

TOYOTA ENGINEERING STANDARD

NO. : **TSB1304G** _____

TITLE : **WELD BOLTS** _____

CLASS : **C2** _____

Established/Revised : **Rev.9(Aug.2005)** _____

This standard has been revised in consequence of the following changes:

- (1) a Remark regarding TSZ0001G has been added to the Scope;
- (2) the surface treatments have been changed due to the hexavalent chromium reduction; and
- (3) the part numbers in the Appendices that are not being used have been deleted.

Engineering Information
Planning Dept.
Engineering Administration Div.
TOYOTA MOTOR CORPORATION

TOYOTA ENGINEERING STANDARD	TSB1304G	CLASS C2		
<u>WELD BOLTS</u>				
<p>1. Scope</p> <p>This standard covers weld bolts (hereinafter referred to as "bolts") used for automobiles.</p> <p style="margin-left: 40px;">Remark:</p> <p style="margin-left: 40px;">This part shall conform to sub-paragraph 'substance prohibition and restriction' in TSZ0001G.</p> <p>2. Classification</p> <p>The classification of bolts is shown in Table 1.</p>				
Table 1				
Type	Shape of end	Type indication number	Applicable nominal diameter of thread	Attached Table
Round	Chamfered end	92616	4, 5, 6, 8, 10	1
	Anti-cross thread Class 1	92617	5, 6, 8, 10	2
<p>3. Materials, Mechanical Properties and Manufacturing Methods</p> <p>3.1 Materials</p> <p>Bolts must be made of carbon steel with a carbon content of 0.28 % (equivalent to S25C) or less so that the product meets the mechanical properties given in Section 3.2 and the weldability to a rolled steel sheet must be excellent.</p> <p>3.2 Mechanical Properties</p> <p>The mechanical properties of bolts shall conform to property class 6.8 specified in Section 3 of TSB1001G.</p> <p>3.3 Manufacturing Methods</p> <p>The manufacturing methods of bolts shall conform to Section 8 of TSB1001G.</p> <p>4. Surface Treatment</p> <p>The surface of bolts shall be untreated. Rust preventive oil may be applied for temporary rust prevention.</p> <p>5. Shapes and Dimensions</p> <p>The shapes and dimensions of bolts shall conform to Attached Tables 1 and 2.</p>				
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Engineering Information Management Dept.		Established/ 9 Revised:		
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Engineering Administration Div.				

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6. Screw Threads

Screw threads shall conform to TSB0200G, however, threads of M8 mm or less shall have the coarse thread and those of M10 mm or more shall have the fine screw thread, and the tolerance range class shall be 6g.

7. Appearance

The surface of bolts shall be smooth and free of cracks, burrs, flashes, flaws and rust, etc. that are detrimental to use.

8. Surface Roughness

The surface roughness of bolt shall be 6.3a specified in TSZ2301G for the upper surface of the head and the bearing surface, and 12.5a for other portions excluding the end of the thread. The threaded portion shall be smooth.

9. Test Methods

9.1 Tensile Strength Test

The tensile strength of bolts shall be tested according to Section 4 of TSB1001G.

9.2 Hardness Test

The hardness of bolts shall be tested according to Section 4 of TSB1001G.

10. Part Numbers, Basic Mass and Mass Tolerance

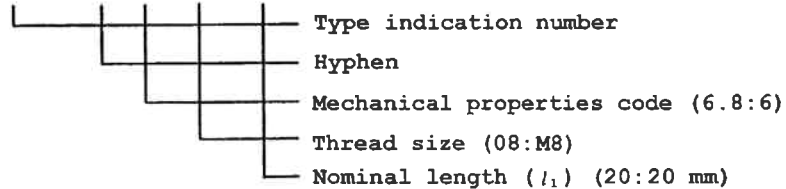
The part numbers, basic mass and mass tolerance of bolts shall conform to Attached Tables 3 and 4. The mass tolerance shall be as specified in TSZ2900G.

11. Part Numbers

The part numbers for bolts shall consist of the type indication number and a hyphen followed by the surface treatment code, the nominal diameter (d), and the nominal length (l_1). If the nominal diameter or the nominal length is in 1 digit, place a "0" before it to represent in 2 digits.

Example:

9 2 6 1 6 - 6 0 8 2 0



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12. Part Name

The part name for bolts shall be "BOLT, WELD".

Applicable Standards

TSB0200G	Metric Screw Threads
TSB1001G	Mechanical Properties of Externally Threaded Fasteners
TSB1006G	Skewed Insertion Preventive Ends of Bolts
TSB1300G	Hexagon Head Bolts
TSH6524G	Electroplated Zinc Coating (Hexavalent Chrome Free)
TSZ0001G	Control Method for Substances of Environmental Concern
TSZ2301G	Definitions and Evaluation Methods for Surface Texture Parameters
TSZ2900G	General Mass Tolerances

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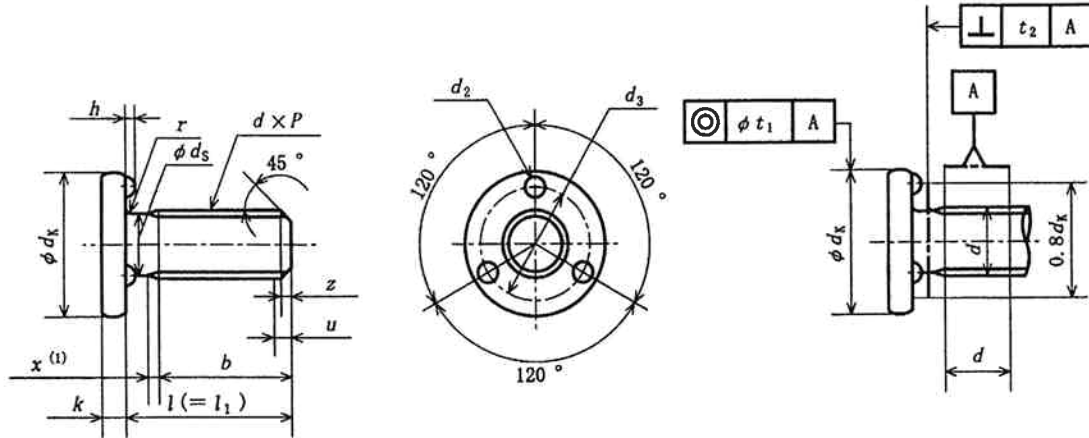
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Attached Table 1 Round Weld Bolts (Chamfered End)



(Unit: mm)

Type indication number		92616				
Thread size (d)		M4	M5	M6	M8	M10
Pitch (P)		0.7	0.8	1.0	1.25	
ϕd_s	Basic dimension	3.55	4.48	5.35	7.20	9.20
	Tolerance	0 -0.15		0 -0.20		
ϕd_k	Basic dimension	10.5	12.5	14.5	18.5	21.5
	Tolerance	± 0.4				
k	Basic dimension	1.3	1.8	2.0	2.5	3.5
	Tolerance	± 0.2				
d_2	Basic dimension	1.5	2.0	2.5	3.0	3.5
	Tolerance	± 0.25				
h	Basic dimension	0.8		1.0		1.2
	Tolerance	± 0.1				
d_3	Basic dimension	8	9.5	11.0	14.5	17.0
	Tolerance	0 -0.5				
z	Approx.	0.8	0.9	1.0	1.2	1.5
r	Max.	0.7		0.9		1.4
	Min.	0.4		0.5	0.6	1.0
b	Basic dimension	14	16	18	22	26
	Tolerance	+2P 0				
u	Max.	2P				

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Attached Table 1 (Continued) (Unit: mm)

Type indication number		92616					
Thread size (d)		M4	M5	M6	M8	M10	
ϕt_1		0.3			0.4		
t_2		0.18	0.22	0.25	0.32	0.38	
Hole diameter of steel sheet (reference)	Basic dimension	5	6	7	9	11	
	Tolerance	+0.3 0					
Basic dimension l	Nominal length (l ₁)	8	8	8	---	---	
		10	10	10	10	---	
		12	12	12	12	12	
		14	14	14	14	14	
		16	16	16	16	16	16
		18	18	18	18	18	18
		20	20	20	20	20	20
		22	---	22	22	22	22
		25	---	25	25	25	25
		28	---	---	28	28	28
		30	---	---	30	30	30
		32	---	---	---	32	32
		35	---	---	---	35	35
		40	---	---	---	40	40
		45	---	---	---	45	45
Tolerance		±0.5					

Remark 1:

Note (1) is given after Attached Table 2.

Remark 2:

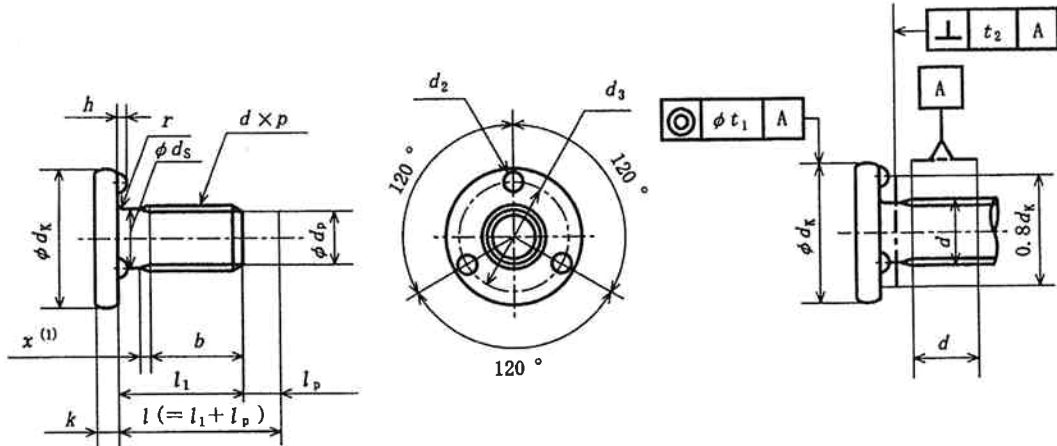
Symbol u indicates the length of incomplete thread at the tip.

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Attached Table 2 Round Weld Bolts (Anti-Cross Thread Class 1)



l : Length to the tip of screw
 l_p : Length of anti-cross thread

(Unit: mm)

Type indication number		92617			
Thread size (d)		M5	M6	M8	M10
Pitch (P)		0.8	1.0	1.25	
ϕd_s	Basic dimension	4.48	5.35	7.20	9.20
	Tolerance	0	0		
ϕd_k	Basic dimension	12.5	14.5	18.5	21.5
	Tolerance	± 0.4			
k	Basic dimension	1.8	2.0	2.5	3.5
	Tolerance	± 0.2			
d_2	Basic dimension	2.0	2.5	3.0	3.5
	Tolerance	± 0.25			
h	Basic dimension	0.8	1.0		1.2
	Tolerance	± 0.1			
d_3	Basic dimension	9.5	11.0	14.5	17.0
	Tolerance	0			
ϕd_p	Basic dimension	4.13	4.91	6.64	8.64
	Tolerance	0		0	
l_p	Basic dimension	3	4	5	6
	Tolerance	+1			± 0.5
		0			

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Attached Table 2 (Continued) (Unit: mm)

Type indication number		92617				
Thread size (d)		M5	M6	M8	M10	
r	Max.	0.7	0.9		1.4	
	Min.	0.4	0.5	0.6	1.0	
b	Basic dimension	16	18	22	26	
	Tolerance	+2P 0				
ϕt_1		0.3		0.4		
t_2		0.22	0.25	0.32	0.38	
Hole diameter of steel sheet (reference)	Basic dimension	6	7	9	11	
	Tolerance	+0.3 0				
l_p		3	4	5	6	
ϕd_p		4.13	4.91	6.64	8.64	
Basic dimension length (l_1)	Nominal length (l_1)	8	11	---	---	
		10	13	14		
		12	15	16	17	
		14	17	18	19	
		16	19	20	21	22
		18	21	22	23	24
		20	23	24	25	26
		22	25	26	27	28
		25	28	29	30	31
		28	---	32	33	34
		30		34	35	36
		32		---	37	38
		35			40	41
		40			45	46
		45			50	51
Tolerance		±0.5				

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Note: (1)

λ represents the length of incomplete thread and should not exceed 2 pitches or less. When either l or l_1 for chamfered end and anti-cross thread Class 1, is equal to or smaller than $\lambda + b$ the bolt shall have the complete thread. In this case, the dimension (a) from bearing surface of the bolt to the complete thread shall not exceed the length of four pitches.

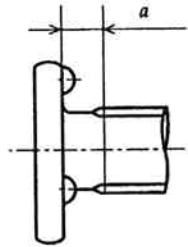


Fig. 1

Remark 1:

Noteless numbers shall conform to TSB1300G.

Remark 2:

Shapes and dimensions of anti-cross thread shall conform to TSB1006G.

Remark 3:

The variation in the height of the head of a bolt including the welding point ($k+h$) shall not exceed 0.15 mm. The side of the head may be rounded during cold forging provided that the projections are not deformed.

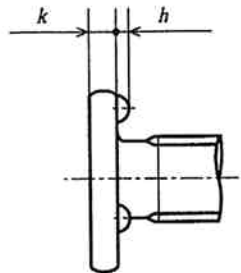


Fig. 2

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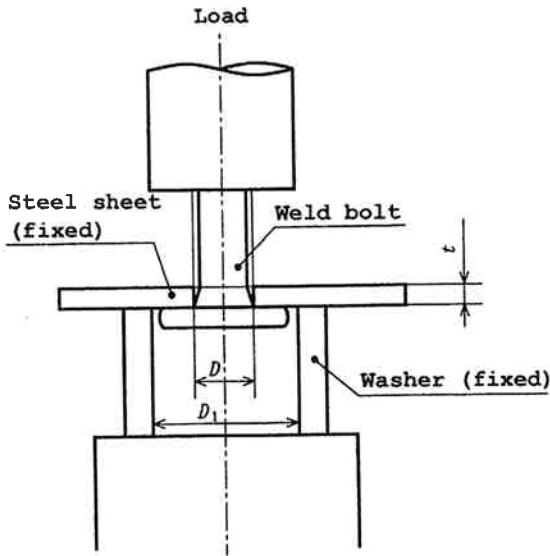
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Reference: Peel test

The peel test is conducted to measure the load required to peel the bolt welded to a steel sheet by applying a load in a direction as parallel to the axis as possible, using a washer as illustrated in Fig. 3. When the measurement is impossible because the steel sheet bends remarkably before the bolt peels off, use a sheet having a thickness (t) that is 0.2 to 0.3 mm thicker. Table 2 shows the weld strength of bolts as measured by this method for reference.

Table 2 (Reference) (Unit: N)

Thread size	M4	M5	M6	M8	M10
Weld strength (Min.)	1470	3430	5390	8820	14700



(Unit: mm)

Thread size of bolt	Thickness of sheet used (t)	D_1
M4	1.2	14
M5	1.6	16
M6	2.3	18
M8		22
M10	3.2	26

Fig. 3

Remark:

For the hole diameter of the sheet used (D), use the values listed in Attached Tables 1 and 2.

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Attached Table 3 Part Number, Mass, and Mass Tolerance of Chamfered End Bolts

Thread size	Nominal length (mm)	Part number	Basic mass (g)	Mass tolerance
M4	8	92616-60408	1.7	MB
	10	92616-60410	1.8	
	12	92616-60412	2.0	
	14	92616-60414	2.1	
	16	92616-60416	2.3	
	18	92616-60418	2.4	
	20	92616-60420	2.6	
M5	8	92616-60508	3.0	
	10	92616-60510	3.2	
	12	92616-60512	3.5	
	14	92616-60514	3.7	
	16	92616-60516	4.0	
	18	92616-60518	4.2	
	20	92616-60520	4.5	
	22	92616-60522	4.7	
M6	25	92616-60525	5.1	
	10	92616-60610	4.3	
	12	92616-60612	4.6	
	14	92616-60614	5.0	
	16	92616-60616	5.3	
	18	92616-60618	5.5	
	20	92616-60620	5.9	
	22	92616-60622	6.2	
	25	92616-60625	6.7	
M8	28	92616-60628	7.2	
	30	92616-60630	7.6	
	12	92616-60812	8.8	
	14	92616-60816	9.5	
	16	92616-60816	10.1	
	18	92616-60818	10.8	
	20	92616-60820	11.4	
	22	92616-60822	12.1	
	25	92616-60825	12.9	
	28	92616-60828	13.9	
M10	30	92616-60830	14.5	
	32	92616-60832	15.1	
	35	92616-60835	16.0	
	40	92616-60840	17.6	
	45	92616-60845	19.2	
	16	92616-61016	18.0	
	18	92616-61018	19.0	
	20	92616-61020	20.0	
	22	92616-61022	21.0	
	25	92616-61025	22.6	
M10	28	92616-61028	24.1	
	30	92616-61030	25.2	
	32	92616-61032	26.3	
	35	92616-61035	27.7	
	40	92616-61040	30.3	
	45	92616-61045	32.8	

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Attached Table 4 Part Number, Mass, and Mass Tolerance of Anti-Cross Thread Class

1

Thread size	Nominal length (mm)	Part number	Basic mass (g)	Mass tolerance
M5	8	92617-60508	3.3	MB
	10	92617-60510	3.5	
	12	92617-60512	3.8	
	14	92617-60514	4.0	
	16	92617-60516	4.3	
	18	92617-60518	4.5	
	20	92617-60520	4.8	
	22	92617-60522	5.0	
	25	92617-60525	5.4	
M6	10	92617-60610	4.8	
	12	92617-60612	5.1	
	14	92617-60614	5.5	
	16	92617-60616	5.8	
	18	92617-60618	6.0	
	20	92617-60620	6.4	
	22	92617-60622	6.7	
	25	92617-60625	7.2	
	28	92617-60628	7.7	
M8	30	92617-60630	8.1	
	12	92617-60812	10.0	
	14	92617-60814	10.7	
	16	92617-60816	11.3	
	18	92617-60818	12.0	
	20	92617-60820	12.6	
	22	92617-60822	13.3	
	25	92617-60825	14.1	
	28	92617-60828	15.1	
	30	92617-60830	15.7	
	32	92617-60832	16.3	
M10	35	92617-60835	17.2	
	40	92617-60840	18.8	
	45	92617-60845	20.4	
	16	92617-61016	20.3	
	18	92617-61018	21.3	
	20	92617-61020	22.3	
	22	92617-61022	23.3	
	25	92617-61025	24.9	
	28	92617-61028	26.4	
	30	92617-61030	27.5	
	32	92617-61032	28.6	
	35	92617-61035	30.0	
	40	92617-61040	32.6	
45	92617-61045	35.1		

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APPENDIX WELD BOLTS WHICH SHALL NOT BE NEWLY ADOPTED

1. Scope

This Appendix covers weld bolts (hereinafter referred to as "bolts") used for automobiles. The weld bolts specified herein shall not be adopted either newly or additionally in future design.

Remark:

This part shall conform to sub-paragraph 'substance prohibition and restriction' in TSZ0001G.

2. Classification

The classification of bolts is shown in Appendix Table 1.

Appendix Table 1

Type	Shape of end	Type indication number	Applicable nominal diameter of thread	Property class	Appendix Attached Table No.	Remark
Round	As rolled end	92611	5, 6, 8, 10	4T	1	For general use
	Chamfered end	92612			2	
	Full dog point	92613	3			
	Cone point	92615	4			
T-shaped	As rolled end	92621	4, 5, 6, 8		5	For use in narrow place
	Chamfered end	92622	5, 6, 8		6	
	Full dog point	92623	6, 8, 10		7	
	Cone point	92625	5, 6, 10		8	

3. Materials, Mechanical Properties and Manufacturing Methods

3.1 Materials

Bolts must be made of carbon steel with a carbon content of 0.2 % or less so that the product meets the mechanical properties given in Appendix Table 2 and the weldability to a rolled steel sheet must be excellent.

3.2 Mechanical Properties

The mechanical properties of bolts shall satisfy Appendix Table 2.

Appendix Table 2

Property class	Mechanical properties
4T	Shall conform to Table 2 of Section 3, TSB1001G.

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3.3 Manufacturing Methods

The manufacturing methods of bolts shall conform to Section 8, TSB1001G.

4. Surface Treatment

The surface treatment of bolts shall conform to Appendix Table 3.

Appendix Table 3

Code	Surface treatment
0	Untreated ⁽¹⁾
1	TSH6524G-BC specified in TSH6524G.

Note:(1)

Rust preventive oil may be applied for temporary rust prevention.

5. Shapes and Dimensions

The shapes and dimensions of bolts shall conform to Appendix Attached Tables 1 to 8.

6. Screw Threads

Threads of M8 mm or below shall have the coarse screw thread and those of M10 mm shall have the fine screw thread respectively specified in TSB0200G. The thread tolerance range class shall be 6g. The maximum limit of size for properly surface-treated screw thread shall be that of 4h external thread.

7. Appearance

The surface of bolts shall be smooth and free of cracks, burrs, flashes, flaws and rust, etc. that are detrimental to use.

8. Surface Roughness

The surface roughness of bolts shall be 6.3a specified in TSZ2301G for the upper surface of the head and the bearing surface, and 12.5a for other portions.

9. Test Methods

9.1 Tensile Strength Test

The tensile strength of bolts shall be tested according to Section 4.1 of TSB1001G.

9.2 Hardness Test

The hardness of bolts shall be tested according to Section 4.3 of TSB1001G.

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10. Basic Mass and Mass Tolerance

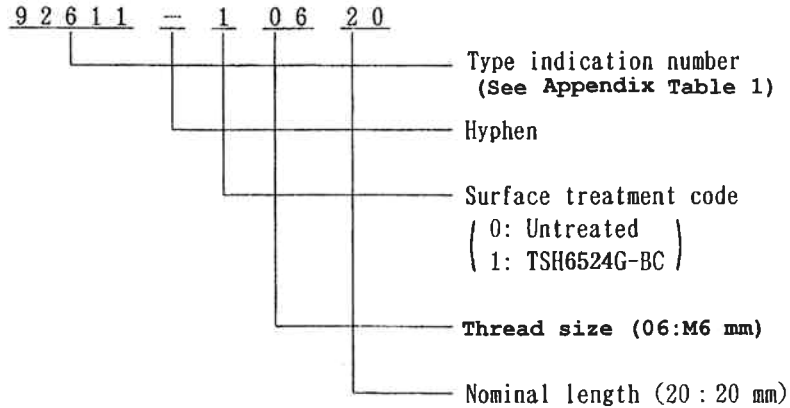
The basic mass and mass tolerance of bolts shall conform to Appendix Attached Tables 9 and 10.

The mass tolerance is specified in TSZ2900G.

11. Part Numbers

The part numbers for bolts shall consist of the type indication number and a hyphen followed by the surface treatment code, the nominal diameter (d), and the nominal length (l). If the nominal diameter or the nominal length is in 1 digit, place a "0" before it to represent in 2 digits.

Example:



12. Part Name

The part name for bolts is "BOLT, WELD".

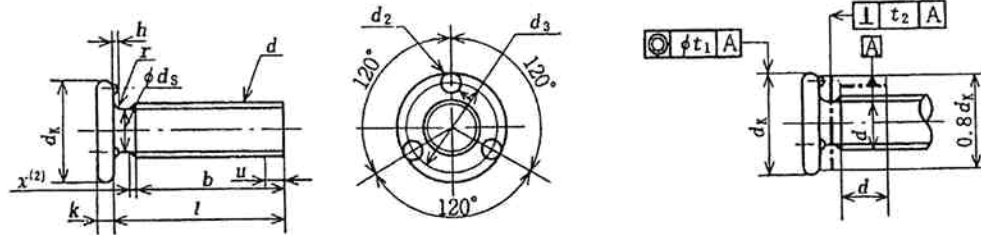
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Appendix Attached Table 1 Round Weld Bolts (As Rolled End)



(Unit: mm)

Type indication number		92611		
Thread size (d)		M5	M6	M8
Pitch (P)		0.8	1.0	1.25
ϕd_s	Basic dimension	4.48	5.35	7.20
	Tolerance	0 -0.15	0 -0.20	
d_k	Basic dimension	12.5	14.5	18.5
	Tolerance		± 0.4	
k	Basic dimension	1.8	2.0	2.5
	Tolerance		± 0.2	
d_2	Basic dimension	2.0	2.5	3.0
	Tolerance		± 0.25	
h	Basic dimension	0.8	1.0	
	Tolerance		± 0.1	
d_3	Basic dimension	9.5	11.0	14.5
	Tolerance		0 -0.5	
r	Max.	0.6	0.7	0.9
	Min.	0.3		0.4

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Appendix Attached Table 1 (Continued) (Unit: mm)

Type indication number		92611			
Thread size (d)		M5	M6	M8	
b	Basic dimension	16	18	22	
	Tolerance	+2P 0			
u	Max.	2P			
	ϕt_1	0.3		0.4	
Hole diameter of steel sheet (reference)	t_2	0.22	0.25	0.32	
	Basic dimension	6	7	9	
l	Tolerance	+0.3 0			
	Basic dimension	10	---		
	Basic dimension	12			
		14			
		---	16		
		20			
		---		22	
		---	25		
		---		28	
		---			30
		---			35
		---			40
---			45		
Tolerance		± 0.5			

Remark 1:
 Note (2) is given after Appendix Attached Table 8.
 Remark 2:
 Noteless numbers shall conform to TSB1300G.
 Remark 3:
 Symbol u indicates the length of incomplete thread at the tip.

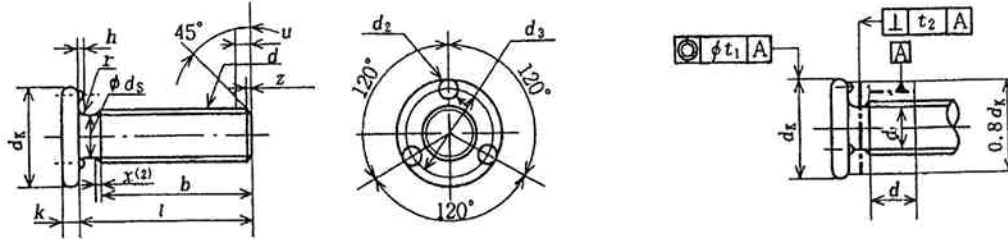
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Appendix Attached Table 2 Round Weld Bolts (Chamfered End)



(Unit: mm)

Type indication number		92612		
Thread size (d)		M6	M8	M10
Pitch (P)		1.0	1.25	
ϕd_s	Basic dimension	5.35	7.20	9.20
	Tolerance		0 -0.20	
d_k	Basic dimension	14.5	18.5	21.5
	Tolerance		± 0.4	
k	Basic dimension	2.0	2.5	3.5
	Tolerance		± 0.2	
d_2	Basic dimension	2.5	3.0	3.5
	Tolerance		± 0.25	
h	Basic dimension	1.0		1.2
	Tolerance		± 0.1	
d_3	Basic dimension	11.0	14.5	17.0
	Tolerance		0 -0.5	
z	Approx.	1.0	1.2	1.5
r	Max.	0.7	0.9	1.2
	Min.	0.3	0.4	0.5

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Appendix Attached Table 2 (Continued) (Unit: mm)

Type indication number		92612			
Thread size (d)		M6	M8	M10	
b	Basic dimension	18	22	26	
	Tolerance	+2P 0			
u	Max.	2P			
ϕt_1		0.3	0.4		
t_2		0.25	0.32	0.38	
Hole diameter of steel sheet (reference)	Basic dimension	7	9	11	
	Tolerance	+0.3 0			
l	Basic dimension	12	---		
		14	---		
		16			---
		18	---		
		20			
		25			
		---			28
		---	35	---	
		---	45	---	
		Tolerance		± 0.5	

Remark 1:

Note (2) is given after Appendix Attached Table 8.

Remark 2:

Noteless numbers shall conform to TSB1300G.

Remark 3:

Symbol u indicates the length of incomplete thread at the tip.

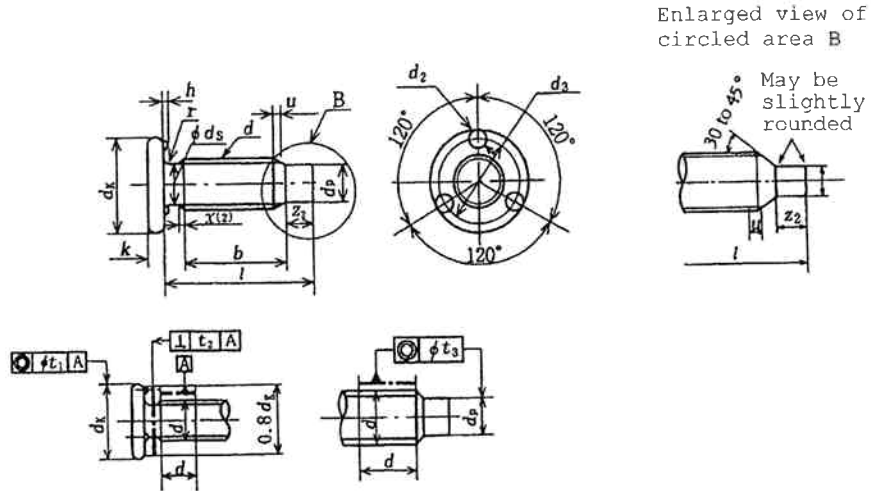
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Appendix Attached Table 3 Round Weld Bolts (Full Dog Point)



(Unit: mm)

Type indication number		92613			
Thread size (d)		M5	M6	M8	M10
Pitch (P)		0.8	1.0	1.25	
ϕd_s	Basic dimension	4.48	5.35	7.20	9.20
	Tolerance	0 -0.15		0 -0.20	
d_k	Basic dimension	12.5	14.5	18.5	21.5
	Tolerance	± 0.4			
k	Basic dimension	1.8	2.0	2.5	3.5
	Tolerance	± 0.2			
d_2	Basic dimension	2.0	2.5	3.0	3.5
	Tolerance	± 0.25			

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Appendix Attached Table 3 (Continued) (Unit: mm)

Type indication number		92613			
Thread size (d)		M5	M6	M8	M10
h	Basic dimension	0.8		1.0	1.2
	Tolerance	±0.1			
d ₃	Basic dimension	9.5	11.0	14.5	17.0
	Tolerance	0 -0.5			
r	Max.	0.6	0.7	0.9	1.2
	Min.	0.3 0.4 0.5			
b	Basic dimension	16	18	22	26
	Tolerance	+2P 0			
d _p	Basic dimension	3.9	4.6	6.3	8.3
	Tolerance	0 -0.4			
z ₂	Approx.	2.5	3	4	5
u	Max.	2P			
	φ t ₁	0.3		0.4	
	t ₂	0.22	0.25	0.32	0.38
	φ t ₃	0.3		0.4	
Hole diameter of steel sheet (reference)	Basic dimension	6	7	9	11
	Tolerance	+0.3 0			
l	Basic dimension	---	12	---	
			14		
		---		16	---
				18	
				20	
					22
		---			25
					28
		---			30
					35
					40
	Tolerance	±0.5			

Remark 1:
 Note (2) is given after Appendix Attached Table 8.
 Remark 2:
 Noteless numbers shall conform to TSB1300G.
 Remark 3:
 Symbol u indicates the length of incomplete thread at the tip.

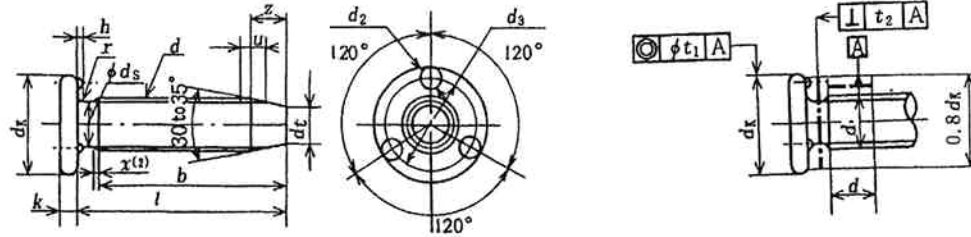
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Appendix Attached Table 4 Round Weld Bolts (Cone Point)



(Unit: mm)

Type indication number		92615			
Thread size (d)		M4	M5	M6	M8
Pitch (P)		0.7	0.8	1.0	1.25
ϕd_s	Basic dimension	3.55	4.48	5.35	7.20
	Tolerance	0 -0.15		0 -0.20	
d_k	Basic dimension	10.5	12.5	14.5	18.5
	Tolerance	± 0.4			
k	Basic dimension	1.3	1.8	2.0	2.5
	Tolerance	± 0.2			
d_2	Basic dimension	1.5	2.0	2.5	3.0
	Tolerance	± 0.25			
h	Basic dimension	0.8		1.0	
	Tolerance	± 0.1			
d_3	Basic dimension	8	9.5	11.0	14.5
	Tolerance	0 -0.5			
d_t	Max.	3.0	3.5	4	5
	Min.	2.6	3.0	3.2	4.2
z	Approx.	2	3	4.7	5.4

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Appendix Attached Table 4 (Continued) (Unit: mm)

Type indication number		92615				
Thread size (d)		M4	M5	M6	M8	
u	Max.	2P				
r	Max.	0.5	0.6	0.7	0.9	
	Min.	0.3			0.4	
b	Basic dimension	16	20	24	28	
	Tolerance	+2P 0				
ϕt_1		0.3			0.4	
t_2		0.18	0.22	0.25	0.32	
Hole diameter of steel sheet (reference)	Basic dimension	5	6	7	9	
	Tolerance	+0.3 0				
l	Basic dimension	12			---	
		---	14		---	
		16			---	
		---			18	---
		---			20	---
		---			22	---
		---			25	---
		---			28	---
		---			30	---
		---			32	
---			35			
Tolerance		± 0.5				

- Remark 1:
- Note (2) is given after Appendix Attached Table 8.
- Remark 2:
- Noteless numbers shall conform to TSB1300G.
- Remark 3:
- Symbol u indicates the length of incomplete thread at the tip.

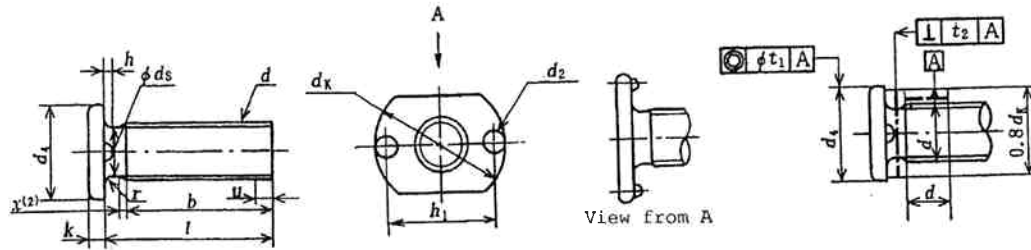
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Appendix Attached Table 5 T-Shaped Weld Bolts (As Rolled End)



(Unit: mm)

Type indication number		92621		
Thread size (d)		M5	M6	M8
Pitch (P)		0.8	1.0	1.25
ϕd_s	Basic dimension	4.48	5.35	7.20
	Tolerance	0 -0.15	0 -0.20	
d_1	Basic dimension	7	8	10
	Tolerance		± 0.3	
k	Basic dimension	1.8	2.0	2.5
	Tolerance		± 0.2	
d_2	Basic dimension	2.0	2.5	3.0
	Tolerance		± 0.25	
h	Basic dimension	0.8	1.0	
	Tolerance		± 0.1	
d_k	Basic dimension	12.5	14.5	18.5
	Tolerance		± 0.4	
h_1	Basic dimension	9.5	11.0	14.5
	Tolerance		0 -0.5	
r	Max.	0.6	0.7	0.9
	Min.		0.3	0.4

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Appendix Attached Table 5 (Continued) (Unit: mm)

Type indication number		92621			
Thread size (d)		M5	M6	M8	
b	Basic dimension	16	18	22	
	Tolerance	+2P 0			
u	Max.	2P			
ϕt_1		0.3		0.4	
t_2		0.22	0.25	0.32	
Hole diameter of steel sheet (reference)	Basic dimension	6	7	9	
	Tolerance	+0.3 0			
l	Basic dimension	12		---	
		---	14		
		---			16
		---			18
		---			20
	---			25	
Tolerance		± 0.5			

Remark 1:

Note (2) is given after Appendix Attached Table 8.

Remark 2:

Noteless numbers shall conform to TSB1300G.

Remark 3:

Symbol u indicates the length of incomplete thread at the tip.

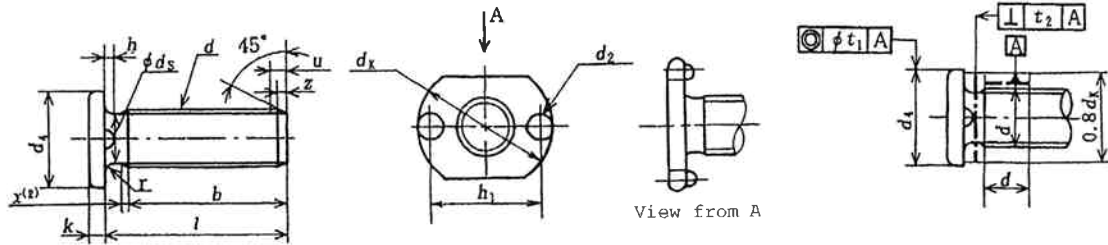
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Appendix Attached Table 6 T-Shaped Weld Bolts (Chamfered End)



(Unit: mm)

Type indication number		92622	
Thread size (d)		M6	M10
Pitch (P)		1.0	1.25
ϕd_3	Basic dimension	5.35	9.20
	Tolerance	0 -0.20	
d_4	Basic dimension	8	12
	Tolerance	± 0.3	
k	Basic dimension	2.0	3.5
	Tolerance	± 0.2	
d_2	Basic dimension	2.5	3.5
	Tolerance	± 0.25	
h	Basic dimension	1.0	1.2
	Tolerance	± 0.1	
d_k	Basic dimension	14.5	21.5
	Tolerance	± 0.4	
h_1	Basic dimension	11.0	17.0
	Tolerance	0 -0.5	
z	Approx.	1.0	1.5
r	Max.	0.7	1.2
	Min.	0.3	0.5

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Appendix Attached Table 6 (Continued) (Unit: mm)

Type indication number		92622	
Thread size (d)		M6	M10
b	Basic dimension	18	26
	Tolerance	+2P 0	
u	Max.	2P	
ϕt_1		0.3	0.4
t_2		0.25	0.38
Hole diameter of steel sheet (reference)	Basic dimension	7	11
	Tolerance	+0.3 0	
l	Basic dimension	12	---
		16	
		---	25
			30
	Tolerance	± 0.5	

- Remark 1:
 Note (2) is given after Appendix Attached Table 8.
 Remark 2:
 Noteless numbers shall conform to TSB1300G.
 Remark 3:
 Symbol u indicates the length of incomplete thread at the tip.

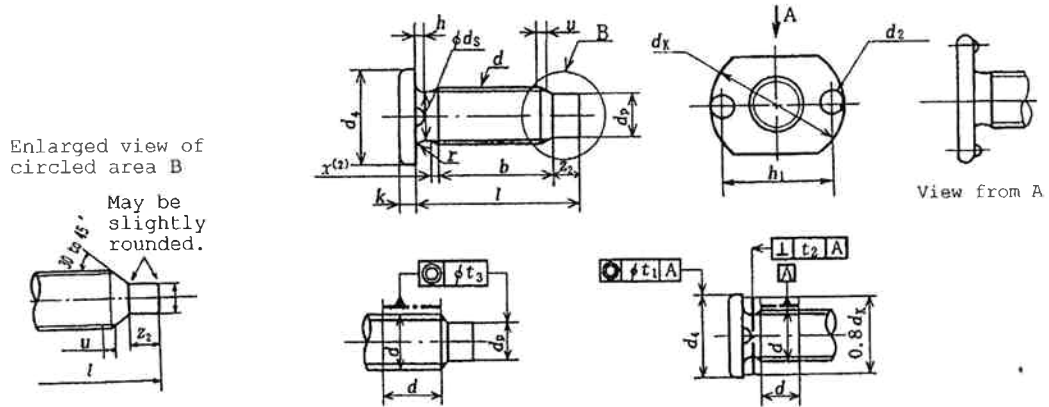
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Appendix Attached Table 7 T-Shaped Weld Bolts (Full Dog Point)



(Unit: mm)

Type indication number		92623		
Thread size (d)		M5	M6	M10
Pitch (P)		0.8	1.0	1.25
φ ds	Basic dimension	4.48	5.35	9.20
	Tolerance	0 -0.15	0 -0.20	
d4	Basic dimension	7	8	12
	Tolerance		±0.3	
k	Basic dimension	1.8	2.0	3.5
	Tolerance		±0.2	
d2	Basic dimension	2.0	2.5	3.5
	Tolerance		±0.25	

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Appendix Attached Table 7 (Continued) (Unit: mm)

Type indication number		92623		
Thread size (d)		M5	M6	M10
h	Basic dimension	0.8	1.0	1.2
	Tolerance	±0.1		
d _k	Basic dimension	12.5	14.5	21.5
	Tolerance	±0.4		
h ₁	Basic dimension	9.5	11.0	17.0
	Tolerance	0 -0.5		
r	Max.	0.6	0.7	1.2
	Min.	0.3		
b	Basic dimension	16	18	26
	Tolerance	+2P 0		
d _p	Basic dimension	3.9	4.6	8.3
	Tolerance	0 -0.4		
z ₂	Approx.	2.5	3	5
u	Max.	2P		
	φ t ₁	0.3		0.4
	t ₂	0.22	0.25	0.38
	φ t ₃	0.3		0.4
Hole diameter of steel sheet (reference)	Basic dimension	6	7	11
	Tolerance	+0.3 0		
l	Basic dimension	10	---	
		---	16	---
			18	
			20	
			25	
	Tolerance	---		
			32	
	Tolerance	±0.5		

Remark 1:

Note (2) is given after Appendix Attached Table 8.

Remark 2:

Noteless numbers shall conform to TSB1300G.

Remark 3:

Symbol u indicates the length of incomplete thread at the tip.

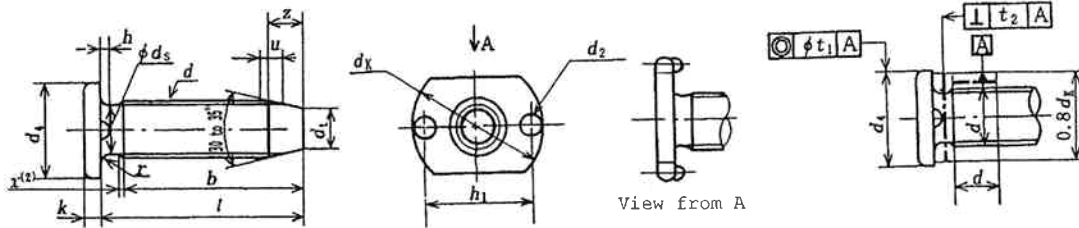
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Appendix Attached Table 8 T-Shaped Weld Bolts (Cone Point)



(Unit: mm)

Type indication number		92625	
Thread size (d)		M6	M8
Pitch (P)		1.0	1.25
ϕd_s	Basic dimension	5.35	7.20
	Tolerance	0 -0.20	
d_4	Basic dimension	8	10
	Tolerance	± 0.3	
k	Basic dimension	2.0	2.5
	Tolerance	± 0.2	
d_2	Basic dimension	2.5	3.0
	Tolerance	± 0.25	
h	Basic dimension	1.0	
	Tolerance	± 0.1	
d_k	Basic dimension	14.5	18.5
	Tolerance	± 0.4	
h_1	Basic dimension	11.0	14.5
	Tolerance	0 -0.5	
d_t	Max.	4	5
	Min.	3.2	4.2
z	Approx.	4.7	5.4
u	Max.	2P	
r	Max.	0.7	0.9
	Min.	0.3	0.4

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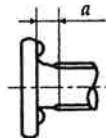
TSB1304G

Appendix Attached Table 8 (Continued) (Unit: mm)

Type indication number		92625	
Thread size (d)		M6	M8
b	Basic dimension	24	28
	Tolerance	+2P 0	
ϕt_1		0.3	0.4
t_2		0.25	0.32
Hole diameter of steel sheet (reference)	Basic dimension	7	9
	Tolerance	+0.3 0	
l	Basic dimension	12	---
		14	
		16	
		20	
		25	
		30	---
	35		
Tolerance	±0.5		

Note:(2)

"x" represents the length of the incomplete thread and should not exceed the length of two pitches. When " $x+b \geq l$ " for as rolled end, chamfered end and cone point, and " $x+b+z_2 \geq l$ " for full dog point, the bolt shall have the complete thread. In this case, the dimension from the bearing surface of the bolt to the complete thread (a) shall not exceed the length of four pitches.



Appendix Fig. 1

Remark 1:

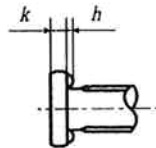
Noteless numbers shall conform to TSB1300G.

Remark 2:

Symbol u indicates the length of incomplete thread at the tip.

Remark 3:

The variation in the height of the head of a bolt including the welding point (k+h) shall not exceed 0.15 mm. The side of the head may be rounded during cold forging provided that the projections are not deformed.



Appendix Fig. 2

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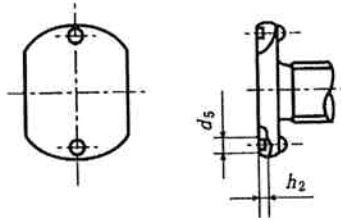
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Remark 4:

The head of round and T-shaped weld bolts may be provided with depressions for forming the projections. The shape and dimensions of the depressions shall conform to and Appendix Fig. 3.

Example:



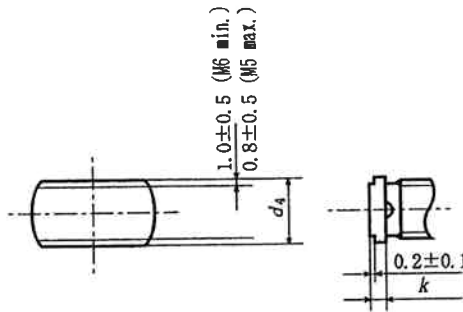
(Unit: mm)

Thread size		M4	M5	M6	M8	M10
d_5	Basic dimension	0.7	1	1.2	1.5	1.7
	Tolerance	± 0.2				
h_2	Basic dimension	0.6	0.8		1.2	1.5
	Tolerance	± 0.2				

Appendix Fig. 3

Remark 5:

The head of T-shaped weld bolts with nominal diameters may have the shape and dimensions as shown in Appendix Fig. 4:



Appendix Fig. 4

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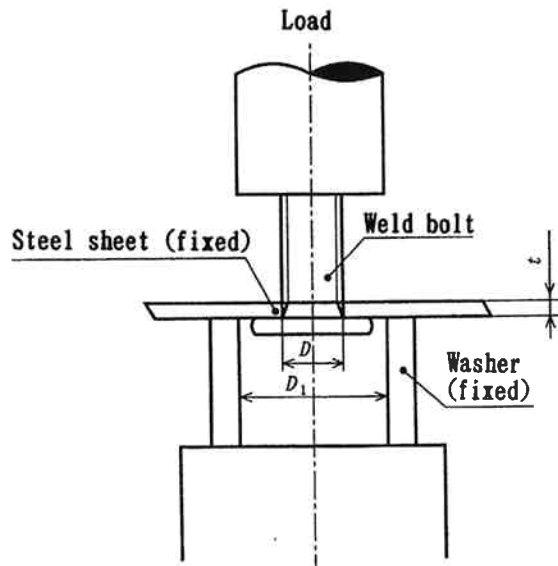
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Reference: Peel test

The peel test is conducted to measure the load required to peel the bolt welded to a steel sheet by applying a load in a direction as parallel to the axis as possible, using a washer as illustrated in Appendix Fig. 5. When the measurement is impossible because the steel sheet bends remarkably before the bolt peels off, use a steel sheet having a thickness (t) that is 0.2 to 0.3 mm thicker. Appendix Table 4 shows the weld strength of bolts as measured by this method for reference.

Appendix Table 4 (Reference) (Unit: N)

Thread size (mm)	M4	M5	M6	M8	M10
Weld strength (Min.)	1470	3430	5390	8820	14700



(Unit: mm)

Thread size of bolt	Thickness of sheet used (t)	D_1
M4	1.2	14
M5	1.6	16
M6	2.3	18
M8		22
M10	3.2	26

Appendix Fig. 5

Remark:

For the hole diameter of the sheet used (D), use the values listed in Appendix Attached Tables 1 to 8.

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Appendix Attached Table 9

Thread size	Part number	6th digit of part number	Basic mass (g)	Mass tolerance	Thread size	Part number	6th digit of part number	Basic mass (g)	Mass tolerance	
M5	92611-□0510	1	3.2	MB	M5	92613-□0514	0	3.1	MB	
	92611-□0512	0, 1	3.5			92613-□0612	1	4.3		
	92611-□0514	1	3.7			92613-□0614	0, 1	4.7		
M6	92611-□0610	0, 1	4.3		M6	92613-□0616	0, 1	5.0		
	92611-□0612	0, 1	4.6			92613-□0618	0	5.4		
	92611-□0614	0, 1	5.0			92613-□0620	0, 1	5.7		
	92611-□0616	0, 1	5.3			92613-□0625	0	6.5		
	92611-□0618	0	5.5			92613-□0630	0	7.3		
	92611-□0620	0, 1	5.9			92613-□0635	0	8.1		
	92611-□0625	0	6.7			92613-□0816	0	9.7		
	92611-□0628	0	7.2			92613-□0818	0, 1	10.3		
	92611-□0812	0, 1	8.9			92613-□0820	0	10.9		
M8	92611-□0814	0, 1	9.5		M8	92613-□0822	0	11.5		
	92611-□0816	0, 1	10.1			92613-□0825	0	12.5		
	92611-□0818	0	10.8			92613-□0828	1	13.4		
	92611-□0820	0, 1	11.4			92613-□0830	0	14.0		
	92611-□0822	0, 1	12.1			92613-□0835	0	15.6		
	92611-□0825	0, 1	12.9			92613-□0840	0	17.1		
	92611-□0830	0, 1	14.5			M10	92613-□1025	0		21.9
	92611-□0835	0	16.0			M4	92615-□0412	0		2.0
	92611-□0840	0	17.6			M5	92615-□0512	0		3.5
	92611-□0845	1	19.2				92615-□0514	0, 1		3.7
M6	92612-□0610	0	4.3		M6	92615-□0516	1	3.9		
	92612-□0612	0, 1	4.6			92615-□0612	0	4.6		
	92612-□0614	1	5.0			92615-□0614	0, 1	5.0		
	92612-□0616	0, 1	5.3			92615-□0616	0, 1	5.3		
	92612-□0618	0	5.5			92615-□0618	0	5.5		
	92612-□0620	0	5.9			92615-□0620	0, 1	5.9		
M8	92612-□0625	0	6.7		M8	92615-□0622	0	6.2		
	92612-□0816	0, 1	10.1			92615-□0625	0	6.6		
	92612-□0820	0, 1	11.4			92615-□0628	0	7.2		
	92612-□0825	1	12.9			92615-□0630	0	7.6		
	92612-□0835	0	16.0			92615-□0635	0	8.5		
M10	92612-□0845	0	19.2	M8	92615-□0630	0	8.5			
	92612-□1016	0, 1	18.0		92615-□0816	0	10.0			
	92612-□1020	0, 1	20.0		92615-□0818	1	10.6			
	92612-□1025	0, 1	22.6		92615-□0820	0, 1	11.2			
	92612-□1028	1	24.1		92615-□0822	0	11.9			
	92612-□1030	0	25.2		92615-□0825	0, 1	12.7			
					92615-□0830	0	14.3			
					92615-□0832	0	15.0			
				92615-□0835	0	15.8				
				92615-□0840	1	17.3				

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Appendix Attached Table 10

Thread size	Part number	6th digit of part number	Basic mass (g)	Mass tolerance	Thread size	Part number	6th digit of part number	Basic mass (g)	Mass tolerance	
M5	92621-□0512	0	3.3	MB	M5	92623-□0510	0	2.2	MB	
	92621-□0610	1	3.7		M5	92623-□0616	0	4.2		
M6	92621-□0612	0	4.0		M6	92623-□0618	0	4.6		
	92621-□0614	1	4.4		M6	92623-□0620	0	4.9		
	92621-□0616	0, 1	4.7		M6	92623-□0625	0	5.7		
	92621-□0814	0, 1	7.9		M10	92623-□1025	0	18.0		
M8	92621-□0816	1	8.5		M10	92623-□1032	0	22.4		
	92621-□0818	0	9.2		M6	92625-□0612	0	4.6		
	92621-□0820	1	9.8		M6	92625-□0614	0	5.0		
	92621-□0825	0	11.3		M6	92625-□0616	0, 1	5.3		
M6	92622-□0612	1	4.0		M6	92625-□0620	0, 1	5.9		
	92622-□0616	1	4.7		M6	92625-□0625	0	6.6		
M10	92622-□1016	1	15.4		M6	92625-□0630	0	7.6		
	92622-□1025	0, 1	20.0		M6	92625-□0635	0	8.5		
	92622-□1030	0	22.6		M8	92625-□0820	0	11.2		
					M8	92625-□0825	0	12.7		

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