Quality	**20MnCr5**	*Technical card*
According to standards	**EN 10084: 2008**	***Lucefin Group***
Number	**1.7147**	

Chemical composition

C%	**Si%** max	**Mn%**	**P%** max	**S%** max	**Cr%**	
0,17-0,22	0,40	1,10-1,40	0,025	0,035	1,00-1,30	Product deviations are allowed
± 0.02	+ 0.03	± 0.05	+ 0.005	+ 0.005	± 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**	**Core hardening**	**Carbonitriding**	**Carburizing**	**Hardening carburizing surf.**	**Tempering**
1150-850	860-880 air (HB 140-201)	860-890 oil-polymer salt bath	750-930 gas	880-980	810-840 oil-polymer salt bath	150 200

Soft anealing +A	**Isothermal annealing**	**Spheroidizing**	**End quench Hardenability**	**Pre-heating welding**		**Stress-relieving after welding**
750-770 cooling 15 °C/h to 680, pause, then cooling to 400, pause, then air (HB max 217)	860 furnace cooling to 650, then air (HB 170-217)	720-740 furnace cooling to 670, pause, cooling to 300, then air (HB 152-201)	870 water	welding must be carried out on the annealed state and before carburizing		
				150-350		600 furnace cooling
				Ac1	**Ac3**	**Ms** * core ** carburizing surface
				730	830	390* 200**

Transformation annealing +FP	**As-rolled**	**Stress-relieving**
950-1000 quick cooling to 620-650, 3 h holding, then air (HB 152-201)	(HB max 230)	600-620

Mechanical and physical properties

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) **R** N/mm²	**Rp** 0.2 N/mm² min.	**A**% min.	**C**% min.	**Kcu** J min.	***HB***	
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

HB	426	426	421	421	415	409	395	381	362	336	294	261	240	224
HRC	45.5	45.5	45	45	44.5	44	42.5	41	39	36	31	26.5	22.5	
R N/mm²	1500	1500	1490	1480	1460	1430	1370	1300	1210	1100	980	875	795	740
Rp 0.2 N/mm²	1060	1140	1190	1230	1240	1240	1220	1180	1090	960	850	750	670	600
A %	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
C %	48	49	50	52	53	55	56	58	60	62	64	67	70	72
Kv J	38	40	40	40	38	38	32	34	75	75	100	128	145	155
HRC carburizing surface	64.5	64	63	60.5	59	57								
Tempering at **°C**	**50**	**100**	**150**	**200**	**250**	**300**	**350**	**400**	**450**	**500**	**550**	**600**	**650**	**700**

20MnCrS5 1.7149 EN 10277-4: 2008 *Lucefin Group*

size mm		Soft annealing +A +SH **Peeled-reeled ground** +SL	Soft annealing +A +C **Cold-drawn**	Heat treatment +FP +SH for pearlite / ferrite **Peeled-reeled, ground**	Heat treatment +FP +C for pearlite / ferrite **Cold-drawn**
from	to	**HB** max	**HB** max	**HB**	**HB**
5 a)	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

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

Forged UNI 8550: 1984. Use only as reference

size mm		Testing at room temperature (longitudinal)								
		R	**Rp** 0.2	**A**% L	**A**% T	**A**% Q	**Kcu** L	**Kcu** T	**Kv** L	***HB***
from	to	N/mm²	N/mm² min	min	min	min	J min	J min	J min	*for inform.*
	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 T = tangential Q = radial

EN 10084: 2008 **Jominy test HRC** grain size 5 min.

mm distance from quenched extremity

	1.5	**3**	**5**	**7**	**9**	**11**	**13**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**	**H**
min	41	39	36	33	30	28	26	25	23	21						normal
max	49	49	48	46	43	42	41	39	37	35	34	33	32			
min	44	42	40	37	34	33	31	30	28	26	25	24	23			**HH**
max	49	49	48	46	43	42	41	39	37	35	34	33	32			
min	41	39	36	33	30	28	26	25	23	21						**HL**
max	46	46	44	42	39	37	36	34	32	30	29	28	27			

Temperature	**Mod. of elasticity** GPa		**Thermal expansion**
Testing at **°C**	**E** long.	**G** tang.	$10^{-6} \bullet K^{-1}$
20	210	80	
100	205	78	11.1
200	195	75	12.1
300			12.9
400	175	67	13.5
500			14.1
600	155	59	

Specific heat capacity J/(Kg•K)	**Density** Kg/dm³	**Thermal conductivity** W/(m•K)	**Specific electric resist.** Ohm•mm²/m	**Electrical conductivity** Siemens•m/mm²
460	7.85	41	0.16	6.25

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