

Quality	ASTM A 105
According to standards	ASTM A 105M - 05
Number	

Chemical composition

C%	Si%	Mn%	P%	S%	Cu%	Ni%	Cr%	Mo%	V%	Nb%
max			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	0,02

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 1,35%

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

Min Al content 0,020% (to be certified)

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

Temperature °C

Hot-forming	Normalizing	Quenching	Tempering	Stress-relieving
1150-850	843-927 air cooling	880-930 oil / polymer water	593 air cooling	50° under the temperature of tempering
Soft annealing	Normalizing and Tempering	Isothermal annealing	Pre-heating welding	Stress-relieving after welding (PWHT)
700 air cooling	843-927 air 593 air	860 furnace cooling to 660, then air	250 Ac1 Ac3	590 furnace cooling Ms Mf

Mechanical properties

Forged values as reference Heat treatments must **guarantee** the reported values ASTM A 105M - 05

all dimension mm	Testing at room temperature (longitudinal)							
	R	Rp 0.2%	A% L	A% T	C% L	C% T	Kv	HB
T	N/mm ² min	N/mm ² min.	min.	min.	min.	min.	J min.	max
	485	250	22		30			187

Forged over 4540 Kg may be ordered according to ASTM A 266/A 266M - 03a

all dimension mm	R	Rp 0.2%	A%	A% T	C% L	C% T	Kv	HB
T	N/mm ²	N/mm ² min.	min.	min.	min.	min.	J min.	
	415-585	205	23	20	38	30		121-170

T= max heat-treated thickness. Test specimen should correspond to the 1/4 T

Minimum values at high temperatures

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

Mechanical properties (longitudinal testing)

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



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EUROPE EN	ITALY UNI	CHINA GB	GERMANY DIN	FRANCE AFNOR	U.K. B.S.	RUSSIA GOST	USA AISI/SAE
			C21			20G	A 105