

<b>Quality</b>	<b>ASTM A 105</b>	<b>Carbon Steel</b>	<i>Technical card</i> <b>Lucefin Group</b> rev. 2018
According to standards	<b>ASTM A 105/A105M - 14</b>		
Number	-		

### Chemical composition

C%	Si%	Mn%	P%	S%	Cu%	Ni%	Cr%	Mo%	V%	Nb%
max			max	max	max	max	max	max	max	
0,35	0,10-0,35	0,60-1,05	0,035	0,040	0,40	0,40	0,30	0,12	0,08	-

The sum of copper (Cu), chromium (Cr), nickel (Ni) and molybdenum (Mo) should not exceed 1,00%

The sum of chromium (Cr) and molybdenum (Mo) should not exceed 0,32%

For each reduction of 0,01% under max carbon value (0,35), it is admitted a 0,06% increase of manganese over its max value (1,05%) up to 1,65%

Carbon Equivalent  $CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$  max 0,47

On request, this steel grade may be supplied Calcium (Ca) treated

Steels to which lead has been added shall not be used

### Temperature °C

Hot-forming	Normalizing +N	Quenching +Q	Tempering +T	Stress-relieving +SR
1150-850	843-927 air cooling	880-930 oil / polymer water	593 air cooling	50° under the temperature of tempering
Soft annealing +A	Normalizing and Tempering +NT	Isothermal annealing +I	Pre-heating welding	Stress-relieving after welding (PWHT)
700 air cooling	843-927 air 593 air	860 furnace cooling to 660, then air	250 <b>Ac1</b> <b>Ac3</b>	593 furnace cooling <b>Ms</b> <b>Mf</b>
			-      -	-      -

### Mechanical properties

**Forged values as reference** Heat treatments must **guarantee** the reported values ASTM A 105/A105M - 14

all dimension mm	Testing at room temperature (longitudinal)							
	<b>R</b>	<b>Rp 0.2%</b>	<b>A%</b>	<b>A%</b>	<b>Z%</b>	<b>Z%</b>	<b>Kv</b>	<b>HBW</b>
	N/mm <sup>2</sup> min	N/mm <sup>2</sup> min.	min. (L)	min. (T)	min. (L)	min. (T)	J min. (L)	max
<b>T</b>	485	250	22	-	30	-	-	187

When ordering, the customer can specify a hardness of HBW 137-187

### Minimum values at high temperatures for information

<b>Rp 0.2</b> N/mm <sup>2</sup>	248	228	219	212	202	190	184	178
<b>°C</b>	<b>38</b>	<b>93</b>	<b>149</b>	<b>204</b>	<b>260</b>	<b>316</b>	<b>343</b>	<b>371</b>

Temperature	Mod. of Elasticity	Density
20 °C	200 - 207 GPa	7.85 Kg/dm <sup>3</sup>

Mechanical properties ( longitudinal testing) **LUCEFİN** experience

Heat treatment	Ø product	test at	<b>R</b>	<b>Rp 0.2</b>	<b>A</b>	<b>C - Z</b>	<b>Kv 0 °C</b>	<b>Kv -18 °C</b>	<b>Kv -46 °C</b>	<b>product</b>
	mm	°C	N/mm <sup>2</sup>	N/mm <sup>2</sup>	%	%	J	J	J	
Normalizing 920 °C	90	<b>+20</b>	603	485	30	69.5	56-64-57	-	-	Hot-rolled
Normalizing 920 °C	90	<b>+400</b>	312	217	-	-	-	-	-	Hot-rolled
Normalizing 900 °C	240	<b>+20</b>	578	417	32.4	63.8	111-136-133	-	-	Hot-rolled
Normalizing 900 °C	240	<b>+400</b>	506	248	-	-	-	-	-	Hot-rolled
Normalizing 900 °C	400	<b>+20</b>	470	309	39.2	69.0	181-222-220	-	-	Forged
Normalizing 900 °C	400	<b>+400</b>	424	206	-	-	-	-	-	Forged
Quenched end tempered	95	<b>+20</b>	579	403	35.6	68.6	210-203-207	-	-	Hot-rolled
Quenched and tempered	95	<b>+400</b>	520	325	-	-	-	-	-	Hot-rolled
Natural	90	<b>+20</b>	580	400	28.0	63.0	20-18-18	14-12-12	10-8-8	Hot-rolled

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~ P245GH			C21			20G	A 105