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EN 15048

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SB-sets



Introduction

Publication of non-preloaded bolting standards for steel construction (EN 15048) as well as the execution standards for steel structures (Eurocode 3 EN 1090-1 and 2) has changed the use of bolts in metal construction.

The European SB-product standards are so called harmonized standards (published in the Official Journal of the European Union) according to the Construction Product Directive of the European Community. On this basis, SB-sets are delivered with CE label which is mandatory for structural bolting. Therefore, trading these products within the European Community is free. The distribution of non “CE” structural bolts is forbidden within the European Community market.

SB-sets are designed for static steel structure joints where preloading is not necessary according to the European standard DIN EN 1090-2:2011 and also the European standard DIN EN 1993-1-8:2010-12.

SB designation applies to non-preloaded steel structure connections. “SB” stands for structure bolting. Non-preloaded connections can also be executed with HV/HR bolts according to EN 14399.

“Bolt assembly” refers to a bolt, a nut and any washers. EN 15048 reports that all bolt assembly components must comply to European Standards. The standard does not, however, specify any standards applicable to the components, but rather indicates the general technical requirements. pgb’s SB-sets include hexagonal nuts ISO 4032. The property class of pgb’s SB-set components is 8.8 and these are zinc plated or hot dip galvanized.

pgb Hot-dip galvanized SB bolts according to ISO 10684 with minimum 50 microns thickness have an excellent corrosion resistance. Corrosion protection is therefore obtained for long years.

Standards

EN 15048 for SB bolts specifies that all bolted connections must comply with European standards. The standard does not, however, indicate which specific standards apply to the components and merely states general technical requirements. SB bolt sets from pgb contain hexagon nuts ISO 4032. The strength class of the components of the pgb SB bolt sets is 8.8 and they are zinc plated or hot-dip galvanised.

The EN 15048 standard has been developed for non-preloaded structural bolting assemblies. Parts 1 and 2 of this standard describe the requirements and the process to get the "CE" marking. The screws and nuts composing the SB sets can be found in this standard.

An SB set consists of the following elements:

- 1 SB 8.8 hexagon head screw, ISO 4014 or 4017, zinc plated or hot dip galvanized
- 1 hexagonal nut ISO 8, ISO 4032, zinc plated or hot dip galvanized

SB bolting assemblies are relevant in the field of metal construction with only static shear force or simply fasten steel structure components together.

Identification

In order to allow a clear identification of the SB sets, each element bears a marking to identify the product and limit the risk of error. The marking must therefore always remain visible. When mounting the nuts, it is mandatory to ensure that the face bearing the marking is facing outward.



- | | |
|-------------------------------|-------------------------------|
| • SB designation | • SB designation |
| • Resistance class 8.8 | • Resistance class 8 |
| • Manufacturer's symbol 'PGB' | • Manufacturer's symbol 'PGB' |
| • Batch number (eg: B52) | |

Standard range

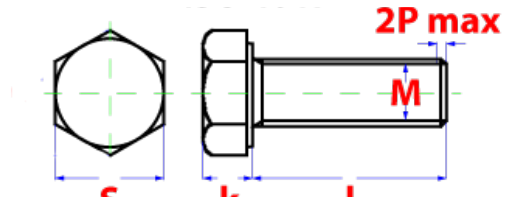
SB 8.8 bolt	SB nut class 8
M10 x 20 - 100	M10
M12 x 25 - 200	M12
M14 x 30 - 50	M14
M16 x 30 - 220	M16
M18 x 40 - 70	M18
M20 x 40 - 260	M20
M22 x 50 - 80	M22
M24 x 50 - 260	M24
M27 x 60 - 200	M27
M30 x 70 - 300	M30
M36 x 90 - 200	M36

Screws and nuts are sold together not assembled.



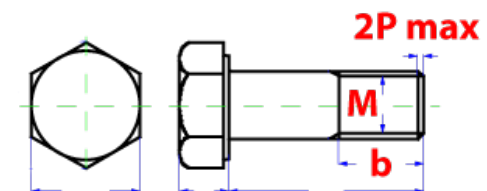
SB combinations

SB hexagonal head screw - 8.8 – ISO 4017



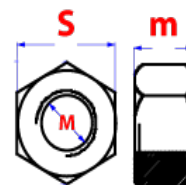
Size	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30	M36
Socket wrench (S)	16	18	21	24	27	30	34	36	41	46	55
Pitch (P)	1,5	1,75	2,0	2,0	2,5	2,5	2,5	3,0	3,0	3,5	4,0
Head thickness (k)	6,4	7,5	8,8	10	11,5	12,5	14	15	17	18,7	22,5

SB hexagonal head screw - 8.8 – ISO 4014



Size	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30	M36
Socket wrench (S)	16	18	21	24	27	30	34	36	41	46	55
Pitch (P)	1,5	1,75	2,0	2,0	2,5	2,5	2,5	3,0	3,0	3,5	4,0
Head thickness (k)	6,4	7,5	8,8	10	11,5	12,5	14	15	17	18,7	22,5
Thread length (b) ≤ 125	26	30	34	38	42	46	50	54	60	66	-
Thread length (b) ≤ 200	32	36	40	44	48	52	56	60	66	72	84
Thread length (b) > 200	45	49	53	57	61	65	69	73	79	85	97

SB nut – class 8 – ISO 4032



Size	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30	M36
Socket wrench (S)	16	18	21	24	27	30	34	36	41	46	55
Nut height (m, max)	8,4	10,8	12,8	14,8	15,8	18	19,4	21,5	23,8	25,6	31

Recommended washers - ISO 7089



Size	M10	M12	M14	M16	M18	M20	M22	M24	M27	M30	M36
Thickness (s)	2,0	2,5	2,5	3,0	3,0	3,0	3,0	4,0	4,0	4,0	5,0
Inner diameter (d1, min)	10,5	13	15	17	19	21	23	25	28	31	37
Outer diameter (d2, max)	20	24	28	30	34	37	39	44	50	56	66

Choice of length according to clamping capacity

Important remarks about clamping capacity

As the thread length of SB bolts is relatively short, a particular attention should be paid to the choice of length according to clamping capacity. If an SB bolt is too long, the body (non-threaded part) of the bolt may exceed the thickness of the steel structure thickness, preventing the required pre-stressing force to be applied. Conversely, in case the bolt is too short, the available thread length is insufficient to effectively resume the pre-stressing force.

Therefore, the following conditions must be fulfilled:

$$(l_{g_{\max}} + 2 P) < \Sigma t < (l_{\min} - P - m_{\max})$$

- $l_{g_{\max}}$ = maximum body length
- P = screw pitch
- Σt = clamping capacity
- $m_{\max}$ = maximum nut height
- $l_{\min}$ = nominal screw length

In other words:

$$(\text{body length} + 2 \text{ pitch}) < \text{clamping capacity} < (\text{nominal length} - 1 \text{ pitch} - 1 \text{ nut height})$$

The values indicated in the table on the next page $\Sigma t_{\min}$ and $\Sigma t_{\max}$ are within this perimeter. The values for $\Sigma t_{\max}$ are fixed so that the screw protrudes 1 pitch from the free face of the nut.

Definition of clamping capacity

The definition of the clamping capacity according to EN 15048 doesn't include washers. Clamping capacity is the distance between the head of the screw and the nut. According to EN 1090-2, to compensate the clamping length, up to three washers of a total thickness not exceeding 12 mm can be installed on the end which is not turned.



Clamping capacity SB-bolts

Clamping capacity Σt - ISO 4017

Size	M10		M12		M14		M16		M18		M20	
L	min	max	min	max	min	max	min	max	min	max	min	max
20	8	9										
25	8	14	9	11								
30	8	19	9	16	10	14	10	12				
35	8	23	9	21	10	19	10	17	13	15		
40	8	28	9	26	10	24	10	22	13	20	13	18
45	8	33	9	31	10	29	10	27	13	25	13	23
50	8	38	9	36	10	34	10	32	13	30	13	28
55	8	43	9	41	10	38	10	36	13	35	13	33
60	8	48	9	46	10	43	10	41	13	40	13	38
65	8	53	9	51	10	48	10	46	13	45	13	43
70	8	58	9	56	10	53	10	51	13	50	13	48
75	8	63	9	61	10	58	10	56	13	55	13	53
80	8	68	9	66	10	63	10	61	13	60	13	58
85	8	73	9	70	10	68	10	66	13	65	13	62
90	8	78	9	75	10	73	10	71	13	70	13	67
95	8	83	9	80	10	78	10	76	13	75	13	72
100	8	88	9	85	10	83	10	81	13	80	13	77
105			9	90	10	88	10	86	13	85	13	82
110			9	95	10	93	10	91	13	90	13	87
115			9	100	10	98	10	96	13	95	13	92
120			9	105	10	103	10	101	13	100	13	97
125					10	108	10	106	13	104	13	102
130					10	113	10	111	13	109	13	107
135					10	118	10	116	13	114	13	112
140					10	123	10	121	13	119	13	117
145							10	126	13	124	13	122
150							10	131	13	129	13	127
155												
160												
165												
170												
175												
180												
185												
190												
195												
200												

Clamping capacity Σt - ISO 4017

Size	M22		M24		M27		M30		M36	
L	min	max	min	max	min	max	min	max	min	max
20										
25										
30										
35										
40	13	18								
45	13	23								
50	13	28	15	24						
55	13	33	15	29	15	26				
60	13	38	15	34	15	31	18	29		
65	13	43	15	39	15	36	18	34		
70	13	48	15	44	15	41	18	39	20	33
75	13	53	15	49	15	46	18	44	20	38
80	13	58	15	54	15	51	18	49	20	43
85	13	62	15	58	15	56	18	54	20	48
90	13	67	15	63	15	61	18	59	20	53
95	13	72	15	68	15	66	18	64	20	58
100	13	77	15	73	15	71	18	69	20	63
105	13	82	15	78	15	76	18	74	20	68
110	13	87	15	83	15	81	18	79	20	73
115	13	92	15	88	15	86	18	84	20	78
120	13	97	15	93	15	91	18	89	20	83
125	13	102	15	98	15	96	18	93	20	88
130	13	107	15	103	15	101	18	98	20	93
135	13	112	15	108	15	106	18	103	20	98
140	13	117	15	113	15	111	18	108	20	103
145	13	122	15	118	15	116	18	113	20	108
150	13	127	15	123	15	121	18	118	20	113
155					15	126	18	123	20	118
160					15	131	18	128	20	123
165					15	136	18	133	20	128
170					15	141	18	138	20	133
175					15	146	18	143	20	138
180					15	151	18	148	20	143
185					15	155	18	153	20	147
190					15	160	18	158	20	152
195					15	165	18	163	20	157
200					15	170	18	168	20	162

Clamping capacity Σt - ISO 4014

Size	M10		M12		M14		M16		M18		M20	
L	min	max	min	max	min	max	min	max	min	max	min	max
45	22	33	19	31								
50	27	38	24	36								
55	32	43	29	41			21	36				
60	37	48	34	46	30	43	26	41	23	40		
65	42	53	29	51	35	48	31	46	28	45	24	43
70	47	58	44	56	40	53	36	51	33	50	29	48
75	52	63	49	61	45	58	41	56	38	55	34	53
80	57	68	54	66	50	63	46	61	43	60	39	58
85	62	73	59	70	55	68	51	66	48	65	44	62
90	67	78	64	75	60	73	56	71	53	70	49	67
95	72	83	69	80	65	78	61	76	58	75	54	72
100	77	88	74	85	70	83	66	81	63	80	59	77
105			79	90	75	88	71	86	68	85	64	82
110			84	95	80	93	76	91	73	90	69	87
115			89	100	85	98	81	96	78	95	74	92
120			94	105	90	103	86	101	83	100	79	97
125			99	110	95	108	91	106	88	104	84	102
130			98	115	94	113	90	111	87	109	83	107
135			103	120	99	118	95	116	92	114	88	112
140			108	125	104	123	100	121	97	119	93	117
145			113	130			105	126	102	124	98	122
150			118	135			110	131	107	129	103	127
155			123	140			115	136	112	134	108	132
160			128	145			120	141	117	139	113	137
165			133	150			125	146	122	144	118	142
170			138	155			130	151	127	149	123	147
175			143	160			135	156	132	154	128	152
180			148	165			140	161	137	159	133	157
185			153	170			145	165			138	162
190			158	175			150	170			143	167
195			163	180			155	175			148	172
200			168	185			160	180			153	177
210							157	190			150	187
220							167	200			160	197
230							177	210			170	207
240							187	220			180	217
250							197	230			190	227
260							207	240			200	236
270												
280												
290												
300												

Clamping capacity Σt - ISO 4014

Size	M22		M24		M27		M30		M36	
L	min	max	min	max	min	max	min	max	min	max
45										
50										
55										
60										
65										
70			22	44						
75			27	49						
80			32	54	26	51				
85			37	58	31	56				
90	45	67	42	63	36	61	31	59		
95	50	72	47	68	41	66	36	64		
100	55	77	52	73	46	71	41	69	24	63
105	60	82	57	78	51	76	46	74	29	68
110	65	87	62	83	56	81	51	79	34	73
115	70	92	67	88	61	86	56	84	39	78
120	75	97	72	93	66	91	61	89	44	83
125	80	102	77	98	71	96	66	93	49	88
130	79	107	76	103	70	101	65	98	54	93
135	84	112	81	108	75	106	70	103	59	98
140	89	117	86	113	80	111	75	108	64	103
145	94	122	91	118	85	116	80	113	69	108
150	99	127	96	123	90	121	85	118	74	113
155	104	132	101	128	95	126	90	123	79	118
160	109	137	106	133	100	131	95	128	84	123
165	114	142	111	138	105	136	100	133	89	128
170	119	147	116	143	110	141	105	138	94	133
175	124	152	121	148	115	146	110	143	99	138
180	129	157	126	153	120	151	115	148	104	143
185	134	162	131	158	125	155	120	153	109	147
190	139	167	136	163	130	160	125	158	114	152
195	144	172	141	168	135	165	130	163	119	157
200	149	177	146	173	140	170	135	168	124	162
210	146	187	143	183	137	180	132	178	121	172
220	156	197	153	193	147	190	142	188	131	182
230			163	203	157	200	152	198	141	192
240			173	213	167	210	162	208	151	202
250			183	223	177	220	172	218	161	212
260			193	232	187	230	182	228	171	222
270							192	238	181	232
280							202	248	191	242
290							212	258	201	252
300							222	268	211	262



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