

<b>Quality</b>	<b>20MnCr5</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>1.7147</b>		rev. 2024

### Chemical composition

C%	Si%	Mn%	P% max	S% max	Cr%	Cu% max	
0,17-0,22	0,15-0,40	1,10-1,40	0,025	0,035	1,00-1,30	0,40	Product deviations are allowed
± 0.02	± 0.03	± 0.06	+ 0.005	± 0.005	± 0.05	+ 0.05	

20MnCrS5 N° 1.7149 S% 0.020-0.040 permissible deviation on the product ± 0.005%  
On request, this steel grade may be supplied with addition of lead (Pb) 0.15-0.35%

### Temperature °C

Hot-forming	Normalizing +N	Core hardening	Carbonitriding	Carburizing	Hardening carburizing surf.	Str-reliev. +SR
1150-850	860-880 air (HB 140-201)	880-900 oil-polymer salt bath	750-930 gas	880-980	810-840 oil-polymer salt bath	150 200
Soft annealing +A	Isothermal annealing +I	Spheroidizing +AC	End quench Hardenability	Pre-heating welding	Stress-relieving after welding	
650-700 furnace cooling	860 furnace cooling to 650, then air	720-740 furnace cooling to 670, pause, cooling to 300, then air	900 water	welding must be carried out on the annealed state and before carburizing	600 furnace cooling	
				150-350		
				<b>Ac1</b>	<b>Ac3</b>	<b>Ms</b> * core ** carburizing surface
				730	830	390* 200**
(HB max 217)	(HB 170-217)	(HB 152-201)		<b>As-rolled +AR</b>	<b>Stress-relieving +SR</b>	
<b>Transformation annealing +FP</b>				(HB max 230)	600-620	
950-1000 quick cooling to 620-650, stop according to the thickness of the material, then air (HB 152-201)						

### Mechanical properties

**20MnCr5 Hot-rolled** values obtained on test blanks after core hardening + stress-relieving UNI 7846: 1978. Use only as reference

size mm test blanks	Testing at room temperature (longitudinal)					
	<b>R</b>	<b>Rp 0.2</b>	<b>A%</b>	<b>Kcu</b>	<b>HB</b>	
	N/mm <sup>2</sup>	N/mm <sup>2</sup> min.	min.	J min.		
11	1230-1570	930	7	17.5	363-438	
30	930-1230	690	8	20	278-363 for information only	
63	780-1080	540	9	25	232-327 for information only	

**Table of tempering** values obtained at room temperature on rounds of Ø 10 mm after quenching at 870 °C in oil

<b>HB</b>	426	426	421	421	415	409	395	381	362	336	294	261	240	224
<b>HRC</b>	45.5	45.5	45	45	44.5	44	42.5	41	39	36	31	26.5	22.5	
<b>R</b> N/mm <sup>2</sup>	1500	1500	1490	1480	1460	1430	1370	1300	1210	1100	980	875	795	740
<b>Rp 0.2</b> N/mm <sup>2</sup>	1060	1140	1190	1230	1240	1240	1220	1180	1090	960	850	750	670	600
<b>A</b> %	11.5	11.9	12.0	12.0	11.9	11.8	11.9	12.2	12.8	14.0	16.0	18.8	21.8	23.2
<b>Z</b> %	48	49	50	52	53	55	56	58	60	62	64	67	70	72
<b>Kv</b> J	38	40	40	40	38	38	32	34	75	75	100	128	145	155
<b>HRC carburizing</b>	64.5	64	63	60.5	59	57	-	-	-	-	-	-	-	-
<b>Tempering at °C</b>	<b>50</b>	<b>100</b>	<b>150</b>	<b>200</b>	<b>250</b>	<b>300</b>	<b>350</b>	<b>400</b>	<b>450</b>	<b>500</b>	<b>550</b>	<b>600</b>	<b>650</b>	<b>700</b>

**20MnCr5 1.7147 - 20MnCrS5 1.7149 EN ISO 683-7:24***Lucefin Group*

size mm		Soft annealing +A+SH <b>Peeled Ground +G</b>	Soft annealing +A+C <b>Cold-drawn</b>	Heat treatment +FP+SH, +G for pearlite / ferrite <b>Peeled, Ground</b>	Heat treatment +FP+C for pearlite / ferrite <b>Cold-drawn</b>
from	to	<b>HBW max</b>	<b>HBW max</b>	<b>HBW</b>	<b>HBW <sup>b)</sup></b>
5 <sup>a)</sup>	10	-	270	-	-
10	16	-	260	-	-
16	40	217	255	152-201	152-250
40	63	217	250	152-201	152-245
63	100	217	250	152-201	152-245

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

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

**Forged UNI 8550: 1984. Use only as reference**

size mm		Testing at room temperature (longitudinal)				
from	to	<b>R</b>	<b>R<sub>p0.2</sub></b>	<b>A%</b>	<b>Kcu</b>	<b>HB</b>
		N/mm <sup>2</sup>	N/mm <sup>2</sup> min	min (L)	J min (L)	<i>for inform.</i>
	11	1225-1570	930	7	17.5	361-438
11	25	930-1225	685	8	20	278-361
25	50	785-1080	540	9	25	234-327

Mechanical properties obtained on test blanks after core hardening + stress-relieving

L = longitudinal

ISO 683-3: 2018 **Jominy test HRC** grain size 5 min.

mm distance from quenched end		1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50	H
<b>min</b>		41	39	36	33	30	28	26	25	23	21	-	-	-			
<b>max</b>		49	49	48	46	43	42	41	39	37	35	34	33	32			
<b>min</b>		44	42	40	37	34	33	31	30	28	26	25	24	23			<b>HH</b>
<b>max</b>		49	49	48	46	43	42	41	39	37	35	34	33	32			
<b>min</b>		41	39	36	33	30	28	26	25	23	21	-	-	-			<b>HL</b>
<b>max</b>		46	46	44	42	39	37	36	34	32	30	29	28	27			

<b>Thermal Expansion</b>	10 <sup>-6</sup> • K <sup>-1</sup>	►	11.1	12.1	12.9	13.5	14.1
<b>Mod. of Elasticity long.</b>	GPa		210	205	195	175	155
<b>Mod. of Elasticity tang.</b>	GPa		80	78	75	67	59
<b>Specific Heat Capacity</b>	J/(Kg•K)		460				
<b>Thermal Conductivity</b>	W/(m•K)		41				
<b>Density</b>	Kg/dm <sup>3</sup>		7.85				
<b>Specific Electric Resist.</b>	Ohm•mm <sup>2</sup> /m		0.16				
<b>Electrical Conductivity</b>	Siemens•m/mm <sup>2</sup>		6.25				

°C **20 100 200 300 400 500 600**

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

EUROPE	ITALY	CHINA	GERMANY	FRANCE	U.K.	RUSSIA	USA
EN	UNI	GB	DIN	AFNOR	B.S.	GOST	AISI/SAE
20MnCr5	20MnCr5	20CrMn	20MnCr5	20MC5		20HG	5120