

Threads/Hole diameters et c.

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Catalogue 7 chapter 5

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ISO tolerances and system of fits

Table 107 Hole tolerances H6 up to H17

Modular measure, mm		Deviation limits, µm																Deviation limits, mm							
		H6		H7		H8		H9		H10		H11		H12		H13		H14		H15		H16		H17	
above	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
	3	+ 6	0	+ 10	0	+ 14	0	+ 25	0	+ 40	0	+ 60	0	+ 100	0	+ 140	0	+ 0,25	0	+ 0,4	0	+ 0,6	0	+ 1,2	0
3	6	+ 8	0	+ 12	0	+ 18	0	+ 30	0	+ 48	0	+ 75	0	+ 120	0	+ 180	0	+ 0,3	0	+ 0,48	0	+ 0,75	0	+ 1,5	0
6	10	+ 9	0	+ 15	0	+ 22	0	+ 36	0	+ 58	0	+ 90	0	+ 150	0	+ 220	0	+ 0,36	0	+ 0,58	0	+ 0,9	0	+ 1,5	0
10	18	+ 11	0	+ 18	0	+ 27	0	+ 43	0	+ 70	0	+ 110	0	+ 180	0	+ 270	0	+ 0,43	0	+ 0,7	0	+ 1,1	0	+ 1,8	0
18	30	+ 13	0	+ 21	0	+ 33	0	+ 52	0	+ 84	0	+ 130	0	+ 210	0	+ 330	0	+ 0,52	0	+ 0,84	0	+ 1,3	0	+ 2,1	0
30	50	+ 16	0	+ 25	0	+ 39	0	+ 62	0	+ 100	0	+ 160	0	+ 250	0	+ 390	0	+ 0,62	0	+ 1	0	+ 1,6	0	+ 2,5	0
50	80	+ 19	0	+ 30	0	+ 46	0	+ 74	0	+ 120	0	+ 190	0	+ 300	0	+ 460	0	+ 0,74	0	+ 1,2	0	+ 1,9	0	+ 3	0
80	120	+ 22	0	+ 35	0	+ 54	0	+ 87	0	+ 140	0	+ 220	0	+ 350	0	+ 540	0	+ 0,87	0	+ 1,4	0	+ 2,2	0	+ 3,5	0
120	180	+ 25	0	+ 40	0	+ 63	0	+ 100	0	+ 160	0	+ 250	0	+ 400	0	+ 630	0	+ 1	0	+ 1,6	0	+ 2,5	0	+ 4	0
180	250	+ 29	0	+ 46	0	+ 72	0	+ 115	0	+ 185	0	+ 290	0	+ 460	0	+ 720	0	+ 1,15	0	+ 1,85	0	+ 2,9	0	+ 4,6	0
250	315	+ 32	0	+ 52	0	+ 81	0	+ 130	0	+ 210	0	+ 320	0	+ 520	0	+ 810	0	+ 1,3	0	+ 2,1	0	+ 3,2	0	+ 5,2	0
315	400	+ 36	0	+ 57	0	+ 89	0	+ 140	0	+ 230	0	+ 360	0	+ 570	0	+ 890	0	+ 1,4	0	+ 2,3	0	+ 3,6	0	+ 5,7	0
400	500	+ 40	0	+ 63	0	+ 97	0	+ 155	0	+ 250	0	+ 400	0	+ 630	0	+ 970	0	+ 1,55	0	+ 2,5	0	+ 4	0	+ 6,3	0
500	630	+ 44	0	+ 70	0	+ 110	0	+ 175	0	+ 280	0	+ 440	0	+ 700	0	+ 1100	0	+ 1,75	0	+ 2,8	0	+ 4,4	0	+ 7	0
630	800	+ 50	0	+ 80	0	+ 125	0	+ 200	0	+ 320	0	+ 500	0	+ 800	0	+ 1250	0	+ 2	0	+ 3,2	0	+ 5	0	+ 8	0
800	1000	+ 56	0	+ 90	0	+ 140	0	+ 230	0	+ 360	0	+ 560	0	+ 900	0	+ 1400	0	+ 2,3	0	+ 3,6	0	+ 5,6	0	+ 9	0
1000	1250	+ 66	0	+ 105	0	+ 165	0	+ 260	0	+ 420	0	+ 660	0	+ 1050	0	+ 1650	0	+ 2,6	0	+ 4,2	0	+ 6,6	0	+ 10,5	0
1250	1600	+ 78	0	+ 125	0	+ 195	0	+ 310	0	+ 500	0	+ 780	0	+ 1250	0	+ 1950	0	+ 3,1	0	+ 5	0	+ 7,8	0	+ 12,5	0
1600	2000	+ 92	0	+ 150	0	+ 230	0	+ 370	0	+ 600	0	+ 920	0	+ 1500	0	+ 2300	0	+ 3,7	0	+ 6	0	+ 9,2	0	+ 15	0
2000	2500	+ 110	0	+ 175	0	+ 280	0	+ 440	0	+ 700	0	+ 1100	0	+ 1750	0	+ 2800	0	+ 4,4	0	+ 7	0	+ 11	0	+ 17,5	0
2500	3150	+ 135	0	+ 210	0	+ 330	0	+ 540	0	+ 860	0	+ 1350	0	+ 2100	0	+ 3300	0	+ 5,4	0	+ 8,6	0	+ 13,5	0	+ 21	0

Table 108 Hole tolerances JS12 up to JS17

Modular measure, mm		Deviation limits, μm				Deviation limits, mm							
		JS12		JS13		JS14		JS15		JS16		JS17	
above	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower
3 6 6	3 6 10	+ 50 + 60 + 75	- 50 - 60 - 75	+ 70 + 90 + 110	- 70 - 90 - 110	+ 0,125 + 0,15 + 0,18	- 0,125 - 0,15 - 0,18	+ 0,2 + 0,24 + 0,29	- 0,2 - 0,24 - 0,29	+ 0,3 + 0,375 + 0,45	- 0,3 - 0,375 - 0,45	+ 0,6 + 0,75	- 0,6 - 0,75
	10 18 30	+ 90 + 105 + 125	- 90 - 105 - 125	+ 135 + 165 + 195	- 135 - 165 - 195	+ 0,215 + 0,26 + 0,31	- 0,215 - 0,26 - 0,31	+ 0,35 + 0,42 + 0,5	- 0,35 - 0,42 - 0,5	+ 0,55 + 0,65 + 0,8	- 0,55 - 0,65 - 0,8	+ 0,9 + 1,05 + 1,25	- 0,9 - 1,05 - 1,25
	50 80 120	+ 150 + 175 + 200	- 150 - 175 - 200	+ 230 + 270 + 315	- 230 - 270 - 315	+ 0,37 + 0,435 + 0,5	- 0,37 - 0,435 - 0,5	+ 0,6 + 0,7 + 0,8	- 0,6 - 0,7 - 0,8	+ 0,95 + 1,1 + 1,25	- 0,95 - 1,1 - 1,25	+ 1,5 + 1,75 + 2	- 1,5 - 1,75 - 2
180 250 315	250 315 400	+ 230 + 260 + 285	- 230 - 260 - 285	+ 360 + 405 + 445	- 360 - 405 - 445	+ 0,575 + 0,65 + 0,7	- 0,575 - 0,65 - 0,7	+ 0,925 + 1,05 + 1,15	- 0,925 - 1,05 - 1,15	+ 1,45 + 1,6 + 1,8	- 1,45 - 1,6 - 1,8	+ 2,3 + 2,6 + 2,85	- 2,3 - 2,6 - 2,85
	400 500 630	+ 315 + 350 + 400	- 315 - 350 - 400	+ 485 + 550 + 625	- 485 - 550 - 625	+ 0,775 + 0,875 + 1	- 0,775 - 0,875 - 1	+ 1,25 + 1,4 + 1,6	- 1,25 - 1,4 - 1,6	+ 2 + 2,2 + 2,5	- 2 - 2,2 - 2,5	+ 3,15 + 3,5 + 4	- 3,15 - 3,5 - 4
	800 1000 1250	+ 450 + 525 + 625	- 450 - 525 - 625	+ 700 + 825 + 975	- 700 - 825 - 975	+ 1,15 + 1,3 + 1,55	- 1,15 - 1,3 - 1,55	+ 1,8 + 2,1 + 2,5	- 1,8 - 2,1 - 2,5	+ 2,8 + 3,3 + 3,9	- 2,8 - 3,3 - 3,9	+ 4,5 + 5,25 + 6,25	- 4,5 - 5,25 - 6,25
1600 2000 2500	2000 2500 3150	+ 750 + 875 + 1050	- 750 - 875 - 1050	+ 1150 + 1400 + 1650	- 1150 - 1400 - 1650	+ 1,85 + 2,2 + 2,7	- 1,85 - 2,2 - 2,7	+ 3 + 3,5 + 4,3	- 3 - 3,5 - 4,3	+ 4,6 + 5,5 + 6,75	- 4,6 - 5,5 - 6,75	+ 7,5 + 8,75 + 10,5	- 7,5 - 8,75 - 10,5

Table 109 Shaft tolerances f3 up to f10

Shaft tolerances m3 up to m9

Modular measure, mm		Deviation limits, μm																																		
		f3		f4		f5		f6		f7		f8		f9		f10		m3		m4		m5		m6		m7		m8		m9						
above	up to	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower	upper	lower					
	3	- 6	- 8	- 6	- 9	- 6	- 10	- 6	- 12	- 6	- 16	- 6	- 20	- 6	- 31	- 6	- 46	+ 4	+ 2	+ 5	+ 2	+ 6	+ 2	+ 8	+ 2	+ 12	+ 2	+ 16	+ 2	+ 27	+ 2					
3	6	- 10	- 12,5	- 10	- 14	- 10	- 15	- 10	- 18	- 10	- 22	- 10	- 28	- 10	- 40	- 10	- 58	+ 6,5	+ 4	+ 8	+ 4	+ 9	+ 4	+ 12	+ 4	+ 16	+ 4	+ 22	+ 4	+ 34	+ 4					
6	10	- 13	- 15,5	- 13	- 17	- 13	- 19	- 13	- 22	- 13	- 28	- 13	- 35	- 13	- 49	- 13	- 71	+ 8,5	+ 6	+ 10	+ 6	+ 12	+ 6	+ 15	+ 6	+ 21	+ 6	+ 28	+ 6	+ 42	+ 6					
10	18	- 16	- 19	- 16	- 21	- 16	- 24	- 16	- 27	- 16	- 34	- 16	- 43	- 16	- 59	- 16	- 86	+ 10	+ 7	+ 12	+ 7	+ 15	+ 7	+ 18	+ 7	+ 25	+ 7	+ 34	+ 7	+ 50	+ 7					
18	30	- 20	- 24	- 20	- 26	- 20	- 29	- 20	- 33	- 20	- 41	- 20	- 53	- 20	- 72	- 20	- 104	+ 12	+ 8	+ 14	+ 8	+ 17	+ 8	+ 21	+ 8	+ 29	+ 8	+ 41	+ 8	+ 60	+ 8					
30	50	- 25	- 29	- 25	- 32	- 25	- 36	- 25	- 41	- 25	- 50	- 25	- 64	- 25	- 87	- 25	- 125	+ 13	+ 9	+ 16	+ 9	+ 20	+ 9	+ 25	+ 9	+ 34	+ 9	+ 48	+ 9	+ 71	+ 9					
50	80			- 30	- 38	- 30	- 43	- 30	- 49	- 30	- 60	- 30	- 76	- 30	- 104					+ 19	+ 11	+ 24	+ 11	+ 30	+ 11	+ 41	+ 11									
80	120			- 36	- 46	- 36	- 51	- 36	- 58	- 36	- 71	- 36	- 90	- 36	- 123					+ 23	+ 13	+ 28	+ 13	+ 35	+ 13	+ 48	+ 13									
120	180			- 43	- 55	- 43	- 61	- 43	- 68	- 43	- 83	- 43	- 106	- 43	- 143					+ 27	+ 15	+ 33	+ 15	+ 40	+ 15	+ 55	+ 15									
180	250			- 50	- 64	- 50	- 70	- 50	- 79	- 50	- 96	- 50	- 122	- 50	- 165					+ 31	+ 17	+ 37	+ 17	+ 46	+ 17	+ 63	+ 17									
250	315			- 56	- 72	- 56	- 79	- 56	- 88	- 56	- 108	- 56	- 137	- 56	- 185					+ 36	+ 20	+ 43	+ 20	+ 52	+ 20	+ 72	+ 20									
315	400			- 62	- 80	- 62	- 87	- 62	- 98	- 62	- 119	- 62	- 151	- 62	- 202					+ 39	+ 21	+ 46	+ 21	+ 57	+ 21	+ 78	+ 21									
400	500			- 68	- 88	- 68	- 95	- 68	- 108	- 68	- 131	- 68	- 165	- 68	- 223					+ 43	+ 23	+ 50	+ 23	+ 63	+ 23	+ 86	+ 23									
500	630							- 76	- 120	- 76	- 146	- 76	- 186	- 76	- 251										+ 70	+ 26	+ 96	+ 26								
630	800							- 80	- 130	- 80	- 160	- 80	- 205	- 80	- 280											+ 80	+ 30	+ 110	+ 30							
800	1000								- 86	- 142	- 86	- 176	- 86	- 226	- 86	- 316											+ 90	+ 34	+ 124	+ 34						
1000	1250								- 98	- 164	- 98	- 203	- 98	- 263	- 98	- 358												+ 106	+ 40	+ 145	+ 40					
1250	1600								- 110	- 188	- 110	- 235	- 110	- 305	- 110	- 420													+ 126	+ 48	+ 173	+ 48				
1600	2000								- 120	- 212	- 120	- 270	- 120	- 350	- 120	- 490													+ 150	+ 58	+ 208	+ 58				
2000	2500								- 130	- 240	- 130	- 305	- 130	- 410	- 130	- 570													+ 178	+ 68	+ 243	+ 68				
2500	3150								- 145	- 280	- 145	- 355	- 145	- 475	- 145	- 685													+ 211	+ 76	+ 286	+ 76				

General tolerances

Table 54 Basic tolerance widths

Modular measure mm	ISO-tolerances (IT)																			Modular measure mm
	01	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
above up to	Tolerance width μm																			above up to
1	0,3	0,5	0,8	1,2	2	3	4	6	10	14	25	40	60	100	140	—	—	—	—	1
3	0,3	0,5	0,8	1,2	2	3	4	6	10	14	25	40	60	100	140	250	400	600	1000	3
6	0,4	0,6	1	1,5	2,5	4	5	8	12	18	30	48	75	120	180	300	480	750	1200	6
10	0,4	0,6	1	1,5	2,5	4	6	9	15	22	36	58	90	150	220	360	580	900	1500	10
18	0,5	0,8	1,2	2	3	5	8	11	18	27	43	70	110	180	270	430	700	1100	1800	18
30	0,6	1	1,5	2,5	4	6	9	13	21	33	52	84	130	210	330	520	840	1300	2100	30
50	0,6	1	1,5	2,5	4	7	11	16	25	39	62	100	160	250	390	620	1000	1600	2500	50
80	0,8	1,2	2	3	5	8	13	19	30	46	74	120	190	300	460	740	1200	1900	3000	80
120	1	1,5	2,5	4	6	10	15	22	35	54	87	140	220	350	540	870	1400	2200	3500	120
180	1,2	2	3,5	5	8	12	18	25	40	63	100	160	250	400	630	1000	1600	2500	4000	180
250	2	3	4,5	7	10	14	20	29	46	72	115	185	290	460	720	1150	1850	2900	4600	250
315	2,5	4	6	8	12	16	23	32	52	81	130	210	320	520	810	1300	2100	3200	5200	315
400	3	5	7	9	13	18	25	36	57	89	140	230	360	570	890	1400	2300	3600	5700	400
500	4	6	8	10	15	20	27	40	63	97	155	250	400	630	970	1550	2500	4000	6300	500
630								44	70	110	175	280	440	700	1100	1750	2800	4400	7000	630
800								50	80	125	200	320	500	800	1250	2000	3200	5000	8000	800
1000								56	90	140	230	360	560	900	1400	2300	3600	5600	9000	1000
1250								66	105	165	260	420	660	1050	1650	2600	4200	6600	10500	1250
1600								78	125	195	310	500	780	1250	1950	3100	5000	7800	12500	1600
2000								92	150	230	370	600	920	1500	2300	3700	6000	9200	15000	2000
2500								110	175	280	440	700	1100	1750	2800	4400	7000	11000	17500	2500
3150								135	210	330	540	860	1350	2100	3300	5400	8600	13500	21000	3150

Source: SS-2090.

Table 170 Tolerances for linear dimensions except for broken edges (external radii and chamfer heights) acc. to SS-ISO 2768-I

Values in millimetres

Tolerance class		Permissible deviations for basic size range							
Designation	Description	0,5 ¹⁾ up to 3	above 3 up to 6	above 6 up to 30	above 30 up to 120	above 120 up to 400	above 400 up to 1000	above 1000 up to 2000	above 2000 up to 4000
f	fine	± 0,05	± 0,05	± 0,1	± 0,15	± 0,2	± 0,3	± 0,5	—
m	medium	± 0,1	± 0,1	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2
c	coarse	± 0,2	± 0,3	± 0,5	± 0,8	± 1,2	± 2	± 3	± 4
v	very coarse	—	± 0,5	± 1	± 1,5	± 2,5	± 4	± 6	± 8

1) For nominal sizes below 0,5 mm, the deviations shall be indicated adjacent to the relevant nominal size(s).

Table 171 Tolerances for broken edges (external radii and chamfer heights) acc. to SS-ISO 2768-I

Values in millimetres

Tolerance class		Permissible deviations for basic size range		
Designation	Description	0,5 ¹⁾ up to 3	above 3 up to 6	above 6
f	fine	± 0,2	± 0,5	± 1
m	medium			
c	coarse	± 0,4	± 1	± 2
v	very coarse			

1) For nominal sizes below 0,5 mm, the deviations shall be indicated adjacent to the relevant nominal size(s).

Thread lengths

Length l. < 125 mm
2. 125 < 200 mm
3. 200 -

Table 38 Metric hexagon head bolts M6S according to DIN 931

Thread d	M1,6	M2	M2,5	M3	(M3,5)	M4	M5	M6	(M7)	M8	M10	M12	(M14)	M16	(M18)
Length l	9	10	11	12	13	14	16	18	20	22	26	30	34	38	42
2	-	-	-	-	-	-	22	24	26	28	32	36	40	44	48
3	-	-	-	-	-	-	-	-	-	-	45	49	53	57	61

Thread d	M20	(M22)	M24	(M27)	M30	(M33)	M36	(M39)	M42	(M45)	M48	(M52)	M56	(M60)	M64
Length l	46	50	54	60	66	72	78	84	90	96	102	-	-	-	-
2	52	56	60	66	72	78	84	90	96	102	108	116	124	132	140
3	65	69	73	79	85	91	97	103	109	115	121	129	137	145	153

Table 39 Metric hexagon head bolts M6S according to ISO 4014

Thread d	M1,6	M2	M2,5	M3	M3,5	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20
Length l	9	10	11	12	13	14	16	18	22	26	30	34	38	42	46
2	-	-	-	-	-	-	-	-	-	-	-	40	44	48	52
3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Thread d	M22	M24	M27	M30	M33	M36	M39	M42	M45	M48	M52	M56	M60	M64	
Length l	50	54	60	66	-	-	-	-	-	-	-	-	-	-	
2	56	60	66	72	78	84	90	96	102	108	116	-	-	-	
3	69	73	79	85	91	97	103	109	115	121	129	137	145	153	

Table 40 Metric hexagon socket head cap screws MC6S according to DIN 912

Thread d	M1,4	M1,6	M2	M2,5	M3	M4	M5	M6	M8	M10	M12	M14	M16
Length	14	15	16	17	18	20	22	24	28	32	36	40	44

Thread d	M18	M20	M22	M24	M27	M30	M33	M36	M42	M48	M56	M64	
Length	48	52	56	60	66	72	78	84	96	108	124	140	

Table 41 Metric hexagon socket countersunk head cap screws MF6S according to DIN 7991

Length l. < 130 mm
2. 130 < 200 mm
3. 200 -

Thread d	M3	M4	M5	M6	M8	M10	M12	M14	M16	M18	M20	M22	M24
Length l	12	14	16	18	22	26	30	34	38	42	46	50	54
2	-	-	-	24	28	32	36	40	44	48	52	56	60
3	-	-	-	-	-	45	49	53	57	61	65	69	73

Table 42 Metric hexagon socket head cap screws with low head MC6LS according to DIN 7984

Length l. < 125 mm
2. 125 < 200 mm
3. 200 -

Thread d	M3	M4	M5	M6	M8	M10	M12	(M14)	M16	(M18)	M20	(M22)	M24
Length l	12	14	16	18	22	26	30	34	38	42	46	50	54
2	-	-	-	-	28	32	36	40	44	48	52	56	60
3	-	-	-	-	-	-	-	-	57	61	65	69	73

Table 42.1 Metric fine threaded hexagon head bolts M6S according to ISO 8765 (replaces DIN 960)

Length l. < 125 mm
2. 125 < 200 mm
3. 200 -

Thread d	M8x1	M10x1,25	M12x1,5	(M14x1,5)	M16x1,5	(M18x2)	M20x2	(M22x2)	M24x2
	-	M10x1	M12x1,25	-	-	(M18x1,5)	M20x1,5	(M22x1,5)	M24x1,5
Length l	22	26	30	34	38	42	46	50	54
2	28	32	36	40	44	48	52	56	60
3	41	45	49	53	57	61	65	69	73

Thread d	(M27x2)	(M30x2)	(M33x2)	M36x3	(M39x3)	M42x3	(M45x3)	M48x3	(M52x3)
	-	-	-	-	-	-	-	-	-
Length l	60	66	72	78	84	90	96	102	-
2	66	72	78	84	90	96	102	108	116
3	79	85	91	97	103	109	115	121	129

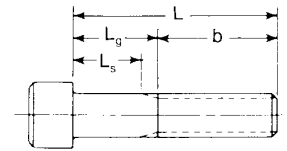
Thread d	M56x4	(M60x4)	M64x4	(M68x4)	M72x4	(M76x4)	M80x4	M90x4	M100x4
	-	-	-	-	-	-	-	-	-
Length l	-	-	-	-	-	-	-	-	-
2	124	132	140	148	156	164	172	192	-
3	137	145	153	161	169	177	185	205	225

Table 43 Metric hexagon socket cap screws with shallow head and pilot recess for wrench key MC6LS according to DIN 6912

Length l. < 125 mm
2. 125 < 200 mm
3. 200 -

Thread d	M4	M5	M6	M8	M10	M12	(M14)	M16	(M18)	M20	(M22)	M24	(M27)	M30	(M33)	M36
Length l	14	16	18	22	26	30	34	38	42	46	50	54	60	66	72	78
2	-	-	-	-	32	36	40	44	48	52	56	60	66	72	78	84
3	-	-	-	-	-	-	-	57	61	65	69	73	79	85	91	97

Thread lengths



**Table 45 Hexagon socket head cap screws acc. to 1960-year's series
UNC and UNF**

Ansi B 18.3 Thread length $b = L - L_g$

Thread size	No 0		No 1		No 2		No 3		No 4		No 5		No 6		No 8		No 10	
Nom. length	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s
0.75	0.25	0.19																
0.88	0.25	0.19	0.25	0.17	0.25	0.16	0.25	0.15										
1.00	0.50	0.44	0.25	0.17	0.25	0.17	0.25	0.15	0.25	0.12	0.25	0.12						
1.25	0.75	0.69	0.62	0.55	0.62	0.54	0.62	0.52	0.25	0.12	0.25	0.12	0.50	0.34	0.38	0.22	0.38	0.17
1.50	...	...	0.88	0.80	0.88	0.79	0.88	0.77	0.75	0.62	0.75	0.62	0.50	0.34	0.38	0.22	0.38	0.17
1.75	...	...	...	...	1.12	1.04	1.12	1.02	0.75	0.62	0.75	0.62	1.00	0.84	0.88	0.72	0.88	0.67
2.00	...	...	...	...	...	...	1.38	1.27	1.25	1.12	1.25	1.12	1.00	0.84	0.88	0.72	0.88	0.67
2.25	...	...	...	...	...	...	...	...	1.25	1.12	1.25	1.12	1.50	1.34	1.38	1.22	1.38	1.17
2.50	...	...	...	...	...	...	...	...	...	...	1.75	1.62	1.50	1.34	1.38	1.22	1.38	1.17
2.75	...	...	...	...	...	...	...	...	...	...	...	...	2.00	1.84	1.88	1.72	1.88	1.67
3.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.88	2.22	2.38	2.17
3.50	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.38	2.17
3.75	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.88	2.67
4.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2.88	2.67

Thread size	1/4		5/16		3/8		7/16		1/2		5/8		3/4		7/8		1	
Nom. length	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s	L _g	L _s
1.50	0.50	0.25																
1.75	0.50	0.25	0.62	0.35	0.50	0.19												
2.00	1.00	0.75	0.62	0.35	0.50	0.19	0.62	0.27										
2.25	1.00	0.75	1.12	0.85	1.00	0.69	0.62	0.27	0.75	0.36								
2.50	1.50	1.25	1.12	0.85	1.00	0.69	1.12	0.77	0.75	0.36	0.75	0.30						
2.75	1.50	1.25	1.62	1.35	1.50	1.19	1.12	0.77	0.75	0.36	0.75	0.30						
3.00	2.00	1.75	1.62	1.35	1.50	1.19	1.62	1.27	1.50	1.12	0.75	0.30	1.00	0.50				
3.25	2.00	1.75	2.12	1.85	2.00	1.69	1.62	1.27	1.50	1.12	1.50	1.04	1.00	0.50	1.00	0.44		
3.50	2.50	2.25	2.12	1.85	2.00	1.69	2.12	1.77	1.50	1.12	1.50	1.04	1.00	0.50	1.00	0.44	1.00	0.38
3.75	2.50	2.25	2.62	2.35	2.50	2.19	2.12	1.77	2.25	1.86	1.50	1.04	1.00	0.50	1.00	0.44	1.00	0.38
4.00	3.00	2.75	2.62	2.35	2.50	2.19	2.62	2.27	2.25	1.86	2.25	1.80	2.00	1.50	1.00	0.44	1.00	0.38
4.25	3.00	2.75	3.12	2.85	3.00	2.69	2.62	2.27	2.25	1.86	2.25	1.80	2.00	1.50	2.00	1.44	1.00	0.38
4.50	3.50	3.25	3.12	2.85	3.00	2.69	3.12	2.77	3.00	2.62	2.25	1.80	2.00	1.50	2.00	1.44	2.00	1.38
4.75	3.50	3.25	3.62	3.35	3.50	3.19	3.12	2.77	3.00	2.62	3.00	2.54	2.00	1.50	2.00	1.44	2.00	1.38
5.00	4.00	3.75	3.62	3.35	3.50	3.19	3.62	3.27	3.00	2.62	3.00	2.54	3.00	2.50	2.00	1.44	2.00	1.38
5.25	...	...	4.12	3.85	4.00	3.69	3.62	3.27	3.75	3.36	3.00	2.54	3.00	2.50	3.00	2.44	2.00	1.38
5.50	...	...	4.12	3.85	4.00	3.69	4.12	3.77	3.75	3.36	3.75	3.30	3.00	2.50	3.00	2.44	3.00	2.38
5.75	...	...	4.62	4.35	4.50	4.19	4.12	3.77	3.75	3.36	3.75	3.30	3.00	2.50	3.00	2.44	3.00	2.38
6.00	...	...	4.62	4.35	4.50	4.19	4.62	4.27	4.50	4.12	3.75	3.30	4.00	3.50	3.00	2.44	3.00	2.38
6.25	...	...	5.12	4.85	5.00	4.69	4.62	4.27	4.50	4.12	4.50	4.04	4.00	3.50	4.00	3.44	3.00	2.38
6.50	...	...	...	...	5.00	4.69	5.12	4.77	4.50	4.12	4.50	4.04	4.00	3.50	4.00	3.44	4.00	3.38
6.75	...	...	...	...	5.50	5.19	5.12	4.77	5.25	4.86	4.50	4.04	4.00	3.50	4.00	3.44	4.00	3.38
7.00	...	...	...	...	5.50	5.19	5.62	5.27	5.25	4.86	5.25	4.80	5.00	4.50	4.00	3.44	4.00	3.38
7.25	...	...	...	...	6.00	5.69	5.62	5.27	5.25	4.86	5.25	4.80	5.00	4.50	5.00	4.44	4.00	3.38
7.50	...	...	...	...	6.00	5.69	6.12	5.77	6.00	5.62	5.25	4.80	5.00	4.50	5.00	4.44	5.00	4.38
7.75	...	...	...	...	...	...	6.12	5.77	6.00	5.62	6.00	5.54	5.00	4.50	5.00	4.44	5.00	4.38
8.00	...	...	...	...	...	...	6.62	6.27	6.00	5.62	6.00	5.54	6.00	5.50	5.00	4.44	5.00	4.38
8.50	...	...	...	...	...	...	7.12	6.77	7.00	6.62	6.75	6.30	6.00	5.50	6.00	5.44	6.00	5.38
9.00	...	...	...	...	...	...	7.62	7.27	7.00	6.62	6.75	6.30	7.00	6.50	6.00	5.44	6.00	5.38
9.50	...	...	...	...	...	...	...	...	8.00	7.62	7.75	7.30	7.00	6.50	7.00	6.44	7.00	6.38
10.00	...	...	...	...	...	...	...	...	8.00	7.62	7.75	7.30	8.00	7.50	7.00	6.44	7.00	6.38
11.00	...	...	...	...	...	...	...	...	...	...	9.25	8.80	9.00	8.50	8.00	7.44	8.00	7.38
12.00	...	...	...	...	...	...	...	...	...	...	10.25	9.80	10.00	9.50	9.00	8.44	9.00	8.38
13.00	...	...	...	...	...	...	...	...	...	...	...	...	11.00	10.50	10.00	9.44	10.00	9.38
14.00	...	...	...	...	...	...	...	...	...	...	...	...	12.00	11.50	11.00	10.44	11.00	10.38
15.00	...	...	...	...	...	...	...	...	...	...	...	...	13.00	12.50	12.00	11.44	12.00	11.38
16.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	13.00	12.44	13.00	12.38
17.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	14.00	13.44	14.00	13.38
18.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	15.00	14.44	15.00	14.38
19.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	16.00	15.38
20.00	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	17.00	16.38

N.B! These measures are presented in inches, 1 inch = 25,4 mm.

L_g = Max. value.

L_s = Min. value.

Thread lengths

Table 46 Hexagon socket head cap screws acc. to 1960-year's series UNC and UNF with dimensions outside table 45

Thread size		Thread length b		Thread size		Thread length b	
		Min	Max			Min	Max
No 0	0.0600	0.50	0.62	7/8	0.8750	2.25	3.69
No 1	0.0730	0.62	0.77	1	1.0000	2.50	4.12
No 2	0.0860	0.62	0.80	1 1/8	1.1250	2.81	4.65
No 3	0.0990	0.62	0.83	1 1/4	1.2500	3.12	5.09
No 4	0.1120	0.75	0.99	1 3/8	1.3750	3.44	5.65
No 5	0.1250	0.75	1.00	1 1/2	1.5000	3.75	6.08
No 6	0.1380	0.75	1.05	1 3/4	1.7500	4.38	7.13
No 8	0.1640	0.88	1.19	2	2.0000	5.00	8.11
No 10	0.1900	0.88	1.27	2 1/4	2.2500	5.62	8.99
1/4	0.2500	1.00	1.50	2 1/2	2.5000	6.25	10.00
5/16	0.3125	1.12	1.71	2 3/4	2.7500	6.88	10.87
3/8	0.3750	1.25	1.94	3	3.0000	7.50	11.75
7/16	0.4375	1.38	2.17	3 1/4	3.2500	8.12	12.63
1/2	0.5000	1.50	2.38	3 1/2	3.5000	8.75	13.50
5/8	0.6250	1.75	2.82	3 3/4	3.7500	9.38	14.37
3/4	0.7500	2.00	3.25	4	4.0000	10.00	15.25

N.B.! These measures are presented in inches, 1 inch = 25,4 mm.

Table 47 Hexagon socket head cap screws UNC and UNF (UC6S/EC6S according to 1936 year's series BS 2470)

Thread d	No 0	No 1	No 2	No 3	No 4	No 5	No 6	No 8	No 10	1/4	5/16	3/8	7/16	1/2	3/8	3/4	7/8	1"
Length	13	16	16	16	19	19	19	22	22	25	28	32	35	38	45	51	57	64

Table 48 Hexagon head bolts UNC and UNF (U6S according to SMS 1943 and 1944)

Length 1. - 152
2. 152 -

Thread d	1/4	5/16	3/8	7/16	1/2	9/16	5/8	3/4	7/8	1	1 1/8	1 1/4	1 1/2
Length 1	19	22	25	28	32	35	38	44	51	57	64	70	83
Length 2	25	28	32	35	38	41	44	51	57	64	70	76	89

Thread lengths

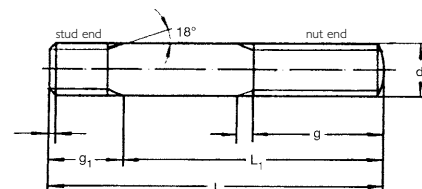


Table 49 Stud bolts according to SMS I460

Thread d	M4		M5		M6		M8		M10		M12		M16		M20		M24		M30	
g ₁	7		8		10		12		15		17		22		27		32		40	
Screw length L	Free length L ₁ and thread length g																			
	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g
18 20	11 13	6 8	12	7																
22 25 28	15 18 21	10 13 16	14 17 20	9 12 15	15 18	10 13														
30 32 35	23 25 28	16 16 16	22 24 27	17 19	20 22 25	15 17 19	18 20 23	13 15												
38 40 45			30 32 37	19 19	28 30 35	19 19	26 28 33	21 22 22	23 25 30	18 20 25										
50 55 60			42	19	40 45 50	19 19 19	38 43 48	22 22 22	35 40 45	25 28 30	33 38 43	28 30 30		33 38	26 31					
65 70 75					55 60 65	19 19 19	53 58 63	22 22 22	50 55 60	25 25 25	48 53 58	30 30 30	43 48 53	35 35 35	38 43 48	30 35 40				
80 85 90							68 73 78	22 30 30	65 70 75	25 35 35	63 68 73	30 40 40	58 63 68	35 45 45	53 58 63	40 50 50	48 53 58	38 43 48		
95 100 105							83 88 93	30 30 30	80 85 90	35 35 35	78 83 88	40 40 40	73 78 83	45 45 45	68 73 78	50 50 50	63 68 73	53 58 60	55 60 65	45 50 55
110 115 120							98 103 108	30 30 30	95 100 105	35 35 35	93 98 103	40 40 40	88 93 98	45 45 45	83 88 93	50 50 50	78 83 88	60 60 60	70 75 80	60 65 70
125 130 140									110 115 125	35 35 35	108 113 123	40 40 40	103 108 118	45 45 45	98 103 113	50 50 50	93 98 108	60 60 60	85 90 100	70 70 70
150 160 170									135	35	133 143	40 40	128 138 148	45 45 65	123 133 143	50 50 70	118 128 138	60 60 80	110 120 130	70 70 90
180 190 200															158 163 173	65 70 70	153 163 168	70 70 80	148 158 168	90 90 90

Table 50 Stud bolts according to SMS I948

Thread d	1/4—20		5/16—18		3/8—16		1/2—13		5/8—11		3/4—10		7/8—9		1—8		1 1/4—7		1 1/2—6	
g ₁	10		12		14		18		22		26		30		34		42		50	
Screw length L	Free length L ₁ and thread length g																			
	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g	L ₁	g
25	15	10																		
28	18	13	16	11																
30	20	15	18	13	16	11														
32	22	18	20	15	18	13														
35	25	19	23	18	21	16														
38	28	19	26	21	24	19	20	13												
40	30	19	28	22	26	21	22	15												
45	35	19	33	22	31	25	27	20												
50	40	19	38	22	36	25	32	25	28	21										
55	45	19	43	22	41	25	37	30	33	25										
60	50	19	48	22	46	25	42	30	38	30	34	27								
65	55	19	53	22	51	25	47	30	43	35	39	31								
70	60	19	58	22	56	25	52	30	48	35	44	36	40	30						
75	65	19	63	22	61	25	57	30	53	35	49	40	45	35						
80			68	22	66	25	62	30	58	35	54	40	50	40	46	36				
85			73	30	71	35	67	40	63	45	59	50	55	45	51	41				
90			78	30	76	35	72	40	68	45	64	50	60	50	56	46				
95			83	30	81	35	77	40	73	45	69	50	65	55	61	51				
100			88	30	86	35	82	40	78	45	74	50	70	55	66	56	58	48		
105			93	30	91	35	87	40	83	45	79	50	75	55	71	60	63	53		
110			98	30	96	35	92	40	88	45	84	50	80	55	76	60	68	58		
115			103	30	101	35	97	40	93	45	89	50	85	55	81	60	73	63	70	58
120			108	30	106	35	102	40	98	45	94	50	90	55	86	60	78	68	75	58
125					111	35	107	40	103	45	99	50	95	55	91	60	83	70	75	63

Recommended drill diameters for various threads



Table I 12 Metric coarse thread

Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter
M1	0,75	M2,2	1,75	M 6	5	M14	12	M30	26,5	M52	47
M1,1	0,85	M2,5	2,05	M 7	6	M16	14	M33	29,5	M56	50,5
M1,2	0,95	M3	2,5	M 8	6,8	M18	15,5	M36	32	M60	54,5
M1,4	1,1	M3,5	2,9	M 9	7,8	M20	17,5	M39	35	M64	58
M1,6	1,25	M4	3,3	M10	8,5	M22	19,5	M42	37,5	M68	62
M1,8	1,45	M4,5	3,7	M11	9,5	M24	21	M45	40,5		
M2	1,6	M5	4,2	M12	10,2	M27	24	M48	43		

Table I 13 Metric fine thread

Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter
M3 x0,35	2,65	M 5 x0,5	4,5	M10 x1,25	8,8	M14 x1,5	12,5	M20 x1,5	18,5	M24 x1,5	22,5
M3,5 x0,35	3,15	M 6 x0,75	5,2	M12 x1	11	M16 x1,5	14,5	M20 x2	18	M24 x2	22
M4 x0,5	3,5	M 8 x1	7	M12 x1,25	10,8	M18 x1,5	16,5	M22 x1,5	20,5	M27 x1,5	25,5
M4,5 x0,5	4	M10 x1	9	M12 x1,5	10,5	M18 x2	16	M22 x2	20	M27 x2	25

Table I 14 Unified thread UNC

Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter
1/4 x20	5,1	7/16 x14	9,4	5/8 x11	13,5	1 x8	22,25	1 3/8 x6	30,75	2 x4 1/2	45
5/16 x18	6,6	1/2 x13	10,8	3/4 x10	16,5	1 1/8 x7	25	1 1/2 x6	34	2 1/2 x4 1/2	51,5
3/8 x16	8	9/16 x12	12,2	7/8 x9	19,5	1 1/4 x7	28	1 3/4 x5	39,5	2 1/2 x4	57

Table I 15 Unified thread UNF

Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter
1/4 x28	5,5	7/16 x20	9,9	5/8 x18	14,5	1 x12	23,25	1 3/8 x12	32,75		
5/16 x24	6,9	1/2 x20	11,5	3/4 x16	17,5	1 1/8 x12	26,5	1 1/2 x12	36		
3/8 x24	8,5	9/16 x18	12,9	7/8 x14	20,4	1 1/4 x12	29,5				

Table I 16 Pipe thread G ISO 228

Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter	Screw thread	Drill diameter
G 1/8 x28	8,8	G 3/8 x19	15,25	G 5/8 x14	21	G 7/8 x14	28,25	G 1 1/8 x11	35,3	G 1 1/2 x11	45
G 1/4 x19	11,8	G 1/2 x14	19	G 3/4 x14	24,5	G 1 x11	30,75	G 1 1/4 x11	39,5	G 1 3/4 x11	51

Target values for hole diameters - clearance holes

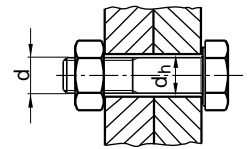


Table 62 Metric threads acc. to EN 20273

Thread d	Hole diameter dh mm		
	fine	medium	coarse
M 1.2	1.3	1.4	1.5
M 1.6	1.7	1.8	2
M 1.8	2	2.1	2.2
M 2	2.2	2.4	2.6
M 2.5	2.7	2.9	3.1
M 3	3.2	3.4	3.6
M 3.5	3.7	3.9	4.2
M 4	4.3	4.5	4.8
M 4.5	4.8	5	5.3
M 5	5.3	5.5	5.8
M 6	6.4	6.6	7
M 7	7.4	7.6	8
M 8	8.4	9	10
M 10	10.5	11	12
M 12	13	13.5	14.5
M 14	15	15.5	16.5
M 16	17	17.5	18.5
M 18	19	20	21
M 20	21	22	24
M 22	23	24	26
M 24	25	26	28
M 27	28	30	32
M 30	31	33	35
M 33	34	36	38
M 36	37	39	42
M 39	40	42	45
M 42	43	45	48
M 45	46	48	52
M 48	50	52	56
M 52	54	56	62
M 56	58	62	66
M 60	62	66	70
M 64	66	70	74
M 68	70	74	78
M 72	74	78	82
M 76	78	82	86
M 80	82	86	91
M 85	87	91	96
M 90	93	96	101
M 95	98	101	107
M 100	104	107	112
M 105	109	112	117
M 110	114	117	122
M 115	119	122	127
M 120	124	127	132
M 125	129	132	137
M 130	134	137	144
M 140	144	147	155
M 150	155	158	165

Table 63 UNC/UNF threads acc. to SMS 775

Thread d	Hole diameter dh mm		
	fine	medium	coarse
No. 2 (0.086)	2.4	2.6	2.8
No. 3 (0.099)	2.7	2.9	3.1
No. 4 (0.112)	3	3.2	3.4
No. 5 (0.125)	3.4	3.6	3.8
No. 6 (0.138)	3.7	4	4.2
No. 8 (0.164)	4.5	4.7	5
No. 10 (0.190)	5.1	5.3	5.6
No. 12 (0.216)	5.8	6	6.3
1/4	6.8	7	7.4
5/16	8.4	9	10
3/8	10	11	12
7/16	11.5	12.5	14
1/2	13.5	14.5	16
9/16	15	16	18
5/8	17	18	20
3/4	20	21	23
7/8	23	25	27
1	26.5	28	30
1 1/8	30	32	34
1 1/4	33	35	38
1 3/8	36	38	41
1 1/2	40	42	45
1 3/4	46	49	52
2	53	56	59
2 1/4	59	62	66
2 1/2	66	69	73
2 3/4	72	76	80
3	79	83	87
3 1/4	85	90	94
3 1/2	92	96	100
3 3/4	98	103	108
4	105	109	114
above 4	d + 3	d + 8	d + 15

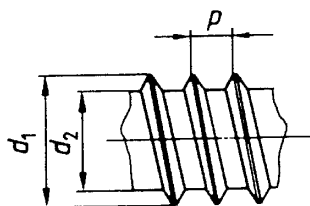
Tapping screws - ST-thread

ST-threads and its screw ends are defined in ISO 1478, the material is defined in ISO 2702. The following part is an excerpt from these standards.

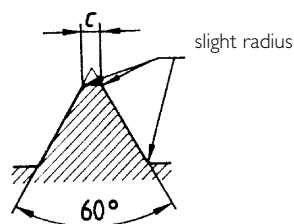
Thread diameters and screw ends

These threads were previously denoted as B-threads. A translation between the two systems is shown below.

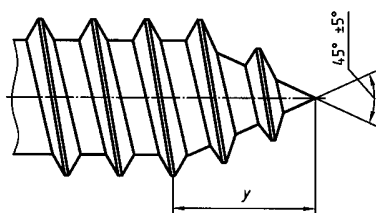
Thread (ST)



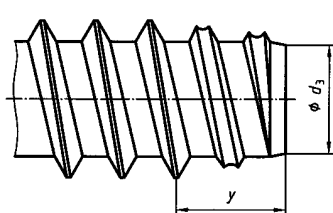
Thread profile



Type C, cone end (previously type AB)



Type F, flat end (previously type B)



Type R, rounded end

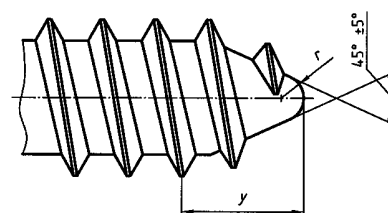


Table 67 Dimensions for ST-thread

Thread		ST 1,5	ST 1,9	ST 2,2	ST 2,6	ST 2,9	ST 3,3	ST 3,5	ST 3,9	ST 4,2	ST 4,8	ST 5,5	ST 6,3	ST 8	ST 9,5
<i>P</i>	≈	0,5	0,6	0,8	0,9	1,1	1,3	1,3	1,3	1,4	1,6	1,8	1,8	2,1	2,1
<i>d</i> ₁	max.	1,52	1,90	2,24	2,57	2,90	3,30	3,53	3,91	4,22	4,80	5,46	6,25	8,00	9,65
	min.	1,38	1,76	2,10	2,43	2,76	3,12	3,35	3,73	4,04	4,62	5,28	6,03	7,78	9,43
<i>d</i> ₂	max.	0,91	1,24	1,63	1,90	2,18	2,39	2,64	2,92	3,10	3,58	4,17	4,88	6,20	7,85
	min.	0,84	1,17	1,52	1,80	2,08	2,29	2,51	2,77	2,95	3,43	3,99	4,70	5,99	7,59
<i>d</i> ₃	max.	0,79	1,12	1,47	1,73	2,01	2,21	2,41	2,67	2,84	3,30	3,86	4,55	5,84	7,44
	min.	0,69	1,02	1,37	1,60	1,88	2,08	2,26	2,51	2,69	3,12	3,68	4,34	5,64	7,24
<i>c</i>	max.	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,15	0,15	0,15	0,15	0,15
<i>r</i> ^a	≈	—	—	—	—	—	—	0,5	0,6	0,6	0,7	0,8	0,9	1,1	1,4
<i>y</i> ref. ^b type C	type C	1,4	1,6	2	2,3	2,6	3	3,2	3,5	3,7	4,3	5	6	7,5	8
	type F	1,1	1,2	1,6	1,8	2,1	2,5	2,5	2,7	2,8	3,2	3,6	3,6	4,2	4,2
	type R	—	—	—	—	—	—	2,7	3	3,2	3,6	4,3	5	6,3	—
Alternative thread designation		B0	B1	B2	B3	B4	B5	B6	B7	B8	B10	B12	B14	B16	B20

^a Dimension *r* is a reference and has been provided for guidance only.
The end may not be perfectly spherical but shall not be sharp to the touch.

^b Length of incomplete thread.

Source: ISO 1478.

Torsional strength

Case-hardened ST-threaded screws should be able to resist the torsional torques below.

Table 68 Torsional torque

Thread	ST 2,2	ST 2,9	ST 3,5	ST 4,2	ST 4,8	ST 5,5	ST 6,3	ST 8,0
Torsional torque Nm min.	0,45	1,5	2,7	4,4	6,3	10	13,6	30,5

Thread d P=pitch	Plate thickness T	Hole diameter d ₁ Tolerance H12 or H13 ¹				Clear- ance hole d ⁴
		Steel, brass and copper ²		Aluminium		
		Extruded or split stamped holes	Drilled or punched holes	Extruded or split stamped holes	Drilled or punched holes	
ST2,2 (B2) d=2,24 P=0,79	-0,56 (0,56)-0,75 (0,75)-0,88 (0,88)-1,13 (1,13)-1,38 (1,38)-1,5		1,6 1,7 1,8 1,8 1,9 1,9		1,6 1,6 1,6 1,7 1,8	2,8
ST2,9 (B4) d=2,9 P=1,06	-0,56 (0,56)-0,63 (0,63)-0,75 (0,75)-0,88 (0,88)-1,25 (1,25)-1,38 (1,38)-1,75 (1,75)-2,5	2,2 2,5 2,5 2,5	2,2 2,3 2,3 2,4 2,4 2,4 2,5 2,6	2,2 2,2 2,2 2,2	2,2 2,2 2,2 2,3 2,4	3,6
ST3,5 (B6) d=3,53 P=1,27	-0,56 (0,56)-0,75 (0,75)-0,88 (0,88)-1,25 (1,25)-1,38 (1,38)-1,75 (1,75)-2,5 (2,5)-3 (3)-6	2,8 2,8 2,8	2,6 2,7 2,7 2,8 2,8 2,9 3 3,2	2,8 2,8 2,8	2,6 2,6 2,7 2,8 2,8 3 3	4,2
ST4,2 (B8) d=4,22 P=1,41	-0,5 (0,5)-0,63 (0,63)-0,88 (0,88)-1,13 (1,13)-1,38 (1,38)-2,5 (2,5)-3 (3)-3,5 (3,5)-10	3,5 3,5 3,5 3,5 3,5	3,2 3,2 3,2 3,3 3,5 3,8 3,9	3,5 3,5 3,5 3,5	2,9 3 3,2 3,5 3,7 3,8 3,9	5
ST4,8 (B10) d=4,8 P=1,59	-0,5 (0,5)-0,75 (0,75)-1,13 (1,13)-1,38 (1,38)-1,75 (1,75)-2,5 (2,5)-3 (3)-3,5 (3,5)-4 (4)-4,75 (4,75)-10	4 4 4 4	3,7 3,7 3,9 3,9 4 4,1 4,3 4,4 4,4	4 4 4	3,7 3,7 3,7 3,8 3,8 3,9 3,9 4 4,2	5,8
ST5,5 (B12) d=5,46 P=1,81	-1,13 (1,13)-1,38 (1,38)-1,5 (1,5)-1,75 (1,75)-2,25 (2,25)-3 (3)-3,5 (3,5)-4 (4)-4,75 (4,75)-10	4,7 4,7	4,2 4,3 4,3 4,5 4,6 4,7 5 5 5,1		4,1 4,1 4,2 4,4 4,6 4,6 4,8 4,8 4,9	6,6
ST6,3 (B14) d=6,25 P=1,81	-1,38 (1,38)-1,75 (1,75)-2 (2)-3 (3)-4 (4)-4,75 (4,75)-5 (5)-10	5,3	4,9 5 5,2 5,3 5,8 5,9		5 5 5,2 5,3 5,4 5,6 5,8	7,4

³ d₇ x min. installation length.

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Thread tolerances for metric ISO-threads

Table I I7 Internal threads - Coarse threads acc. to ISO 965-2

Thread	Length of thread engagement		Pitch diameter		Minor diameter	
	over	up to and incl.	max.	min.	max.	min.
M1*	0,6	1,7	0,894	0,838	0,785	0,729
M1,2*	0,6	1,7	1,094	1,038	0,985	0,929
M1,4*	0,7	2	1,265	1,205	1,142	1,075
M1,6	0,8	2,6	1,458	1,373	1,321	1,221
M1,8	0,8	2,6	1,658	1,573	1,521	1,421
M2	1	3	1,830	1,740	1,679	1,567
M2,5	1,3	3,8	2,303	2,208	2,138	2,013
M3	1,5	4,5	2,775	2,675	2,599	2,459
M3,5	1,7	5	3,222	3,110	3,010	2,850
M4	2	6	3,663	3,545	3,422	3,242
M5	2,5	7,5	4,605	4,480	4,334	4,134
M6	3	9	5,500	5,350	5,153	4,917
M7	3	9	6,500	6,350	6,153	5,917
M8	4	12	7,348	7,188	6,912	6,647
M10	5	15	9,206	9,026	8,676	8,376
M12	6	18	11,063	10,863	10,441	10,106
M14	8	24	12,913	12,701	12,210	11,835
M16	8	24	14,913	14,701	14,210	13,385
M18	10	30	16,600	16,376	15,744	15,924
M20	10	30	18,600	18,376	17,744	17,294
M22	10	30	20,600	20,376	19,744	19,294
M24	12	36	22,316	22,051	21,252	20,752
M27	12	36	25,316	25,051	24,252	23,752
M30	15	45	28,007	27,727	26,771	26,211
M33	15	45	31,007	30,727	29,771	29,211
M36	18	53	33,702	33,402	32,270	31,670
M39	18	53	36,702	36,402	35,270	34,670
M42	21	63	39,392	39,077	37,799	37,129
M45	21	63	42,392	42,077	40,799	40,129
M48	24	71	45,087	44,752	43,297	42,587
M52	24	71	49,087	48,752	47,297	46,587
M56	28	85	52,783	52,428	50,796	50,046
M60	28	85	56,783	56,428	54,796	54,046
M64	32	95	60,478	60,103	58,305	57,505

Tolerance quality: Medium Thread engagement group: Normal Tolerance class: 6H

* The table's values for thread M1,4 and smaller correspond to tolerance class 5H.

Table I I8 External threads - Coarse threads acc. to ISO 965-2

Thread	Length of thread engagement		Major diameter		Pitch diameter		Root radius min ¹⁾
	over	up to and incl.	max.	min.	max.	min.	
M1*	0,6	1,7	1,000	0,933	0,838	0,785	0,031
M1,2*	0,6	1,7	1,200	1,133	1,038	0,985	0,031
M1,4*	0,7	2	1,400	1,325	1,205	1,149	0,038
M1,6	0,8	2,6	1,581	1,496	1,354	1,291	0,044
M1,8	0,8	2,6	1,781	1,696	1,554	1,491	0,044
M2	1	3	1,981	1,886	1,721	1,654	0,050
M2,5	1,3	3,8	2,480	2,380	2,188	2,117	0,056
M3	1,5	4,5	2,980	2,874	2,655	2,580	0,063
M3,5	1,7	5	3,479	3,354	3,089	3,004	0,075
M4	2	6	3,978	3,838	3,523	3,433	0,088
M5	2,5	7,5	4,976	4,826	4,456	4,361	0,100
M6	3	9	5,974	5,794	5,324	5,212	0,125
M7	3	9	6,974	6,794	6,324	6,212	0,125
M8	4	12	7,972	7,760	7,160	7,042	0,156
M10	5	15	9,968	9,732	8,994	8,862	0,188
M12	6	18	11,966	11,701	10,829	10,679	0,219
M14	8	24	13,962	13,682	12,663	12,503	0,250
M16	8	24	15,962	15,682	14,663	14,503	0,250
M18	10	30	17,958	17,623	16,334	16,164	0,313
M20	10	30	19,958	19,623	18,334	18,164	0,313
M22	10	30	21,958	21,623	20,334	20,164	0,313
M24	12	36	23,952	23,577	22,003	21,803	0,375
M27	12	36	26,952	26,577	25,003	24,803	0,375
M30	15	45	29,947	29,522	27,674	27,462	0,438
M33	15	45	32,947	32,522	30,674	30,462	0,438
M36	18	53	35,940	35,465	33,342	33,118	0,500
M39	18	53	38,940	38,465	36,342	36,118	0,500
M42	21	63	41,937	41,437	39,014	38,778	0,563
M45	21	63	44,937	44,437	42,014	41,778	0,563
M48	24	71	47,929	47,399	44,681	44,431	0,625
M52	24	71	51,929	51,399	48,681	48,431	0,625
M56	28	85	55,925	55,365	52,353	52,088	0,688
M60	28	85	59,925	59,365	56,353	56,088	0,688
M64	32	95	63,920	63,320	60,023	59,743	0,750

Tolerance quality: Medium Thread engagement group: Normal Tolerance class: 6g

* The table's values for thread M1,4 and smaller correspond to tolerance class 6h.

¹⁾ See ISO 965-1, section 11.

Table 223 Internal threads - Fine threads acc. to ISO 965-2

Thread	Length of thread engagement		Pitch diameter		Minor diameter	
	over	up to and incl.	max.	min.	max.	min.
M8 x 1	3	9	7,500	7,350	7,153	6,917
M10 x 1	4	12	9,500	9,350	9,153	8,917
M10 x 1,25	4	12	9,348	9,188	8,912	8,647
M12 x 1,25	4,5	13	11,368	11,188	10,912	10,647
M12 x 1,5	4,5	13	11,216	11,026	10,676	10,376
M14 x 1,5	5,6	16	13,216	13,026	12,676	12,376
M16 x 1,5	5,6	16	15,216	15,026	14,676	14,376
M18 x 1,5	5,6	16	17,216	17,026	16,676	16,376
M18 x 2	5,6	16	16,913	16,701	16,210	15,835
M20 x 1,5	5,6	16	19,216	19,026	18,676	18,376
M20 x 2	5,6	16	18,913	18,701	18,210	17,835
M22 x 1,5	5,6	16	21,216	21,026	20,676	20,376
M22 x 2	5,6	16	20,913	20,701	20,210	19,835
M24 x 2	8,5	25	22,925	22,701	22,210	21,835
M27 x 2	8,5	25	25,925	25,701	25,210	24,835
M30 x 2	8,5	25	28,925	28,701	28,210	27,835
M33 x 2	8,5	25	31,925	31,701	31,210	30,835
M36 x 3	12	36	34,316	34,051	33,252	32,752
M39 x 3	12	36	37,316	37,051	36,252	35,752
M42 x 3	12	36	40,316	40,051	39,252	38,752
M45 x 3	12	36	43,316	43,051	42,252	41,752
M48 x 3	15	45	46,331	46,051	45,252	44,752
M52 x 4	19	56	49,717	49,402	48,270	47,670
M56 x 4	19	56	53,717	53,402	52,270	51,670
M60 x 4	19	56	57,717	57,402	56,270	55,670
M64 x 4	19	56	61,717	61,402	60,270	59,670

Tolerance quality: Medium

Thread engagement group: Normal

Tolerance class: 6H

Table 224 External threads - Fine threads acc. to ISO 965-2

Thread	Length of thread engagement		Major diameter		Pitch diameter		Root radius
	over	up to and incl.	max.	min.	max.	min.	min. ¹⁾
M8 x 1	3	9	7,974	7,794	7,324	7,212	0,125
M10 x 1	4	12	9,974	9,794	9,324	9,212	0,125
M10 x 1,25	4	12	9,972	9,760	9,160	9,042	0,156
M12 x 1,25	4,5	13	11,972	11,760	11,160	11,028	0,156
M12 x 1,5	4,5	13	11,968	11,732	10,994	10,854	0,188
M14 x 1,5	5,6	16	13,968	13,732	12,994	12,854	0,188
M16 x 1,5	5,6	16	15,968	15,732	14,994	14,854	0,188
M18 x 1,5	5,6	16	17,968	17,732	16,994	16,854	0,188
M18 x 2	5,6	16	17,962	17,682	16,663	16,503	0,250
M20 x 1,5	5,6	16	19,968	19,732	18,994	18,854	0,188
M20 x 2	5,6	16	19,962	19,682	18,663	18,503	0,250
M22 x 1,5	5,6	16	21,968	21,732	20,994	20,854	0,188
M22 x 2	5,6	16	21,962	21,682	20,663	20,503	0,250
M24 x 2	8,5	25	23,962	23,682	22,663	22,493	0,250
M27 x 2	8,5	25	26,962	26,682	25,663	25,493	0,250
M30 x 2	8,5	25	29,962	29,682	28,663	28,493	0,250
M33 x 2	8,5	25	32,962	32,682	31,663	31,493	0,250
M36 x 3	12	36	35,952	35,577	34,003	33,803	0,375
M39 x 3	12	36	38,952	38,577	37,003	36,803	0,375
M42 x 3	12	36	41,952	41,577	40,003	39,803	0,375
M45 x 3	12	36	44,952	44,577	43,003	42,803	0,375
M48 x 3	15	45	47,952	47,577	46,003	45,791	0,375
M52 x 4	19	56	51,940	51,465	49,342	49,106	0,500
M56 x 4	19	56	55,940	55,465	53,342	53,106	0,500
M60 x 4	19	56	59,940	59,465	57,342	57,106	0,500
M64 x 4	19	56	63,940	63,465	61,342	61,106	0,500

Tolerance quality: Medium

Thread engagement group: Normal

Tolerance class: 6g

¹⁾ See ISO 965-1.

Pitch tables

Table 51

Dim.			Pitch											
1st choice	2nd choice	3rd choice	Coarse	Fine										
				4	3	2	1,5	1,25	1	0,75	0,5	0,35	0,25	0,2
1			0,25											0,2
1,2	1,1		0,25											0,2
	1,4		0,25 0,3											0,2 0,2
1,6			0,35											0,2
2	1,8		0,35 0,4											0,2 0,2
													0,25	
2,5	2,2		0,45										0,25	
3			0,45 0,5									0,35		
												0,35		
4	3,5		0,6 0,7 0,75								0,5			
	4,5										0,5			
5			0,8								0,5			
6		5,5	1							0,75				
8	7		1 1,25 1,25						1 1	0,75 0,75 0,75				
		9												
10		11	1,5 1,5					1,25 1,25	1 1	0,75 0,75				
12			1,75				1,5 1,5	1,25 1,25*						
16	14	15	2 2				1,5 1,5 1,5							
20	18	17	2,5 2,5			2 2	1,5 1,5							
24	22		2,5 3			2 2 2	1,5 1,5 1,5							
		25												
	27	26	3			2 2	1,5 1,5 1,5							
		28												
30		32	3,5		(3)	2 2	1,5 1,5							
	33		3,5		(3)	2	1,5							
36		35** 38	4		3	2	1,5 1,5 1,5 1,5							
	39		4		3	2								
42	45	40	4,5 4,5	4 4	3 3	2 2	1,5 1,5							
48		50	5	4	3 3	2 2	1,5 1,5							
	52		5	4	3	2	1,5							
56		55	5,5	4 4	3 3	2 2	1,5 1,5							
		58												
64	60	62	5,5	4 4	3 3	2 2	1,5 1,5							
			6	4	3	2	1,5							

* Only for ignition plugs.
** Only for mounting in roller bearings.
Split 3 for diameter 30 and 33 should be avoided.

The most common pitches of thread for screws and nuts are marked with bold text.

Source: SS-ISO 261/262.

Table 52 Whitworth (55°)

Dim.	mm	Number of threads/inch			
		BSW	BSF	BSP/BSPF (R) Ø mm	
1/16	1,588	60	—	—	
3/32	2,382	48	—	—	
1/8	3,175	40	—	28	9,73
5/32	3,970	32	—	—	
3/16	4,763	24	32	—	
7/32	5,556	24	28	—	
1/4	6,350	20	26	19	13,16
9/32	7,142	20	26	—	
5/16	7,938	18	22	—	
3/8	9,525	16	20	19	16,66
7/16	11,113	14	18	—	
1/2	12,700	12	16	14	20,96
9/16	14,288	12	16	—	
5/8	15,875	11	14	14	22,91
11/16	17,463	11	14	—	
3/4	19,051	10	12	14	26,44
13/16	20,638	10	12	—	
7/8	22,226	9	11	14	30,20
15/16	23,813	9	11	—	
1	25,401	8	10	11	33,25
1 1/8	28,576	7	9	—	
1 1/4	31,751	7	9	11	41,91
1 3/8	34,926	6	8	—	
1 1/2	38,101	6	8	11	47,80
1 5/8	41,277	5	8	—	
1 3/4	44,452	5	7	11	53,75
1 7/8	47,627	4 1/2	7	—	
2	50,802	4 1/2	7	11	59,62

Table 53 UNC (60°)

Dim.	mm	Number of threads/inch			
		NC/UNC	NF/UNF	NEF/UNEFF	NPS/NPT/NPTF
No. 0	1,524	—	80	—	—
No. 1	1,854	64	72	—	—
No. 2	2,184	56	64	—	—
No. 3	2,515	48	56	—	—
No. 4	2,845	40	48	—	—
No. 5	3,175	40	44	—	—
No. 6	3,505	32	40	—	—
No. 8	4,166	32	36	—	—
No. 10	4,826	24	32	—	—
No. 12	5,486	24	28	32	—
1/16	1,588	—	—	—	27
1/8	3,175	—	—	—	27
1/4	6,350	20	28	32	18
5/16	7,938	18	24	32	—
3/8	9,525	16	24	32	18
7/16	11,116	14	20	28	—
1/2	12,700	13	20	28	14
9/16	14,288	12	18	24	—
5/8	15,875	11	18	24	—
11/16	17,463	—	—	24	—
3/4	19,050	10	16	20	14
13/16	20,638	—	—	20	—
7/8	22,225	9	14	20	—
15/16	23,813	—	—	20	—
1	25,401	8	12	20	11 1/2
1 1/8	28,576	7	12	18	—
1 1/4	31,751	7	12	18	11 1/2
1 3/8	34,926	6	12	18	—
1 1/2	38,101	6	12	18	11 1/2
1 5/8	41,277	—	—	18	—
1 3/4	44,452	5	—	16	—
2	50,802	4 1/2	—	15	11 1/2

Table 225 Diameter and pitch in mm/inch









Dimension inch	Diameter inch	Dimension metric	Diameter inch	Pitch mm
		M1.4	0.055	0.3 0.2
No. 0	0.060			
		M1.6	0.063	0.35 0.2
No. 1	0.073			
		M2	0.079	0.4 0.25
No. 2	0.086			
		M2.5	0.098	0.45 0.35
No. 3	0.099			
No. 4	0.112			
		M3	0.118	0.5 0.35
No. 5	0.125			
No. 6	0.138			
		M4	0.157	0.7 0.5
No. 8	0.164			
No. 10	0.190			
		M5	0.196	0.8 0.5
		M6	0.236	1.0 0.75
1/4	0.250			
5/16	0.312			
		M8	0.315	1.25 1.0
3/8	0.375			
		M10	0.393	1.5 1.25
7/16	0.437			
		M12	0.472	1.75 1.25
1/2	0.500			
		M14	0.551	2 1.5
5/8	0.625			
		M16	0.630	2 1.5
		M18	0.709	2.5 1.5
3/4	0.750			
		M20	0.787	2.5 1.5
		M22	0.866	2.5 1.5
7/8	0.875			
		M24	0.945	3 2
1"	1.000			
		M27	1.063	3 2

Chisel- and bits tables

Suitable screw driver for different screws

(according to SS and whenever applicable according to corresponding German or U.S. standard).

Table 119 Machine screw Straight slots

Chisel thickness x chisel width mm	For Metrical screws M					For Unified screws UNC		
	ECS 	MCS 	MSCS 	MFS 	MKFS 	ULCS 	UFS 	UKFS 
0,4 x 2,5 0,5 x 3 (0,5 x 3,5) 0,6 x 3,5 (0,6 x 4)	M 1,6 M 2 M 2,5	M 1,6 M 2 M 2,5	M 1,6 M 2 M 2,5	M 1,6 M 2 M 2,5 M 3	M 1,6 M 2 M 2,5 M 3			
0,8 x 4 (0,8 x 5,5) 1,0 x 5,5 (1,0 x 6,5) 1,2 x 6,5 (1,2 x 8)	M 3 M 3,5 M 4 M 5	M 3 M 3,5 M 4 M 5	M 3 M 3,5 M 4 M 5	M 3,5 M 4 M 5 M 6	Nr 5 M 5 M 6	Nr 5 Nr 6 8 Nr 10 12	Nr 5 Nr 6 8 Nr 10 12	Nr 6 8 Nr 10 12
1,6 x 8 (1,6 x 10) 2,0 x 12 (2 x 13) 2,5 x 14 (2,5 x 16)	M 6 M 8 M 10	M 6 M 8 M 10	M 6 M 8 M 10	M 8 M 10	M 8 M 10	1/4 5/16 3/8 1/2 5/8 3/4	1/4 5/16 3/8 1/2 5/8 3/4	1/4 5/16 3/8 1/2 5/8 3/4

Chisel dimensions within brackets refer to older standard.

Table 120 Tapping screw Straight slots



Chisel thickness x chisel width mm	For ST-threads	
	CSK CSS 	KFSK KFSS 
0,4 x 2,5 0,5 x 3 (0,5 x 3,5) 0,6 x 3,5 (0,6 x 4)	ST 2,2 ST 2,9	ST 2,2 ST 2,9
0,8 x 4 (0,8 x 5,5) 1,0 x 5,5 (1,0 x 6,5) 1,2 x 6,5 (1,2 x 8)	ST 3,5 ST 4,2 ST 4,8 ST 5,5	ST 3,5 ST 4,2 ST 4,8 ST 5,5
1,6 x 8 (1,6 x 10) 2,0 x 12 (2 x 13) 2,5 x 14 (2,5 x 16)	ST 6,3	ST 6,3

Table 121 Wood screw Straight slots



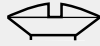
Chisel thickness x chisel width mm	For screw no.		
	TKS 	TFS 	TKFS 
0,5 x 3 (0,5 x 3,5) 0,6 x 3,5 (0,6 x 4) 0,8 x 4 (0,8 x 5,5)	2 (3) 4 (5) 6	2 (3) 4 (5) 6	2 (3) 4 (5) 6
1,0 x 5,5 (1,0 x 6,5) 1,2 x 6,5 (1,2 x 8)	(7) 8 (9) 10 12 14	(7) 8 (9) 10 12 14	(7) 8 (9) 10 12 14
1,6 x 8 (1,6 x 10) 2 x 12 (2 x 13)	16 18 20	16 18 20	16 18 20

Table 122 Machine screw cross recessed (Phillips and Pozidriv/Supadriv)


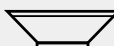



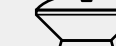
Cross-slot no.	For Metric screws M			For Unified screws UNC		
	MRX 	MFX 	MKFX 	URX 	UFX 	UKFX 
0 1 2 3 4	M 2 M 2,5 M 3 M 3,5 M 4 M 5 M 6 M 8 M 10	M 2,5 M 3 M 3,5 M 4 M 5 M 6 M 8 M 10	M 2,5 M 3 M 3,5 M 4 M 5 M 6 M 8 M 10	Nr 5 Nr 6 Nr 8 Nr 10 Nr 12 1/4 5/16 3/8 7/16 1/2	Nr 5 Nr 6 Nr 8 Nr 10 Nr 12 1/4 5/16 3/8 7/16 1/2	Nr 5 Nr 6 Nr 8 Nr 10 Nr 12 1/4 5/16 3/8 7/16 1/2

Table 123 Tapping screw cross recessed Phillips and Pozidriv/Supadriv


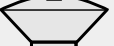



Cross-slot no.	For ST-threads	
	RXX RXS 	KFXK KFXS 
0 1 2 3 4	— ST 2,2 ST 2,9 ST 3,5 ST 4,2 ST 4,8 ST 5,5 ST 6,3 —	— ST 2,2 ST 2,9 ST 3,5 ST 4,2 ST 4,8 ST 5,5 ST 6,3 —

Table 124 Wood screw cross recessed Phillips and Pozidriv/Supadriv

Cross-slot no.	Screw no.		
	TKX 	TFX 	TKFX 
0 1 2 3 4	— (3) 4 (5) 6 (7) 8 (9) 10 12 14 16 —	— (3) 4 (5) 6 (7) 8 (9) 10 12 14 16 —	— (3) 4 (5) 6 (7) 8 (9) 10 12 14 16 —

Bits tables

Suitable torx bits according to screw standards

Table 183 Tapping screw Torx







Torx no.	For ST-threads		
	RTS RTK 	FTS 	KFTS 
10	ST 2,9	ST 2,9	ST 2,9
15	ST 3,5	ST 3,5	ST 3,5
20	ST 4,2	ST 4,2	ST 4,2
25	ST 4,8	ST 4,8	ST 4,8
	ST 5,5	ST 5,5	ST 5,5
30	ST 6,3	ST 6,3	ST 6,3

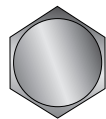
Table 184 Machine screw Torx



Torx no.	For Metrical screws M	Torx no.	For Metrical screws M
	MRT 		MRT 
8	M 2,5	25	M 5
10	M 3	30	M 6
15	M 3,5	45	M 8
20	M 4	50	M 10

Screw heads

Below follows a selection of screw heads available on the market.



Hexagon



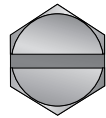
Socket head cap screw



Phillips



Torx®
Torx Plus®



Hexagon slot



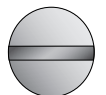
Socket head cap screw with pin



Pozidriv
Supadrive®



Combitorx®



Slot



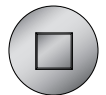
Socket head cap screw with control hole



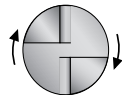
Combiphillips



Torx® with pin



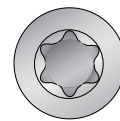
Square head



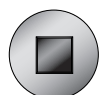
One-way screw



Half-turn
thumb screw



External torx®



Square head
hole



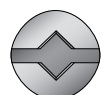
Snakeeyes



Thumb screw



Y-slot



Square head
slot



Square head



T-head