



Technical Data Sheet	Grade	Code (SEL)	Hot work tool steel
	1.2367 ESR	X38CrMoV5-3	

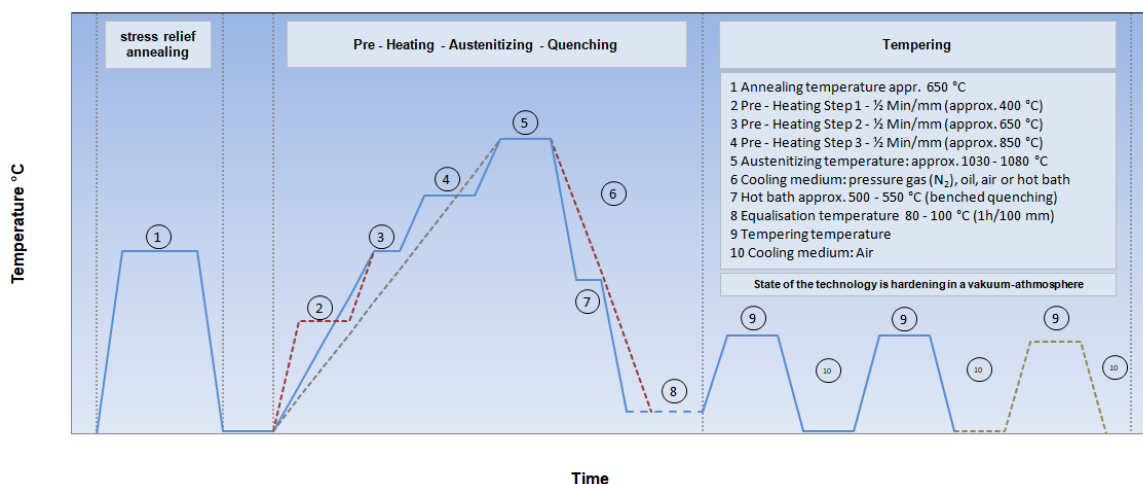
Standards	Steel properties
EN ISO 4957 X38CrMoV5-3 AFNOR Z38CDV5-3 BS - UNE - UNI - AISI - GOST 4X5M3Φ	Chromium-Molybdenum-Vanadium-alloyed hot working tool steel with excellent toughness, hot wear resistance and heat resistance. Excellent temperature strength and thermal shock resistance, good hardenability, minimal warpage. Insusceptibility to hot cracking.
	Suitable for: Forging dies, die casting dies, die holders, extrusion dies for heavy metals, inner liner for light metals, profiling dies, and mandrels.

C	Si	Mn	Cr	Mo	Ni	V	W	Co	Sonst.
0,38	0,40	0,40	5,00	3,00	-	0,50	-	-	-

Melting	ESR	Remarks Enhanced cleanness and homogeneity in comparison to conventional melted 1.2367. 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 ...)	-	11,9	12,5	12,6	-	12,8	13,1	13,3	13,5
Thermal conductivity (W / m * K)	annealed	30,8				33,5				35,1
	quenched + tempered	29,8				33,9				35,3

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 - 820	Furnace	Controlled slow cooling in furnace
Stress-relief annealing	ca. 650	Furnace	Slow cooling in furnace. After extensive machining process or complex shapes
Hardening	1030 - 1080		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

Temperature °C	100	200	300	400	500	550	600	650	700
HRC	57	55	53	52	55	55	52	45	36

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: 1080°C

Heat resistance chart