



Technical Data Sheet	Grade	Code (SEL)	Cold work tool steel
	1.2767	45NiCrMo16	

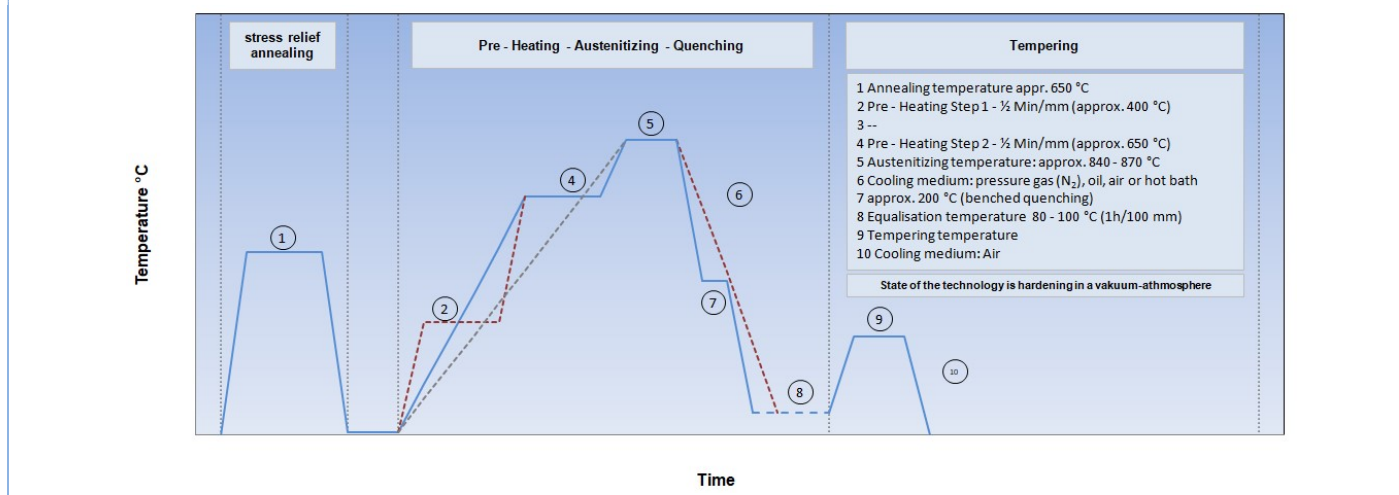
Standards	Steel properties
<b>EN ISO 4957</b> 45NiCrMo16	Ni-alloyed tool steel with highest toughness, good polishability, good capability for texturing operations and erodible.
<b>AFNOR</b> 45NCD16	
<b>BS</b> -	
<b>UNE</b> -	
<b>UNI</b> 40NiCoMoV16KU	
<b>AISI</b> -	
<b>GOST</b> 40X2H2MA	
<b>Suitable for:</b>	
Plastic moulds, highly stressed coining tools with maximum toughness, tools for heavy cold-forming, highly stressed-blanking dies, dies for jewellery, hobbing tools, cutting-, blanking- and punching tools, shear blades for the thickest cutting material, hobbing tools.	

C	Si	Mn	Cr	Mo	Ni	V	W	Co	Sonst.
0,45	0,25	0,40	1,40	0,25	4,00	-	-	-	-

<b>Melting</b>	EAF + VOD	<b>Remarks</b> For requirements concerning cleanness and better homogeneity we recommend the use of 1.2767 ESR.
<b>Density (g/cm³)</b>	7,85	
<b>Supply condition</b>	soft annealed	
<b>Hardness (HB)</b>	max. 260	
<b>Tensile strength (N/mm²)</b>	-	
<b>Work hardness (HRC)</b>	-	
<b>Structure</b>	-	
<b>Cleanness (DIN 50602)</b>	-	

Physical properties		20 °C	100 °C	200 °C	300 °C	350 °C	400 °C	500 °C	600 °C	700 °C
<b>Thermal expansion coefficient</b>	10 <sup>-6</sup> * K (20 °C bis ...)	-	11,7	12,6	13,1	-	13,5	14,0	-	-
<b>Thermal conductivity (W / m * K)</b>	annealed	38,2	-	-	-	-	-	-	-	-
	quenched + tempered	-	-	-	-	-	-	-	-	-

**Thermal Cycle Diagram (Heat treatment)**

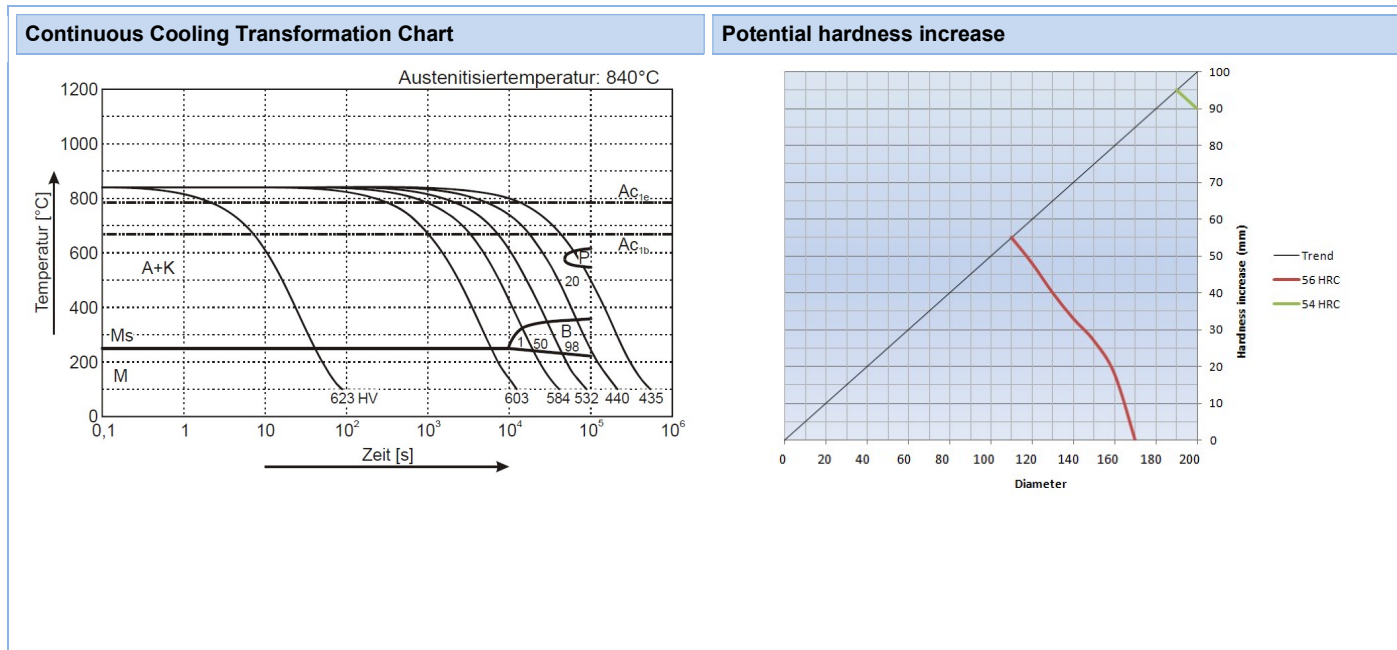


Hinweis: Die in diesem Datenblatt enthaltenen Angaben dienen der Beschreibung, eine Haftung ist ausgeschlossen.



Heat treatment	Temperature (°C)	Cooling	Remarks heat treatment
<b>Soft annealing</b>	610 - 650	Furnace	Controlled slow cooling in furnace
<b>Stress-relief annealing</b>	ca. 650	Furnace	Slow cooling in furnace. After extensive machining process or complex shapes
<b>Hardening</b>	840 - 870		After through-heating hold for 15-30 minutes
Pre – heating Step 1	appr. 400		
Pre – heating Step 2	appr. 650		
Pre – heating Step 3	-		
<b>Quenching</b>	appr. 200	hot bath	To reduce as possible thermal stress, size alteration and distorsion it is recommended to use the softest quenching medium.
	appr. 80	Oil	
	appr. 80	Air	Oftentimes a hot bath hardening with the advantage of less thermal stress. To avoid stress corrosion cracks the steel has to be carried out immediately after hardening and when the steel is at appr. 80 °C.
	appr. 80	pressure gas	Cooling down to RT has to be disabled. In case of oil hardening interrupt at appr. 150 °C.

Tempering Chart		Tempering – Hardness after tempering									
	Temperature °C	100	200	300	400	500	550	600	650	700	
	HRC	56	54	50	46	42	-	38	-	-	
<b>Remarks for tempering</b> 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.											



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

**Wilhelm Oberste-Beulmann GmbH & Co. KG**

An der Hasenjagd 2, D-42897 Remscheid | Tel.: +49 (0) 2191 93 60-0, Fax: +49 (0) 2191 34 99 80 | [info@oberste-beulmann.de](mailto:info@oberste-beulmann.de) | [www.oberste-beulmann.de](http://www.oberste-beulmann.de)

**DIE WELT DES EDELSTAHLS  
THE WORLD OF SPECIAL STEEL**



**Oberste-Beulmann  
Edelstähle-Special Steels**