector pins and tools for plastic processing
Thermodur 2343 EFS Superclean	0.38	1.00	0.40	5.30	1.30	0.40	-	-	X37CrMoV5-1	H11	42 - 52 HRC	●●	●●●●	●●●	●●	●●	●●●●	As Thermodur 2343 EFS for your most challenging requirements
Thermodur 2344 EFS	0.40	1.00	0.40	5.30	1.40	1.00	-	-	X40CrMoV5-1	H13	42 - 52 HRC	●●●	●●●	●●	●●●	●●	●●	Universally usable e.g. die casting dies and moulds for light metal processing, mandrel bars, forging dies and inserts, hot shear blades, ejector pins and extrusion tools
Thermodur 2344 EFS Superclean	0.40	1.00	0.40	5.30	1.40	1.00	-	-	X40CrMoV5-1	H13	42 - 52 HRC	●●●	●●●	●●●	●●●	●●	●●●	As Thermodur 2344 EFS for your most challenging requirements
Thermodur 2365 EFS	0.32	0.25	0.30	3.00	2.80	0.50	-	-	32CrMoV12-28	H10	40 - 50 HRC	●●●	●●	●●●	●●●	●●●		High speed forging machines, dies and inserts, extrusion dies for steel and heavy metal processing, heavy metal die casting tools, piercer plugs, steel for high alternating thermal stress
Thermodur 2367 EFS	0.37	0.30	0.40	5.00	3.00	0.60	-	-	X38CrMoV5-3	-	42 - 52 HRC	●●●	●●●	●●●	●●●	●●●		Die casting dies and extrusion dies for light and heavy metal processing, dies and inserts, high speed forging machines
Thermodur 2367 EFS Superclean	0.37	0.30	0.40	5.00	3.00	0.60	-	-	X38CrMoV5-3	-	42 - 52 HRC	●●●	●●●	●●●●	●●●	●●●		As Thermodur 2367 EFS for your most challenging requirements
Thermodur 2999 EFS Superclean	0.45	0.30	0.30	3.00	5.00	1.00	-	-	-	-	42 - 52 HRC	●●●●	●●	●●●●	●●●●	●●●		For use at highest temperatures, highly wear-exposed die inserts, high speed forging machines, die casting dies for heavy metal processing
Thermodur E 38 K Superclean	0.35	0.30	0.30	5.00	1.35	0.45	-	-	-	-	42 - 52 HRC	●●	●●●●	●●●	●●	●●	●●●●	Universally usable for highly stressed tools and highest temperatures, die casting dies for light metal processing (especially for complex tools), extrusion dies for light and heavy metal processing (especially for complexly formed profiles), dies and inserts
Thermodur E 40 K Superclean	0.35	0.30	0.30	5.00	1.75	0.80	-	+	-	-	42 - 52 HRC	●●●	●●●●	●●●●	●●●	●●●	●●●●	Universally usable for highly stressed tools and highest temperatures, die casting dies for light metal processing (especially for complex tools), extrusion dies for light and heavy metal processing (especially for complexly formed profiles), dies and inserts
Thermodur 2383 Supercool	0.45	-	0.90	-	1.50	1.50	0.90	-	-	-	40 - 52 HRC	●●●	●	●●●●	●●●●	●●●●		Special steel for press hardening, also useable for small plastic injection moulds

*pre-hardened Superclean = ESR

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Cold work tool steels

Brand	Chemical composition in weight-%								Designations		Working hardness	Wear resistance	Hardness after quenching	Through hardenability	Toughness	Nitridability	Applications
	C	Si	Mn	Cr	Mo	V	Ni	Additions	DIN EN ISO 4957	AISI							
Cryodur 2210	1.20	0.20	0.35	0.70	-	0.10	-	-	(115CrV3)	L2	58 - 62 HRC	●●●	●●●●	○	●●●●		Piercing dies, guide rods, twist drills, ejector pins and wood chisels
Cryodur 2242	0.59	0.30	0.90	1.00	-	0.10	-	-	(59CrV4)	-	50 - 58 HRC	●●●	●●●	●●	●●●		Special steel for hand chisels of all types, including flat, cross-cut and pointed chisels for the treatment of hard materials; also for screwdrivers and other hand tools
Cryodur 2249	0.45	1.35	0.65	1.35	-	0.10	-	-	(45SiCrV6)	-	50 - 57 HRC	●●●	●●●	●●	●●●		Pneumatic chipping hammers, punching tools, riveting hammers, punches and woodworking tools
Cryodur 2357	0.50	0.30	0.70	3.35	1.60	0.25	-	-	(50CrMoV13-14)	S7	54 - 58 HRC	●●●	●●●	●●●	●●●	●●●	Punching tools, moulds, scrap shears, piercing dies, hobs, coining dies, plastic moulds, tableting tools
Cryodur 2363	1.00	0.30	0.50	5.00	0.95	0.20	-	-	X100CrMoV5	A2	56 - 62 HRC	●●●	●●●●	●●●	●●	●●●	Cutting tools, rolls, shear blades, cold pilger mandrels, cold stamping tools, plastic moulds
Cryodur 2379	1.55	0.30	0.35	12.00	0.75	0.90	-	-	X153CrMoV12	D2	56 - 62 HRC	●●●●	●●●●	●●●●	●●	●●●●	Threading rolls and dies, cold extrusion tools, trimming, cutting and stamping tools, precision cutting tools, cold pilger mandrels, rotary shear blades, deep-drawing tools, highly wear-resistant plastic moulds
Cryodur 2436	2.10	0.35	0.35	12.00	-	-	-	0.70 W	X210CrW12	D6	58 - 62 HRC	●●●●	●●●●	●●●	●		Blanking dies for cutting transformer and dynamo sheets, paper and plastics, deep-drawing tools, drawing dies and mandrels, shear blades
Cryodur 2510	0.95	0.20	1.10	0.60	-	0.10	-	0.60 W	(100MnCrW4)	O1	54 - 61 HRC	●●●	●●●●	●●	●●		Blanking and stamping dies for cutting sheets, threading tools, drills, broaches, gauges, measuring tools, plastic moulds, shear blades, guide rails
Cryodur 2550	0.60	0.60	0.35	1.10	-	0.20	-	2.00 W	60WCrV8	~S1	54 - 58 HRC	●●●	●●●	●●	●●●		Blanking dies for cutting sheets, trimming and splitting dies, cold piercing punches, tableting tools, shear blades, chipping knives, pneumatic chisels, coining tools, cold shear blades, ejectors
Cryodur 2709	< 0.02	-	-	-	5.00	-	18.00	10.00 Co + 1.00 Ti	(X3NiCoMoTi18-9-5)		51 - 55 HRC	●	●●	●●●●	●●●●		Casings for cold extrusion tools, die casting dies, plastic moulds
Cryodur 2746	0.45	0.25	0.70	1.50	0.80	0.50	4.00	-	(45NiCrMoV16-6)		50 - 54 HRC	●●●	●●	●●●	●●●●		Special steel for cold-shear blades, particularly for cutting scrap, drawing jaws, coining and bending tools
Cryodur 2767	0.45	0.25	0.35	1.40	0.20	-	4.00	-	45NiCrMo16	6F3	48 - 54 HRC	●●	●●	●●●	●●●●		Cutlery dies, cutting tools for thick materials, billet-shear blades, drawing jaws, massive embossing and bending tools, plastic moulds, reinforcements
Cryodur 2826	0.63	0.80	1.10	0.30	-	-	-	-	(60MnSiCr4)	S6	51 - 59 HRC	●●●	●●●	●●	●●●		Special steel for spring collets
Cryodur 2842	0.90	0.20	2.00	0.40	-	0.10	-	-	90MnCrV8	O2	56 - 60 HRC	●●●	●●●●	●●	●●		Universally usable, cutting and stamping tools, thread-cutting tools, reamers, gauges, measuring tools, plastic moulds, shear blades, guide rails, ejector pins
Cryodur 2990	1.00	0.90	0.35	8.00	1.10	1.60	-	-	-	-	57 - 63 HRC	●●●●	●●●●	●●●●	●●	●●●●	Cutting and punching tools including precision cutting tools, threading dies and rolls, rotary shear blades, cold pilger mandrels, strike plates, plastic moulds, cold-forming and deep-drawing dies, wood-working tools, cold rolls

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High speed tool steels

Brand	Chemical composition in weight-%						Designations		Working hardness	Wear resistance	Hardness after quenching and tempering	Cutting edge retention	Toughness	Tempering resistance	Applications
	C	Cr	W	Mo	V	Co	DIN EN ISO 4957	AISI							
Rapidur 3207	1.23	4.10	9.50	3.50	3.30	10.00	HS10-4-3-10	T42	65 - 67 HRC	•••••	•••••	•••••	••	•••••	Universally applicable for roughing and for automatic lathes; all kinds of cutting tools and milling cutters
Rapidur 3243	0.92	4.10	6.40	5.00	1.90	4.80	HS6-5-2-5	M35	63 - 67 HRC	••	•••	•••	•••	•••	Heavy-duty milling cutters, highly stressed twist drills and taps, profile knives, machining of high-strength materials, broaches
Rapidur 3247	1.08	4.10	1.50	9.50	1.20	8.00	HS2-9-1-8	M42	64 - 68 HRC	•••	•••••	•••	•••	•••	For tools subject to severe mechanical wear, particularly suitable for die-sinking cutters, milling cutters and engraving machines, suitable for non-cutting shaping
Rapidur 3343	0.90	4.10	6.40	5.00	1.90	-	HS6-5-2C	M2	61 - 65 HRC	••	•••	•	•••••	••	Metal-cutting tools for roughing or finishing, shaping tools, woodworking tools, suitable for cold-forming tools
Rapidur 3344	1.22	4.10	6.40	5.00	2.90	-	HS6-5-3	M3 Typ 2	62 - 66 HRC	•••	•••	••	•••	••	Taps, reamers, heavy-duty milling cutters, rotary gear shaping and shaving cutters for processing of hard materials, hexagon socket punches and piercing dies for the nut production.

PM-steels¹

Classification	Brand	Chemical composition in weight-%								Designations		Working hardness	Wear resistance	Hardness at higher temperature	Through hardenability	Toughness	Applications
		C	Si	Mn	S	Cr	Mo	V	Additions	Material number / Short name	AISI						
Cold work tool steel	Cryodur PM-V10	2.45	0.90	0.50	0.05	5.30	1.30	10.00	-	-	-	59 - 62 HRC	••	••	•••	•••	Various application for cold work: punches, bending dies, cold forming presses, cutting knives; screw conveyors
	Cryodur PM-V12	2.90	0.90	0.50	0.05	5.30	1.30	12.00	-	-	-	60 - 63 HRC	•••	••	•••	••	Various application for cold work: punches, bending dies, cold forming presses, cutting knives; screw conveyors
	Cryodur PM-V15	4.40	0.90	0.90	-	13.00	1.20	15.00	Ni + Co + W < 0.5	-	-	62 - 65 HRC	•••••	••	•••••	•	Various application for cold work: punches, bending dies, cold forming presses, cutting knives; screw conveyors; knives for the food industry
High speed tool steel	Rapidur PM-23	1.30	-	-	-	4.20	5.00	3.00	6.4 W	1.3344 / 1.3395 HS6-5-3	M3-2	58 - 65 HRC	••	••	•••••	•••••	Thread-cutting tools, reamers, heavy-duty milling cutters, drills, punching tools
	Rapidur PM-30	1.30	-	-	-	4.20	5.00	3.00	6.4 W + 8.5 Co	1.3294 / 1.3244 HS6-5-3-8	M36	60 - 68 HRC	••	•••	•••••	•••••	Thread-cutting tools, reamers, heavy-duty milling cutters, drills, punching tools
	Rapidur PM-52	1.60	-	-	-	5.00	2.00	5.00	10.5 W + 8.0 Co	1.3253 HS10-2-5-8	-	62 - 68 HRC	••	•••	•••••	•••	Thread-cutting tools, heavy-duty milling cutters, drills for difficult to machine materials
	Rapidur PM-60	2.30	-	-	-	4.20	7.00	6.50	7.0 W + 10.5 Co	~1.3241 / 1.3292 HS6-7-6-10	-	63 - 69 HRC	•••••	•••••	•••••	••	Heavy-duty cutting tools with very high requirements on red hardness and wear resistance
	Rapidur PM-M4	1.35	-	-	-	4.10	5.00	4.10	6.0 W	~1.3351 HS6-5-4	M4	59 - 65 HRC	••	••	•••••	•••••	Thread-cutting tools, reamers, heavy-duty milling cutters, drills, punching tools

¹ These powder metallurgical tool steels are produced to order and are currently not stocked. Additional powder metallurgical tool steels available upon request. This is an excerpt from our portfolio that also contains other grades. All grades are available in remelted condition. Reference numbers / designations in brackets are not standardized in EN ISO 4957.