

<b>Quality</b>	<b>18CrNiMo7-6</b>	<b>Case-hardening</b>	<i>Technical card</i>
According to standards	<b>ISO 683-3: 2018</b>	<b>Steel</b>	<b>Lucefin Group</b>
Number	<b>1.6587</b>		rev. 2024

### Chemical composition

C%	Si%	Mn%	P% max	S% max	Cr%	Mo%	Ni%	Cu% max	
0,15-0,21 ± 0.02	0,15-0,40 ± 0.03	0,50-0,90 ± 0.04	0,025 + 0.005	0,035 ± 0.005	1,50-1,80 ± 0.05	0,25-0,35 ± 0.03	1,40-1,70 ± 0.05	0,40 +0.05	Product deviations are allowed

### Temperature °C

Hot-forming	Normalizing +N	Core hardening	Carburizing	Hardening carburiz. surface	Tempering +T	Annealing +FP
1150-900	860-925 air	830-870 oil or polymer	900-950 (HRC 60-63)	780-820 oil or polymer	150-200 air	900-1000 (HB 159-207)
Soft annealing +A	Isothermal annealing +I	Spheroidized annealed +AC	End quench hardening test	Pre-heating welding	Stress-relieving after welding	
660-700 air  (HB max 229)	850-900 furnace cooling to 610 then air (HB 140-210)	1000-1100 furnace cooling to 650 then air (HB max 180)	860 water	250-350  <b>Ac1</b>  745	welding must be carried out on the annealed state and before carburizing  furnace cooling  <b>Ac3</b>  825  400* 170**	

### Mechanical properties

Mechanical properties for **hot-formed** products according to Stalschlüssel 2010 standard, after hardening 850 °C oil + stress-relieving at 200 °C

size mm		Testing at room temperature (longitudinal)					Lucefin experience					
from	to	R min N/mm <sup>2</sup>	Rp 0.2 N/mm <sup>2</sup> min.	A% min.	Kcu J min.	HB min	quenching 850 °C water, tempering 200 °C air					
							Ø	R	Rp 0.2	A	Kv +20 °C	
							mm	N/mm <sup>2</sup>	N/mm <sup>2</sup>	%	J	
16	16	1200	-	-	-	359	30	1160	1010	12.2	48-46-52	
16	40	1100	-	-	-	331						
40	100	900	-	-	-	271						

**18CrNiMo7-6** 1.6587 Stalschlüssel 2010. Material: casehardened, quenched and tempered

size mm		R	Rp 0.2	A%	Z%	Kv	HB
from	to	N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min	min	J min	
11	11	1180-1420	835	7	30	44	354-406
12	30	1080-1320	785	8	35	44	327-384
31	63	980-1270	685	8	35	-	295-373

### ISO 683-3: 2018 Jominy test HRC

mm distance from quenched end																grades
mm	1.5	3	5	7	9	11	13	15	20	25	30	35	40	45		
<b>min</b>	40	40	39	38	37	36	35	34	32	31	30	29	29	-	<b>H = normal</b>	
<b>max</b>	48	48	48	48	47	47	46	46	44	43	42	41	41	-		
<b>min</b>	43	43	42	41	40	40	39	38	36	35	34	33	33	-	<b>HH restricted</b>	
<b>max</b>	48	48	48	48	47	47	46	46	44	43	42	41	41	-	scatter bands	
<b>min</b>	40	40	39	38	37	36	35	34	32	31	30	29	29	-	<b>HL restricted</b>	
<b>max</b>	45	45	45	45	44	43	42	42	40	39	38	37	37	-	scatter bands	

<b>Thermal Expansion</b>	10 <sup>-6</sup> • K <sup>-1</sup> ▶	-	11.1	12.1	12.9	13.5	13.9
<b>Mod. of Elasticity long.</b>	GPa	210					
<b>Specific Heat Capacity</b>	J/(Kg•K)	460					
<b>Thermal Conductivity</b>	W/(m•K)	38					
<b>Density</b>	Kg/dm <sup>3</sup>	7.85					
<b>Specific Electric Resistivity</b>	Ohm•mm <sup>2</sup> /m	0.18					
<b>Electrical Conductivity</b>	Siemens•m/mm <sup>2</sup>	5.55					
<b>°C</b>		<b>20</b>	<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>

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

<b>18CrNiMo7-6</b> 1.6587 EN ISO 683-7:24					<i>Lucefin Group</i>	
size mm		Soft annealing +A+SH <b>Peeled, Ground</b> +G	Soft annealing +A+C <b>Cold-drawn</b>	Heat treatment +FP+SH, +G for pearlite / ferrite structure <b>Peeled, Ground</b>	Heat treatment +FP+C for pearlite / ferrite structure <b>Cold-drawn</b>	
from	to	<b>HBW</b> max	<b>HBW</b> max	<b>HBW</b>	<b>HBW</b> <sup>b)</sup>	
5 <sup>a)</sup>	10	-	-	-	-	
10	16	-	-	-	-	
16	40	229	-	149-201	149-280	
40	63	229	-	149-201	149-280	
63	100	229	-	149-201	149-280	

<sup>a)</sup> for thickness < 5 mm, hardness values should be agreed before order placement

<sup>b)</sup> te hardness values for flats may deviate by  $\pm 10\%$

<b>Table of tempering</b> values obtained at room temperature on rounds $\varnothing$ 11 mm after quenching at 850 °C in water								
<b>HB</b>		400	393	384	363	319	258	213
<b>HRC</b>		43	42.5	41.5	39	34	26	-
<b>R</b>	N/mm <sup>2</sup>	1390	1360	1320	1230	1050	860	700
<b>Rp 0.2</b>	N/mm <sup>2</sup>	1230	1210	1170	1080	940	791	560
<b>A</b>	%	12	12	12	13	15	18	20
<b>Z</b>	%	52	53	54	55	58	65	68
<b>Kv</b>	J	44	60	50	40	80	140	160
Tempering at °C		<b>100</b>	<b>200</b>	<b>300</b>	<b>400</b>	<b>500</b>	<b>600</b>	<b>700</b>

<b>EUROPE</b>	<b>ITALY</b>	<b>CHINA</b>	<b>GERMANY</b>	<b>FRANCE</b>	<b>U.K.</b>	<b>RUSSIA</b>	<b>USA</b>
EN	UNI	GB	DIN	AFNOR	B.S.	GOST	AISI/SAE
18CrNiMo7-6	18CrNiMo7-6		17CrNiMo6	18CND6	822M17 ~		4820 ~

**Classification of steel grades according to minimum tensile strength (R - N/mm<sup>2</sup>) as a function of diameter after hardening and tempering at 200 °C ISO 683-3: 2018**

R N/mm <sup>2</sup>	steel	steel	steel
<b>1200</b>	18NiCrMo5, 20MnCr5, 20MnCrS5 17NiCrMo6-4, 18NiCrMo5-4 17NiCrMo6-6, 18NiCrMo7-6		
<b>1100</b>	22CrMoS3-5, 18CrMo4, 18CrMoS4, 20NiCrMo2-2, 20NiCrMoS2-2	18NiCrMo5-4, 17CrNi6-6, 18NiCrMo7-6	
<b>1000</b>	15NiCr13, 16MnCr5, 16MnCrS5 16MnCrB5, 16NiCr4, 16NiCrS4	18NiCrMo5 17NiCrMo6-4	
<b>900</b>	20MoCr4, 20MoCrS4, 28Cr4 28CrS4	20MnCr5, 20MnCrS5, 22CrMoS3-5	
<b>800</b>	C16E, C16R, 17Cr3, 17CrS3 C15E, C15R	18CrMo4, 18CrMoS4, 15NiCr13 16MnCr5, 16MnCrS5, 16MnCrB5, 16NiCr4, 16NiCrS4	18NiCrMo5-4, 17NiCrMo6-6 18NiCrMo7-6, 22CrMoS3-5 17NiCrMo6-4
<b>700</b>		28Cr4, 28CrS4	15NiCr13, 20MnCr5, 20MnCrS5
<b>600</b>		17Cr3, 17CrS3, C16E, C16R C15E C15R	18CrMo4, 18CrMoS4 20NiCrMo2-2, 20NiCrMoS2-2 28Cr4, 28CrS4, 16MnCr5 16MnCrS5, 16MnCrB5
<b>500</b>	C10E C10R		
<b>400</b>		C10E C10R	
$\varnothing$	< 16 mm	16-40 mm	40-100 mm