BS EN 10028-3: 1993 Flat products made of steels for pressure purposes

Weldable fine grain steels, normalised

(Properties minima unless stated)

Grade				P275N	P275NH	P275NL1	P275NL2	P355N	P355NH	P355NL1	P355NL2	P460N	P460NH	P460NL1	P460NL2
Chemical Composition % maximum			C	0.18	0.16	0.16	0.16	0.20	0.20	0.18	0.18	0.20	0.20	0.20	0.20
			Si	0.40	0.40	0.40	0.40	0.50	0.50	0.50	0.50	0.60	0.60	0.60	0.60
			Mn	0.50 ~ 1.40	0.50 ~ 1.50	0.50 ~ 1.50	0.50 ~ 1.50	0.90 ~ 1.70	0.90 ~ 1.70	0.90 ~ 1.70	0.90 ~ 1.70	1.00 ~ 1.70	1.00 ~ 1.70	1.00 ~ 1.70	1.00 ~ 1.70
			P	0.030	0.030	0.030	0.025	0.030	0.030	0.030	0.025	0.030	0.030	0.030	0.025
			S	0.025	0.020	0.020	0.015	0.025	0.025	0.020	0.015	0.025	0.020	0.020	0.015
			Cr	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
			Mo	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.10	0.10	0.10	0.10
			Ni	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.80	0.80	0.80	0.80
			Nb	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050
			Ti	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
			V	0.05	0.05	0.05	0.05	0.10	0.10	0.10	0.10	0.20	0.20	0.20	0.20
			N	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.020	0.025	0.025	0.025	0.025
			Cu	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.70	0.70	0.70	0.70
			Others [1) 4)]	-2)	-2)	-2)	-2)	-2)	-2)	-2)	-2)	-3)	-3)	-3)	-3)
Treatment				N	N	N	N	N	N	N	N	N	N	N	N
			Thickness (mm)												
Yield[7] Stress R_{eH} N/mm²			t ≤ 16	275	275	275	275	355	355	355	355	460	460	460	460
			16 < t ≤ 35	275	275	275	275	355	355	355	355	450	450	450	450
			35 < t ≤ 50	265	265	265	265	345	345	345	345	440	440	440	440
			50 < t ≤ 70	255	255	255	255	325	325	325	325	420	420	420	420
			70 < t ≤ 100	235	235	235	235	315	315	315	315	400	400	400	400
			100 < t ≤ 150	235	235	235	235	295	295	295	295	380	380	380	380
Tensile Strength R_m N/mm²			t ≤ 70	390/ 510	390/ 510	390/ 510	390/ 510	490/ 630	490/ 630	490/ 630	490/ 630	570/ 720[6)]	570/ 720[6)]	570/ 720[6)]	570/ 720[6)]
			70 < t ≤ 100	370/ 490	370/ 490	370/ 490	370/ 490	470/ 610	470/ 610	470/ 610	470/ 610	540/ 710	540/ 710	540/ 710	540/ 710
			100 < t ≤ 150	350/ 470	350/ 470	350/ 470	350/ 470	450/ 590	450/ 590	450/ 590	450/ 590	520/ 690	520/ 690	520/ 690	520/ 690
Elongation [5) 8)] A %			t ≤ 70	24	24	24	24	22	22	22	22	17	17	17	17
			70 < t ≤ 150	23	23	23	23	21	21	21	21	16	16	16	16
Minimum Impact Value for 5 to 150mm thick plate in normalised condition KV J	Temperature °C	-50	long.	-	27	27	30	-	27	27	30	-	27	27	30
			transv.	-	16	16	27	-	16	16	27	-	16	16	27
		-40	long.	-	34	34	40	-	34	34	40	-	34	34	40
			transv.	-	20	20	30	-	20	20	30	-	20	20	30
		-20	long.	40	47	47	65	40	47	47	65	40	47	47	65
			transv.	20	27	27	40	20	27	27	40	20	27	27	40
		0	long.	47	55	55	90	47	55	55	90	47	55	55	90
			transv.	27	34	34	60	27	34	34	60	27	34	34	60
		+20	long.	55	63	63	100	55	63	63	100	55	63	63	100
			transv.	31	40	40	70	31	40	40	70	31	40	40	70
Minimum 0.2% proof stress N/mm²	Temperature °C	50	t ≤ 35	-	264	-	-	-	336	-	-	-	-	-	-
			35 < t ≤ 70	-	247	-	-	-	313	-	-	-	-	-	-
			70 < t ≤ 100	-	229	-	-	-	300	-	-	-	-	-	-
			100 < t ≤ 150	-	214	-	-	-	280	-	-	-	-	-	-
		100	t ≤ 35	-	245	-	-	-	304	-	-	-	402	-	-
			35 < t ≤ 70	-	235	-	-	-	294	-	-	-	392	-	-
			70 < t ≤ 100	-	216	-	-	-	275	-	-	-	373	-	-
			100 < t ≤ 150	-	196	-	-	-	255	-	-	-	353	-	-
		150	t ≤ 35	-	226	-	-	-	284	-	-	-	373	-	-
			35 < t ≤ 70	-	216	-	-	-	275	-	-	-	363	-	-
			70 < t ≤ 100	-	196	-	-	-	255	-	-	-	343	-	-
			100 < t ≤ 150	-	176	-	-	-	235	-	-	-	324	-	-
		200	t ≤ 35	-	196	-	-	-	245	-	-	-	333	-	-
			35 < t ≤ 70	-	196	-	-	-	245	-	-	-	333	-	-
			70 < t ≤ 100	-	176	-	-	-	235	-	-	-	324	-	-
			100 < t ≤ 150	-	157	-	-	-	216	-	-	-	304	-	-
		250	t ≤ 35	-	177	-	-	-	226	-	-	-	314	-	-
			35 < t ≤ 70	-	177	-	-	-	226	-	-	-	314	-	-
			70 < t ≤ 100	-	157	-	-	-	216	-	-	-	294	-	-
			100 < t ≤ 150	-	137	-	-	-	196	-	-	-	275	-	-
		300	t ≤ 35	-	147	-	-	-	216	-	-	-	294	-	-
			35 < t ≤ 70	-	147	-	-	-	216	-	-	-	294	-	-
			70 < t ≤ 100	-	127	-	-	-	196	-	-	-	275	-	-
			100 < t ≤ 150	-	108	-	-	-	177	-	-	-	255	-	-
		350	t ≤ 35	-	127	-	-	-	196	-	-	-	265	-	-
			35 < t ≤ 70	-	127	-	-	-	196	-	-	-	265	-	-
			70 < t ≤ 100	-	108	-	-	-	177	-	-	-	245	-	-
			100 < t ≤ 150	-	88	-	-	-	157	-	-	-	226	-	-
		400	t ≤ 35	-	108	-	-	-	167	-	-	-	235	-	-
			35 < t ≤ 70	-	108	-	-	-	167	-	-	-	235	-	-
			70 < t ≤ 100	-	88	-	-	-	147	-	-	-	216	-	-
			100 < t ≤ 150	-	69	-	-	-	127	-	-	-	196	-	-