

BS EN 10028-2: 1993 Flat products made of steels for pressure purposes

Non-alloy and alloy steels with specified elevated temperature properties

(Properties minima unless stated)

Grade		P235GH	P265GH	P295GH	P355GH	16Mo3	13CrMo4-5	10CrMo9-10	11CrMo9-10		
Chemical Composition % maximum	C	0.16	0.20	0.08 ~ 0.20	0.10 ~ 0.22	0.12 ~ 0.20	0.08 ~ 0.18	0.08 ~ 0.14 ¹⁾	0.08 ~ 0.15 ¹⁾		
	Si	0.35	0.40	0.40	0.60	0.35	0.35	0.50	0.50		
	Mn	0.40 ~ 1.20	0.50 ~ 1.40	0.90 ~ 1.50	1.00 ~ 1.70	0.40 ~ 0.90	0.40 ~ 1.00	0.40 ~ 0.80	0.40 ~ 0.80		
	P	0.030	0.030	0.030	0.030	0.030	0.030	0.030	0.030		
	S	0.025	0.025	0.025	0.025	0.025	0.025	0.025	0.025		
	Cr	0.30	0.30	0.30	0.30	0.30	0.70 ~ 1.15	2.00 ~ 2.50	2.00 ~ 2.50		
	Mo	0.08	0.08	0.08	0.08	0.25 ~ 0.35	0.40 ~ 0.60	0.90 ~ 1.10	0.90 ~ 1.10		
	Ni	0.30	0.30	0.30	0.30	0.30	-	-	-		
Others		- 7) 8)	- 7) 8)	- 7) 8)	- 7) 8)	Cu 0.30	Cu 0.30	Cu 0.30	Cu 0.30		
Treatment		N	N	N	N	N ⁵⁾	N+T or Q5	N+T or Q5	N+T or Q5		
	Thickness (mm)										
Yield ³⁾ Stress R _{eH} N/mm ²	t ≤ 16	235	265	295	355	275	300	310	310		
	16 < t ≤ 40	225	255	290	345	270	295	300	310		
	40 < t ≤ 60	215	245	285	335	260	295	290	310		
	60 < t ≤ 100	200	215	260	315	240	275	270	310		
	100 < t ≤ 150 ⁴⁾	185	200	235	295	220	255	250	-		
Tensile Strength R _m N/mm ²	t ≤ 16	360/480	410/530	460/580	510/650	440/590	450/600	480/630	520/670		
	16 < t ≤ 40	360/480	410/530	460/580	510/650	440/590	450/600	480/630	520/670		
	40 < t ≤ 60	360/480	410/530	460/580	510/650	440/590	450/600	480/630	520/670		
	60 < t ≤ 100	360/480	410/530	460/580	490/630	430/560	440/590	470/620	520/670		
	100 < t ≤ 150 ⁴⁾	350/480	400/530	440/570	480/630	420/570	430/580	460/610	-		
Elongation A ^{5) 6)} %	t ≤ 40	25	23	22	21	24	20	18	18		
	40 < t ≤ 60	25	23	22	21	23	20	18	18		
	60 < t ≤ 100	24	22	21	20	22	19	17	17		
	100 < t ≤ 150 ⁴⁾	24	22	21	20	19	19	17	17		
Impact ¹²⁾ KV J	t ≤ 150 ⁴⁾	27 at 0°C	27 at 0°C	27 at 0°C	27 at 0°C	-	-	-	-		
	t ≤ 60	-	-	-	-	31 at 20°C ¹⁴⁾	31 at 20°C ¹⁵⁾	31 at 20°C	31 at 20°C ¹⁵⁾		
	60 < t ≤ 150 ⁴⁾	-	-	-	-	27 at 20°C ¹⁴⁾	27 at 20°C ¹⁴⁾	27 at 20°C	27 at 20°C ^{13) 14)}		
Minimum 0.2% proof stress N/mm ²	Temperature °C	50	t ≤ 60	206	234	272	318	-	-	-	-
			60 < t ≤ 100	191	207	249	298	-	-	-	-
			100 < t ≤ 150	176	192	226	278	-	-	-	-
		100	t ≤ 60	190	215	250	290	-	-	-	-
			60 < t ≤ 100	175	195	230	270	-	-	-	-
			100 < t ≤ 150	160	180	210	250	-	-	-	-
		150	t ≤ 60	180	205	235	270	-	-	-	-
			60 < t ≤ 100	165	185	220	255	-	-	-	-
			100 < t ≤ 150	155	175	200	240	-	-	-	-
		200	t ≤ 60	170	195	225	255	215	230	245	-
			60 < t ≤ 100	160	175	210	240	200	220	225	-
			100 < t ≤ 150	150	165	195	230	190	210	215	-
		250	t ≤ 60	150	175	205	235	200	220	230	255
			60 < t ≤ 100	140	160	195	220	185	210	220	255
			100 < t ≤ 150	130	155	185	210	175	200	205	-
		300	t ≤ 60	130	155	185	215	170	205	220	235
			60 < t ≤ 100	125	145	180	200	165	195	210	235
			100 < t ≤ 150	115	135	170	195	155	185	195	-
		350	t ≤ 60	120	140	170	200	160	190	210	225
			60 < t ≤ 100	115	135	165	190	155	185	195	225
			100 < t ≤ 150	110	130	155	175	145	175	185	-
		400	t ≤ 60	110	130	155	180	150	180	200	215
			60 < t ≤ 100	105	125	145	165	145	175	185	215
			100 < t ≤ 150	100	120	135	155	140	170	175	-
		450	t ≤ 60	-	-	-	-	145	170	190	205
			60 < t ≤ 100	-	-	-	-	140	165	175	205
			100 < t ≤ 150	-	-	-	-	135	160	165	-
		500	t ≤ 60	-	-	-	-	140	165	180	195
			60 < t ≤ 100	-	-	-	-	135	160	165	195
			100 < t ≤ 150	-	-	-	-	130	155	155	-