

<b>Quality</b>	<b>X 38CrMo16</b>	Supply conditions:	<i>Technical card</i>
According to standards	<b>UNI EN ISO 4957: 2002</b>	Annealed HB max 240	<b>Lucefin Group</b>
Number	<b>1.2316</b>	Quenched and Tempered HB 280-325	<i>rev. 2018</i>

### Chemical composition

C%	Si%	Mn%	P%	S%	Cr%	Mo%	Ni%
	max	max	max	max			max
0,33-0,45	1,00	1,50	0,030	0,030	15,50-17,50	0,80-1,30	1,00
± 0.03	± 0.05	± 0.04	+ 0.005	+ 0.005	± 0.15	± 0.05	± 0.07

Product deviations are allowed

On request, sulphur content can be increased and nickel content can be omitted

### Temperature °C

Hot-forming	Stress-relieving after machining and before quenching	Quenching <sup>1)</sup> <b>+Q</b>	Tempering <sup>1)</sup> <b>+T</b>	Quenching <sup>2)</sup> <b>+Q</b>	Tempering <sup>2)</sup> <b>+T</b>		
1050-850	650	1000-1050 oil or polymer s.b. (500-550)	550-650 calm air minimum <b>2</b> cycles	1000-1050 calm or forced air	170-210 calm air minimum <b>2</b> cycles		
Soft annealing +A	Stress-relieving <b>+SR</b>	Spheroidizing <b>+AC</b>	End quench hardenable test	Pre-heating welding	Stress-relieving after welding		
790-840 furnace cooling (HB max 240)	50° under the temperature of tempering	-	-	250-300	650 furnace cooling		
				<b>Ac1</b>	<b>Ac3</b>	<b>Ms</b>	<b>Mf</b>
				810	900	260	40

s.b. = salt bath

### Mechanical and physical properties

**Table of tempering** after quenching at 1040 °C in oil

HB	468	468	455	442	432	432	432	432	442	448	371	301
HRC	49	49	48	47	46	46	46	46	47	47,5	40	32
R N/mm <sup>2</sup>	1700	1700	1640	1580	1520	1520	1520	1520	1580	1610	1250	1010
Tempering at °C	50	100	150	200	250	300	350	400	450	500	550	600

<b>Thermal expansion</b>	10 <sup>-6</sup> . K <sup>-1</sup>	▶	10.7	11.7	11.7	11.7	11.8	11.9	12.4	12.9
<b>Modulus of elasticity long.</b>	GPa	223	218	212	205	197				
<b>Modulus of elasticity tang.</b>	GPa	85	84	81	79	75				
<b>Specific heat capacity</b>	J/(Kg.K)	430								
<b>Thermal conductivity</b>	W/(m.K)	15.0								
<b>Density</b>	Kg/dm <sup>3</sup>	7.71								
<b>Specific electric resist.</b>	Ohm.mm <sup>2</sup> /m	0.80								
<b>Electrical conductivity</b>	Ohm.mm <sup>2</sup> /m	1.25								
<b>°C</b>		<b>20</b>	<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>	<b>600</b>	<b>700</b>	<b>800</b>

The symbol ▶ indicates temperature between 20 °C and 100 °C, 20 °C and 200 °C ...

Europe	Germany	China	Japan	India	R. of Korea	Russia	USA
EN	DIN	GB	JIS	IS	KS	GOST	AISI/SAE
X38CrMo16	X36CrMo17						

### Cold-work tool steels

- high alloyed martensitic steel grade
- particularly suitable for moulds for the plastic industry, especially if plastics have strong abrasive and corrosive powers
- very stable dimensionally during hardening; very limited deformations, even by cooling in polymer
- excellent machinability; after this operation, it is very suitable to polishing
- suitable for the construction of those mechanical components that have to deal with very hard substances, able to remove small quantities of base material
- applications: *moulds for corrosive plastic materials, moulds for the automotive industry (head lamp components), moulds for rubber pressing*