



Technical Data Sheet	Grade	Code (SEL)	Hot work tool steel
	1.2365 ESR	32CrMoV12-28	

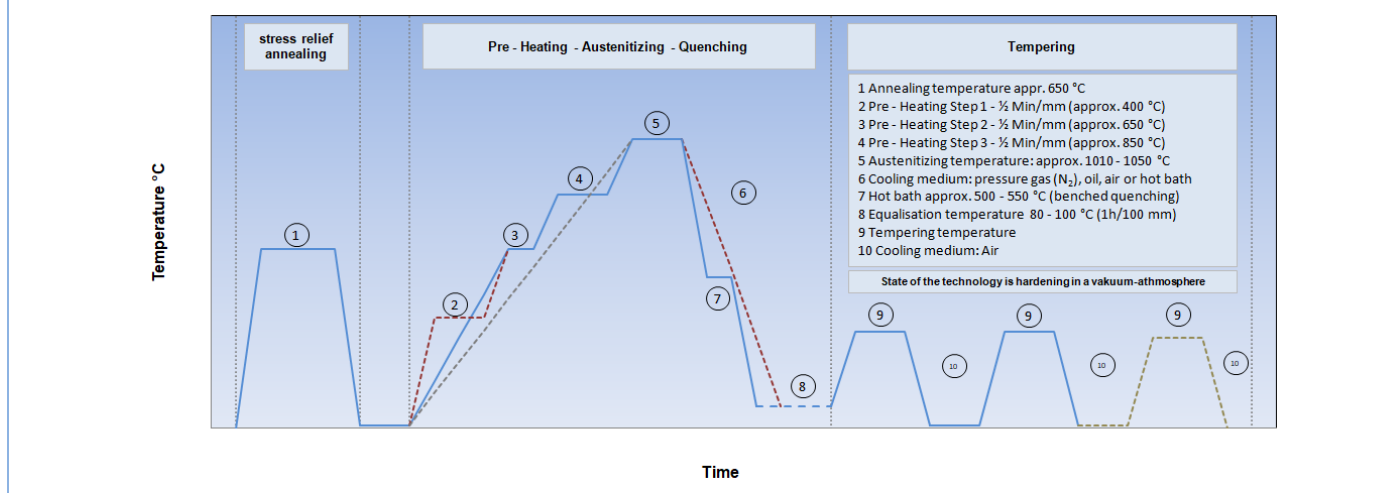
Standards	Steel properties
EN ISO 4957 32CrMoV12-28 AFNOR 30DCV28 BS BH 10 UNE F.520.O UNI 30CrMoV1227KU AISI H 10 GOST 3X3M3Φ	Chromium-Molybdenum-Vanadium-alloyed hot working tool steel with excellent hot wear resistance, good toughness, excellent temperature strength and thermal shock resistance. May be water-cooled to a limited extent. Suitable for cold hobbing.
	Suitable for: Dies and die inserts, plastic moulds, tools for the manufacture of nuts, bolts and rivets, tools for forging machines, highly stressed tools for extrusion of copper alloys (liners, dies) and of light metal (bolsters, mandrels), pressure casting dies for brass and light metal.

C	Si	Mn	Cr	Mo	Ni	V	W	Co	Sonst.
0,32	0,30	0,35	3,0	2,80	-	0,50	-	-	-

Melting	ESR	Remarks Enhanced cleanness and homogeneity in comparison to conventional melted 1.2365. Preheating before use: 250 - 300 °C – is recommended.
Density (g/cm³)	7,80	
Supply condition	EFS - annealed	
Hardness (HB)	max. 229	
Tensile strength (N/mm²)	-	
Work hardness (HRC)	-	
Structure	SEP 1614	
Cleanness (DIN 50602)	K1 < 15	

Physical properties		20 °C	100 °C	200 °C	300 °C	350 °C	400 °C	500 °C	600 °C	700 °C
Thermal expansion coefficient	10 ⁻⁶ * K (20 °C bis ...)	-	11,8	12,5	12,7	-	13,1	13,5	13,6	13,8
Thermal conductivity (W / m * K)	annealed	32,8				34,5				32,2
	quenched + tempered	31,4				32,0				29,3

Thermal Cycle Diagram (Heat treatment)



Hinweis: Die in diesem Datenblatt enthaltenen Angaben dienen der Beschreibung, eine Haftung ist ausgeschlossen.



Heat treatment	Temperature (°C)	Cooling	Remarks heat treatment
Soft annealing	750 - 800	Furnace	Controlled slow cooling in furnace
Stress-relief annealing	ca. 650	Furnace	Slow cooling in furnace. After extensive machining process or complex shapes
Hardening	1010 - 1050		After through-heating hold for 15-30 minutes
Pre – heating Step 1	appr. 400		
Pre – heating Step 2	appr. 650		
Pre – heating Step 3	appr. 850		
Quenching	500 - 550	hot bath	In case of oil or polymer hardening interrupt at appr. 250 °C; or vacuum hardening
	appr. 80	Oil	
	appr. 80	Air	
	appr. 80	pressure gas	

Tempering Chart

Tempering – Hardness after tempering

Temperature °C	100	200	300	400	500	550	600	650	700
HRC	51	50	50	50	52	50	47	40	34

Remarks for tempering

Slow heating to tempering temperature immediately after hardening. Time in furnace 1 hour for each 20 mm of workpiece thickness but at least 2 hours. Tempering must be repeated at least twice at a temperature 30 °C lower than the previous.

A third tempering cycle for the purpose of a best possible ductility and stress relieving may be advantageous.

Continuous Cooling Transformation Chart

Austenitizing temperature: 1030°C

Heat resistance chart

Hinweis: Die in diesem Datenblatt enthaltenen Angaben dienen der Beschreibung, eine Haftung ist ausgeschlossen.

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