

<b>Quality</b>	<b>16NiCr4</b>	<b>Case-hardening Steel</b>	<i>Technical card</i>
According to standard	<b>ISO 683-3 : 2018</b>		<b>Lucefin Group</b>
Number	<b>1.5714</b>		<i>rev. 2018</i>

### Chemical composition

C%	Si%	Mn%	P% max	S% max	Ni%	Cr%	Cu% max	Product deviations are allowed
0,13-0,19 ± 0.02	0,15-0,40 ± 0.03	0,70-1,00 ± 0.04	0,025 + 0.005	0,035 ± 0.005	0,80-1,10 ± 0.05	0,60-1,00 ± 0.05	0,40 +0.05	

On request, this steel grade may be supplied with addition of Lead (Pb) 0.15-0.35%

16NiCrS4 n° 1.5715 Sulphur (S) 0.020-0.040%

It can be also supplied Calcium (Ca) treated or Bismuth (Bi) 0,030-0,080%

Copper (Cu) max 0.40%

### Temperature °C

Hot-forming	Normalizing +N	Core hardening	Carbonitriding	Carburizing	Hardening carburizing surf.	Str-reliev. +SR
1150-900	870 air	840 -880 oil-polymer salt bath	750-930 gas	870-950	810-840 oil-polymer salt bath	150 200
Soft annealing +A	Isothermal annealing +I	Spheroidizing +AC	End quench hardenability test	Pre-heating welding	Stress-relieving after welding	
700 air (HB max 217)	860-880 rapid cooling to 650, then air (HB 166-217)	700 soaking 4 h / inch after air (HB 156-207)	870 water	welding must be carried out on the annealed state and before carburizing	550 furnace cooling	
				250 <b>Ac1</b>	<b>Ac3</b>	<b>Ms</b> * core ** carburizing surface
				735	825	380* 180**

### Mechanical properties

**16NiCr4 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%	Z%	Kcu	HB
11	N/mm <sup>2</sup>	N/mm <sup>2</sup> min.	min.	min.	J min.	
11	1080-1470	835	9	-	30	327-417
30	830-1130	590	10	-	32.5	249-339 for information only

**Table of tempering** values obtained at room temperature on rounds of Ø 10 mm after quenching oil at 850 °C

HB	400	395	395	395	390	381	371	353	336	301	271	240	224	210
HRC	43	42.5	42.5	42.5	42	41	40	38	36	32	28	22.5	-	-
R	N/mm <sup>2</sup>	1380	1370	1370	1360	1340	1310	1250	1180	1100	1010	900	800	730
Rp 0.2	N/mm <sup>2</sup>	1020	1070	1100	1200	1200	1100	1070	1020	940	850	770	690	620
A	%	13.0	13.0	13.2	13.2	13.4	13.6	13.8	14.2	15.5	17.0	19.2	22.0	24.0
Z	%	55	58	59	60	62	63	63	63	64	65	67	70	73
Kv	J	66	66	66	64	64	46	45	46	75	110	135	170	196
HRC carburizing		64	63	62	60	59	57	-	-	-	-	-	-	-
Tempering at °C	<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>

<b>16NiCr4 1.5714 - 16NiCrS4</b> 1.5715 EN 10277: 2018						<i>Lucefin Group</i>	
size mm		Soft annealing +A+SH <b>Peeled, Ground +G</b>	Soft annealing +A+C <b>Cold-drawn</b>	Heat treatment for pearlite / ferrite +FP+SH, +G <b>Peeled, Ground</b>	Heat treatment for pearlite / ferrite +FP+C <b>Cold-drawn</b>		
from	to	HBW max	HBW max	HBW	HBW <sup>b)</sup>		
5 <sup>a)</sup>	10	-	270	-	-		
10	16	-	260	-	-		
16	40	217	255	156-207	156-245		
40	63	217	255	156-207	156-240		
63	100	217	255	156-207	156-240		

<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 ± 10%

<b>16NiCr4 Forged</b> UNI 8550: 1984. Use only as reference						
size mm		Testing at room temperature				
from	to	<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 (L)	J min (L)	<i>for inform.</i>
	11	1080-1470	835	9	30	327-417
11	25	880-1195	640	10	32.5	263-356
25	40	785-1080	590	10	32.5	234-327
40	60	735-980	540	11	32.5	224-295

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

ISO 683-3: 2018 <b>Jominy test HRC</b> 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>	39	36	33	29	27	25	23	22	20	-	-	-	-	-	-	
<b>max</b>	47	46	44	42	40	38	36	34	32	30	29	28	28	-	-	
<b>min</b>	42	39	37	33	31	29	27	26	24	22	21	20	20	-	-	<b>HH</b>
<b>max</b>	47	46	44	42	40	38	36	34	32	30	29	28	28	-	-	
<b>min</b>	39	36	33	29	27	25	23	22	20	-	-	-	-	-	-	<b>HL</b>
<b>max</b>	44	43	40	38	36	34	32	30	28	26	25	24	24	-	-	

<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				
<b>Mod. of Elasticity tang.</b>	GPa		80				
<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 Resist.</b>	Ohm•mm <sup>2</sup> /m		0.18				
<b>Electrical Conductivity</b>	Siemens•m/mm <sup>2</sup>		5.56				
<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 ...

EUROPE	ITALY	CHINA	GERMANY	FRANCE	U.K.	RUSSIA	USA
EN	UNI	GB	DIN	AFNOR	B.S.	GOST	AISI/SAE
16NiCr4	16CrNi4		15CrNi6	16NC4	637M17	16HGN	3215 appr.