

Quality	P235GH
According to standard	UNI EN 10273: 2008
Number	1.0345

Chemical composition

C%	Si%	Mn%	P%	S%	Cu%	Al	
max	max		max	max	max	min	
0,16	0,35	0,40-1,20	0,30	0,025	0,30	0,020	Cast analysis
+ 0.02	+ 0.05	+0.10 - 0.05	+ 0.005	+ 0.005	+ 0.05	± 0.005	Product analysis
Cr%	Mo%	Nb%	Ni%	Ti%	V%	B%	
max	max	max	max	max	max		
0,30	0,08	0,010	0,30	0,03	0,02		Cast analysis
± 0.05	± 0.03	+ 0.01	+ 0.05	+ 0.01	+ 0.01		Product analysis
Cr+Cu+Mo+Ni max 0.70		P = for pressure purposes, G = other characteristics, H = high temperatures					

Temperature °C

Hot-forming	Normalizing	Normalizing and tempering	Soft annealing	Quenching and tempering	Stress-relieving
1100-850	890-950 air	920 air 550-650 air	700 air	880-900 water 550-650 air	50° under the temperature of tempering
				Pre-heating welding 100	Stress-relieving after welding slow cooling

Mechanical properties

Hot-rolled +N UNI EN 10273: 2008

Kv and traction test at room temperature in longitudinal

size mm		R	ReH min ^{b)}	A%	Kv -20 °C	Kv 0 °C	Kv +20 °C	HB
from	to	N/mm ²	N/mm ²	min	J min	J min	J min	
	16	360-480	235	25	40	47	47	104-146
16	40	360-480	225	25	40	47	47	104-146
40	60	360-480	215	25	40	47	47	104-146
60	100	360-480	200	24	40	47	47	104-146
100	150 ^{a)}	350-480	185	24	40	47	47	103-146

^{a)} for thickness > 150 mm, values can be agreed. +N = normalized

^{b)} if the upper yield strength (ReH) is not strong, its determination is replaced with Rp0,2, with a 10 N/mm² decrease in ReH value.

Min. proof strength 0.2 % at high temperatures UNI EN 10273: 2008

from	to	Rp 0.2		N/mm ²					
	16	227	214	198	182	167	153	142	133
16	40	218	205	190	174	160	147	136	128
40	60	208	196	181	167	153	140	130	122
60	100	193	182	169	155	142	130	121	114
100	150	179	168	156	143	131	121	112	105
	°C	50	100	150	200	250	300	350	400

Min. values obtained from material normalized in furnace

Plastic deformations and creep rupture UNI EN 10273: 2008

°C	σ_1 N/mm ²		σ_R N/mm ²		
	10 000 h	100 000 h	10 000 h	100 000 h	200 000 h
380	164	118	229	165	145
390	150	106	211	148	129
400	136	95	191	132	115
410	124	84	174	118	101
420	113	73	158	103	89
430	101	65	142	91	78
440	91	57	127	79	67
450	80	49	113	69	57
460	72	42	100	59	48
470	62	35	86	50	40
480	53	30	75	42	33

σ_1 = permanent creep strain 1% σ_R = creep rupture strength

Quality P235GH

According to standard **UNI EN 10273: 2008**

Temperature	Modulus of elasticity	Thermal expansion	Specific heat	Specific electric resistance	Heat conductivity
Test at °C	GPa E long	10 ⁻⁶ · K ⁻¹	J/(Kg·K)	Ohm·mm ² /m	W/(m·K)
-100	217	10.8	423		
0	213	11.7	456		
20	212	11.9	461	0.181	57.5
100	207	12.5	479	0.230	55.7
200	199	13.0	499	0.304	51.9
300	192	13.6	517	0.394	47.6
400	184	14.1	536	0.501	43.4
500	175	14.5	558	0.625	39.6
600	164	14.9	587	0.770	36.0

Density +20 °C
Kg/dm³
7.85

Physical properties according to DIN SEW 310 (08/1992) standard

EUROPE EN	ITALY UNI	CHINA GB	GERMANY DIN	FRANCE AFNOR	U.K. B.S.	RUSSIA GOST	USA AISI/SAE
P235GH	Fe360 1 KW		P235GH	A37CP	141-360		A414 gr. B