

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

**Chemical composition**

C% max	Si%	Mn%	P% max	S% max	Cu% max	Ni% max	Cr% max	Mo% max	V% max	Nb% 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	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 N/mm2 min	Rp 0.2% N/mm2 min.	A% L min.	A% T min.	C% L min.	C% T min.	Kv J min.	HB max
T	485		250		22	30		187

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

	N/mm2 min.	N/mm2 min.	A% L min.	A% T min.	C% L min.	C% T min.	Kv J min.	HB max
T	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/mm2 °C	248	228	219	212	202	190	184	178
	38	93	149	204	260	316	343	371

**Mechanical properties ( longitudinal testing)**

Heat treatment	_ product mm	Test At °C +	R N/mm2	Rp 0.2 N/mm2	A %	C-Z %	Kv 0 jC J	Kv -18 jC J	Kv -46 jC 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	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	63	20-18-18	14/12/12	10/08/08	Hot-rolled

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