

Quality	16MnCr5	<i>Technical card</i> <i>Lucefin Group</i>
According to standards	EN 10084: 2008	
Number	1.7131	

Chemical composition

C%	Si%	Mn%	P%	S%	Cr%	
	max		max	max		
0,14-0,19	0,40	1,00-1,30	0,025	0,035	0,80-1,10	Product deviations are allowed
± 0.02	+ 0.03	± 0.05	+ 0.005	+ 0.005	± 0.05	

16MnCr5 n° 1.7139 S% 0.020-0.040 product deviation ± 0.005%

On request, this steel grade can 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	880 air (HB 138-187)	860-900 oil-polymer salt bath	750-930 gas	880-980	810-840 oil polymer salt bath (160-250 °C)	150 200
Soft annealing	Isothermal annealing	Spheroidizing	End quench hardenability	Pre-heating welding	Stress-relieving after welding	
750-770 cooling 15 °C/h until 680, pause, then cooling to 400, pause, then air (HB max 207)	870 furnace cooling to 650, then air (HB 156-207)	730-750 furnace cooling 50 °C/h to 680, pause, cooling to 400 then air (HB 140-187)	870 water	welding must be carried out on the annealed state and before carburizing 150-350 Ac1 740	600 furnace cooling Ms * core ** carburizing surface 400* 200**	
Transformation annealing +FP	950-1000 quick cooling to 630-650, 3 h holding, then air (HB 140-187)			As-rolled	Stress-relieving 600-620	
				(HB max 230)		

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	Rp 0.2	A%	C%	Kcu	HB
	N/mm ²	N/mm ² min.	min.	min.	J min.	
11	1030-1370	735	8		25	311-394
30	740-1030	490	9		25	224-311 for information only
63	640-930	440	10		25	198-278 for information only

Hot-rolled natural state. **Lucefin** experience

size mm	R	Rp 0.2	A%	C%	Kcu	HB
	N/mm ²	N/mm ² min.	min.	min.	J min.	max
from 10 to 100	560-720	350	15	25		207

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

HB	390	385	385	385	385	381	376	362	348	319	286	240	213	200
HRC	42	41.5	41.5	41.5	41.5	41	40.5	39	37.5	34	30	22.5		
R N/mm ²	1340	1335	1330	1330	1320	1300	1260	1210	1150	1050	950	800	700	650
Rp 0.2 N/mm ²	1020	1060	1110	1140	1145	1140	1110	1070	1010	930	830	710	620	560
A %	12.0	12.5	12.5	12.5	12.0	12.0	12.5	13.0	14.0	15.5	17.5	20.0	23.0	25.5
C %	52.0	52.0	53.0	54.0	55.0	57.0	59.0	61.0	63.0	64.0	68.0	72.0	75.0	
Kv J	42	46	46	45	42	40	42	62	90	124	135	155	180	194
HRC carburizing surface	64	63	62	60.5	59	57								
Tempering at °C	50	100	150	200	250	300	350	400	450	500	550	600	650	700

16MnCrS5 1.7139 EN 10277-4: 2008		<i>Lucefin Group</i>			
size mm	Soft annealing +A +SH Peeled-reeled, ground +SL	Soft annealing +A +C Cold-drawn	Heat treatment +FP +SH for pearlite / ferrite structure Peeled-reeled, ground	Heat treatment +FP +C for pearlite / ferrite structure Cold-drawn	
from	to	HB max	HB max	HB	
5 a)	10		260		
10	16		250		
16	40	207	245	140-187	
40	63	207	240	140-187	
63	100	207	240	140-187	

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

Forged UNI 8550: 1984. Use only as reference

size mm		Testing at room temperature								
from	to	R	Rp 0.2	A% L	A% T	A% Q	Kcu L	Kcu T	Kv L	HB
		N/mm ²	N/mm ² min	min	min	min	J min	J min	J min	for inform.
	11	1030-1375	735	8			25			311-395
11	25	785-1080	540	9			30			234-327
25	50	685-930	490	10			30			209-278

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 G 5 min.

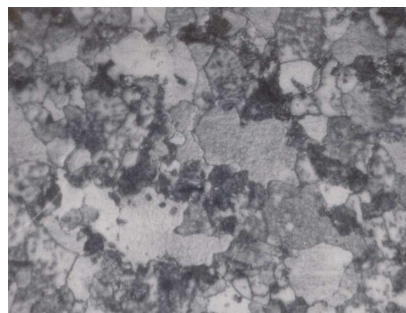
mm distance from quenched extremity

	1.5	3	5	7	9	11	13	15	20	25	30	35	40	45	50	H
min	39	36	31	28	24	21										normal
max	47	46	44	41	39	37	35	33	31	30	29	28	27			
min	42	39	35	32	29	26	24	22	20							HH
max	47	46	44	41	39	37	35	33	31	30	29	28	27			
min	39	36	31	28	24	21										HL
max	44	43	40	37	34	32	30	28	26	25	24	23	22			

Temperature Testing at °C	Mod. of elasticity GPa		Thermal expansion			
	E long.	G tang.	10 ⁻⁶ • K ⁻¹			
20	210	80				
100			11.1			
200			12.1			
300			12.9			
400			13.5			
500			13.9			
600						

Specific heat capacity J/(Kg•K)	Density Kg/dm ³	Thermal conductivity W/(m•K)	Specific electric resist. Ohm•mm ² /m	Electrical conductivity Siemens•m/mm ²
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
16MnCr5	16MnCr5	15CrMn	16MnCr5	16MC		16HG	5115



Structure of hot-rolled annealed steel (+A)
and subsequently cold-drawn (+C)

x1000