

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

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 Ac1 745	welding must be carried out on the annealed state and before carburizing furnace cooling Ac3 825 MS * core ** carburizing surface 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 ²	Rp 0.2 N/mm ² 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 ²	N/mm ²	%	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 ²	N/mm ² 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		1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	grades
min	40	40	39	38	37	36	35	34	34	32	31	30	29	29	-	H = normal
max	48	48	48	48	47	47	46	46	46	44	43	42	41	41	-	
min	43	43	42	41	40	40	39	38	36	35	34	33	33	33	-	HH restricted scatter bands
max	48	48	48	48	47	47	46	46	44	43	42	41	41	41	-	
min	40	40	39	38	37	36	35	34	32	31	30	29	29	29	-	HL restricted scatter bands
max	45	45	45	45	44	43	42	42	40	39	38	37	37	37	-	

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

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

18CrNiMo7-6 1.6587 EN 10277: 2018		<i>Lucefin Group</i>			
size mm		Soft annealing +A+SH Peeled, Ground +G	Soft annealing +A+C Cold-drawn	Heat treatment +FP+SH, +G for pearlite / ferrite structure Peeled, Ground	Heat treatment +FP+C for pearlite / ferrite structure Cold-drawn
from	to	HBW max	HBW max	HBW	HBW^{b)}
5 ^{a)}	10	-	-	-	-
10	16	-	-	-	-
16	40	229	-	149-201	149-280
40	63	229	-	149-201	149-280
63	100	229	-	149-201	149-280

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

b) te hardness values for flats may deviate by ± 10%

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

EUROPE	ITALY	CHINA	GERMANY	FRANCE	U.K.	RUSSIA	USA
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/mm²) as a function of diameter after hardening and tempering at 200 °C ISO 683-3: 2018

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