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1. Scope of Application

This specification shall specify the 6-lobe socket round head small screw (Hereinafter “TORX”) and the washer assembled small screw used to cars.

- Remarks :** 1. TORX is registered as Camcan Dio.’s trademark of Textron Co., America, and made under their technical license.
2. In this standard, the washer assembled small screw is specified as “Small screw” and the washer assembled to the small screw is called as “washer”.
3. If there are contradictions between this standard and KES C-C001, follow this standard.

2. Definition of Terms

The definition of the main terms used in this standard is same with the followings.

- (1) TORX : TORX is specified that the torque transferring part is formed of 6-lobe like Figure 1.
- (2) Type T : The Type T is a kind of the socket head TORX. (Refer to Appendix 1.)
- Reference : The unified shaft TORX is called as Type E.
- (3) Drive Size : The drive size is the designation to express the size of the Type T TORX.

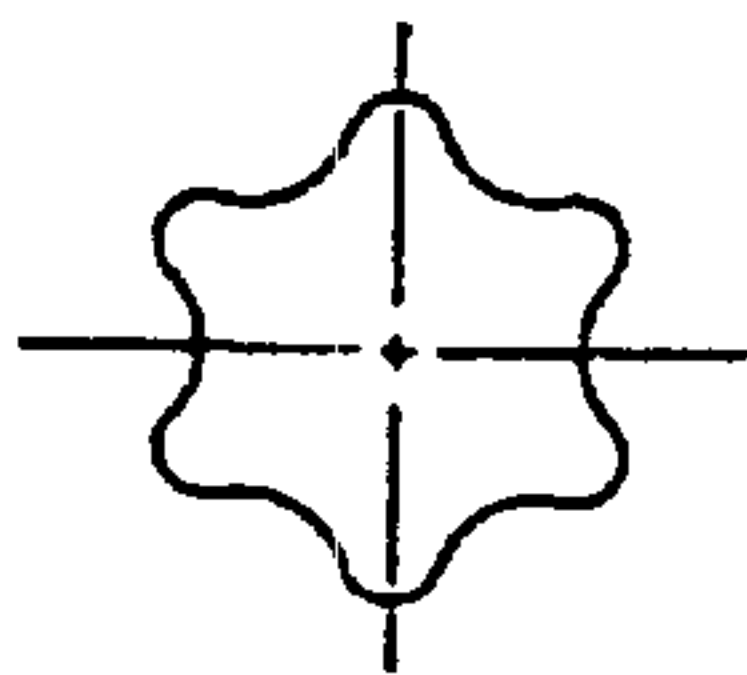


Figure 1. Shape of TORX

3. Type and Type Number

- 3.1 The types of small screws and washer assembled small screws shall be same with Table 1.
- 3.2 Composition of Type Number

The composition of type number for the small screws and the washer assembled small screw shall be same with the prescription in Figure 2.

- (1) Type I : Basic type number

Basic type number (5 figures)

- (2) Type II : Derivative type number

Simple number (3 figures)	Additional number (2 figures)
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3.3 Basic Type Number

When the standard surface treatment (Hereinafter “standard treatment”) specified in the clause 11.1 is designated about the small screw and the washer assembled small screw, the basic type number expressed in Table 1 shall be used. The standard treatment shall be changed by adding the supplementary number shown specifically in KES A-A006 (Numbering Method of Standard Parts) after 10 figures of the part number.

3.4 Derivative Type Number

The derivative type numbers are shown specifically in the clause 11.1 and shall be followed the surface treatment instruction specified in the appended table of KES A-A006 except for the surface treatment marked by the complementary number.

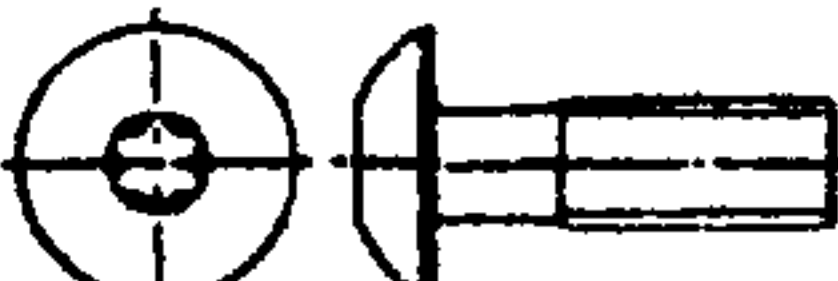
3.4.1 Simple Number

The simple number is the number reduced in 3 figures from the basic type number and the relation with the basic type number shall be followed Table 1.

3.4.2 Additional Number

The additional number is composed of 2 figures and used when carrying out the surface treatment except for the standard surface treatment. The composition of the additional number and the surface treatment shall be followed KES A-A006.

Table 1

Strength classification	Type No. (Simple No.)	Washer		Head shape and end shape	Shape	Size of Applied Screw		Appended Table
		Teeth having washer	Parallel washer			M6 x 1.0	M8 x 1.25	
4.8	99441 (9CZ)			Round head, rough end				1
	90442 (9CY)			Flange pan head, taper end				2
8.8	99443			Round head, rough end				3
	90440	O		Flat head, taper end			O	4

Note : The circle (O) in the blank of “Size of Applied Screw” indicate that the part is authorized as a standard part.

4. Mechanical Property

4.1 Small Screw

The mechanical properties of the small screw shall be same with Table 2.

Table 2

Test Items					Strength Classification	
					4.8	8.8
Tensile strength * ¹	Product	Tensile strength	N/mm ² (kgf/mm ²)	Minimum	392 (40)	784 (80)
Yield point or endurance strength * ²		Wedge tensile strength			314 (32)	628 (64)
		Both ends measuring				
Hardness	Hardness	Vickers hardness	HV	Minimum	106	243
				Maximum	220	320
		Rockwell hardness * ³	HRB	Minimum	62	—
				Maximum	95	—
			HRC	Minimum	—	21
				Maximum	—	32
	Surface hardness	Vickers hardness * ⁴	HV	—	—	350 * ⁵
	Head Impact Strength				—	Crack shall not take place at the neck between the head and the body. * ⁶
Decarbonization of thread part * ⁷	Height of non-decarbonized part (E)			Minimum	—	1/2H1
	Depth of ferrite carbonized layer (G)			Maximum	—	0.015

Note : The tensile strength shall be applicable to the mail screws whose nominal diameter is over than 2.5d. The minimum value of the hardness shall be applicable to the small screws whose nominal diameter is less than 2.5d.

^{*1} : The crack of products may happen on the screw part or the body. But, the crack shall not happen on the neck between the head and the body. Refer to “a” and “b” of Figure 2.

^{*2} : If clear, the yield point shall follow itself. If not clear, measure the endurance strength at 0.2 % of permanent strain.

^{*3} : Mark the Rockwell Hardness as reference of schedule control.

^{*4} : The surface hardness may be measured by changing as HR30-N according to SAE J 417.

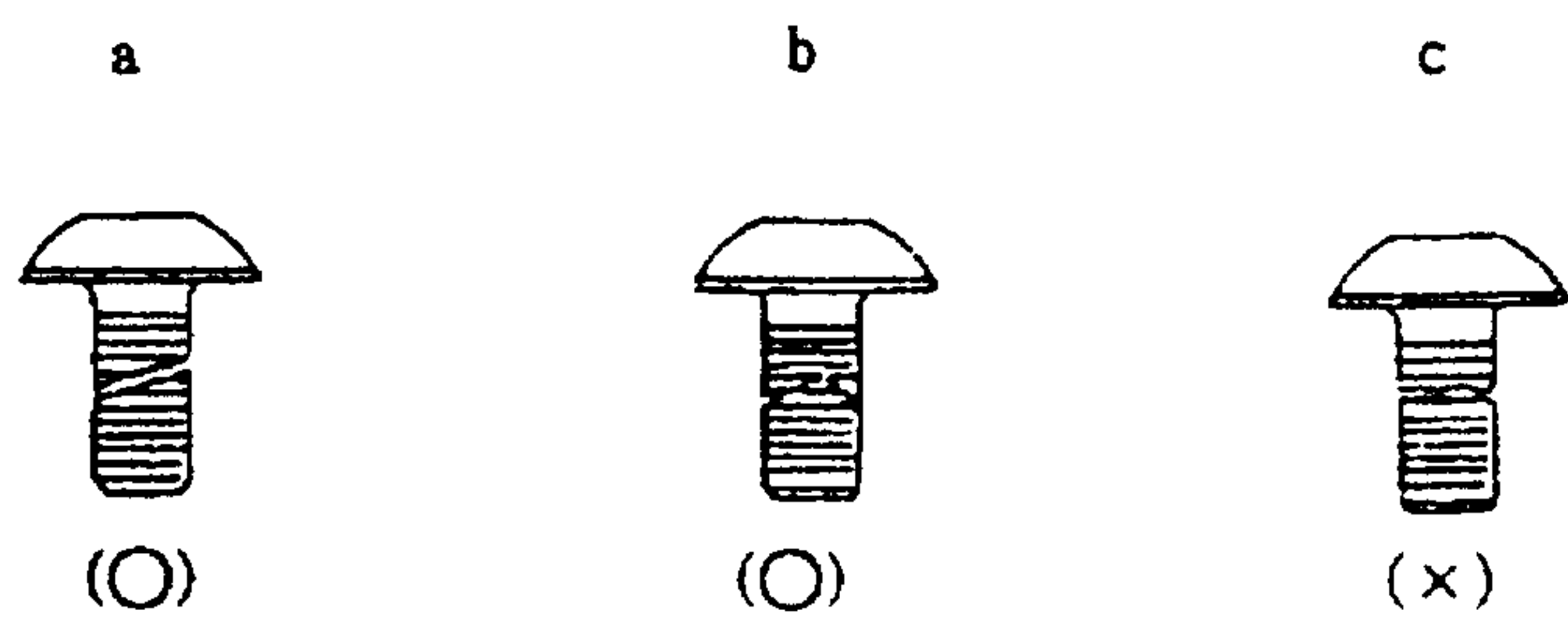


Figure 2

- *⁵ : About the surface hardness of the product whose strength classification is 8.8, the increase of the surface hardness compared to the inside hardness shall not excess HV30 when measuring the hardness at 2.94N (300g) of the test payload.
- *⁶ : In case of complete screw, crack may happen on the end of the first thread from the head as long as the head part is not cracked.
- *⁷ : About H1, E and G of thread part, refer to Figure 3. The value of H1 and E (Minimum) shall be same with Figure 3. Heat treatment under cementation condition shall not be carried out because it is cause of lag crack. In case that heat treatment is obliged to carry out, the condition in *⁵ shall be satisfied.

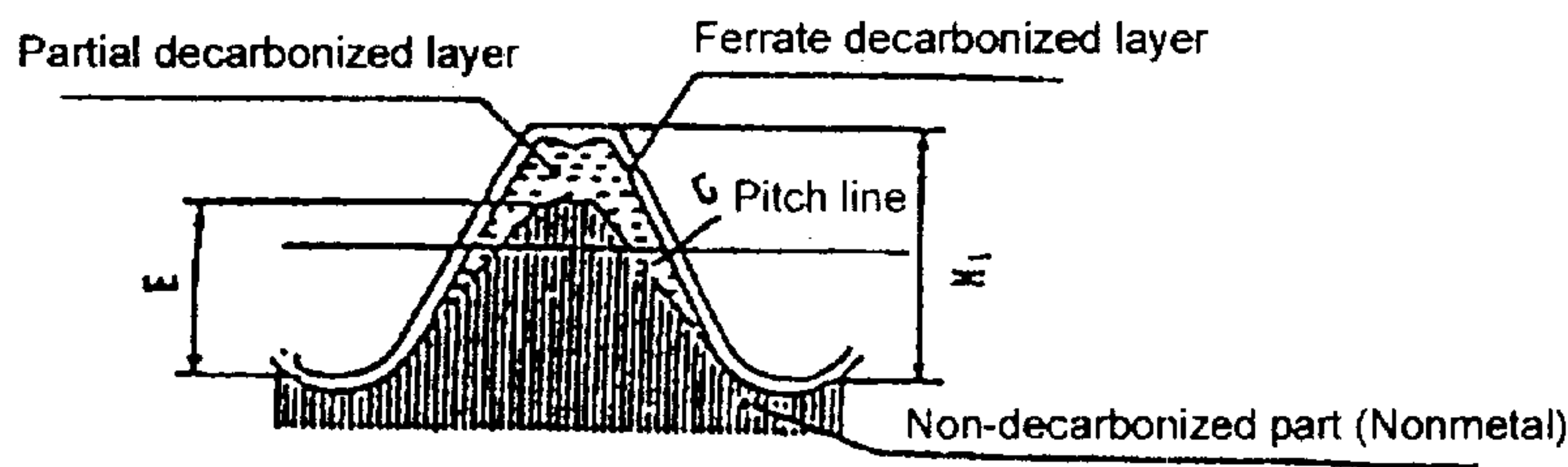


Figure 3

H1: Height of thread at maximum main body of mail screw

Table 3

Pitch of screw (P)		1.25
H1		0.767
E (Minimum)	Strength classification : 8.8	0.384

4.2 Washer

The mechanical properties of washer shall follow Table 4.

Table 4

Mechanical properties	Classification of Washer	
	Parallel washer	Lock Washer
Hardness	Not specified	HRC 40 ~ 50
Function of spring	—	When tested according to the specification of the clause 14.1 (1), the free height shall be over 5/6 of the free height before compression.
Toughness	—	When tested according to the specification of the clause 14.1 (1), it shall not be destructed.

5. Shape and Dimension

5.1 Shape and Basic Dimension of TORX

The shape and dimension of TORX shall be according to Appendix and the gauge penetrating depth of Type T shall be according to Appended Table 1 ~ Appended Table 4.

5.2 Shape and Dimension of Small Screw except for TORX

The shape and dimension of small screw except for TORX shall be according to Appended Table 1 ~ 4.

5.3 Shape and Dimension of Washer

The shape and dimension of washer shall be according to Appended Table 5.

6. Thread

The thread of the small screw and the washer assembled small screw shall be according to Table 5.

Table 5

Classification of Thread	Limit of Dimension and Tolerance	
	Before Plating	After Plating
Metric Normal Screw specified in KS B 0201	6g or 2 nd Grade specified in KS B 0211	4h or 1 st Grade (Maximum) specified in KS B 0211

7. Matching of Nominal Diameter and Drive Size

The matching of the nominal diameter and the drive size shall be according to Table 6.

Table 6

Nominal Diameter	6	8
Drive Size	T30	T40

8. Geometrical Tolerance

The geometrical tolerance of the small screw and washer assembled small screw shall be according to Appended Table 6.

9. Surface Condition

The surface condition of the small screw and washer assembled small screw shall be same with the below (1) ~ (4). The toughness of surface shall be same with the standard specified in the clause 12.

(1) The tolerance of surface intermittence shall be same with Table 7.

Table 7

Intermittence of surface	Tolerance
Tempering crack	The tempering crack of depth, length, width or location shall not be allowable in any case.
Forging crack	(a) The crack happened on the surface at the end of small screw, the crack whose length is less than 1d and the crack whose width and depth is less than 0.2 mm + 0.1d may be allowable. (Refer to Figure 4) (b) In case of upset bolt, the crack happened around the head whose length is less than 0 or width is less than 0.3 mm + 0.02d may be allowable. (c) The crack whose length is less than 1/2 of the length from the sunken-in part to the end shall be allowable. (Refer to Figure 4)
Intermittence of width	(a) The intermittence happened on threaded part and the under head fillet shall be allowable. (b) The intermittence whose body depth is less than 0.15 mm in case that the nominal diameter is less than 12 mm and test result is satisfied with the specified minimum tensile strength shall be allowable.

Table 7 (Continued)

Intermittence of Surface	Tolerance						
Seam crack	(a) In case that the nominal diameter is less than 8 mm, the seam less than 0.08 mm between the thread and the under head fillet shall be allowable. (b) About the seam of the body, the followings may be allowable. Unit : mm <table><tr><td>Nominal diameter</td><td>6 ~ 12</td></tr><tr><td>Width (Maximum)</td><td>0.15</td></tr><tr><td>Depth (Minimum)</td><td>0.1+0.015d</td></tr></table> The crack of the small screw shown in the followings may be allowable. (a) The crack whose width and depth is less than 0.3 mm + 0.025d, and not reaching to the bearing surface. (Refer to Figure 4) (b) In case of flange small screw, the crack whose width is less than 0.15 mm + 0.02dc and depth is less than 0.1 mm + 0.012dc may be allowable.	Nominal diameter	6 ~ 12	Width (Maximum)	0.15	Depth (Minimum)	0.1+0.015d
Nominal diameter	6 ~ 12						
Width (Maximum)	0.15						
Depth (Minimum)	0.1+0.015d						
Scratch	(a) The scratch on part except for the thread part shall be allowable. (b) The scratch at thread part satisfied with the screw ring passing gauge under 5.88d N.cm (0.6d kgf.cm) of torque may be allowable. (Example) In case of M8, 5.88 x 8 = 47.0N.cm (5kgf.cm)						

- Note :** 1. The meaning of the surface intermittence shall be according to KS B 0101.
2. The symbol d in the above table express the nominal diameter of the small screw and the washer assembled small screw, dc indicates the flange diameter of the flange small screw.

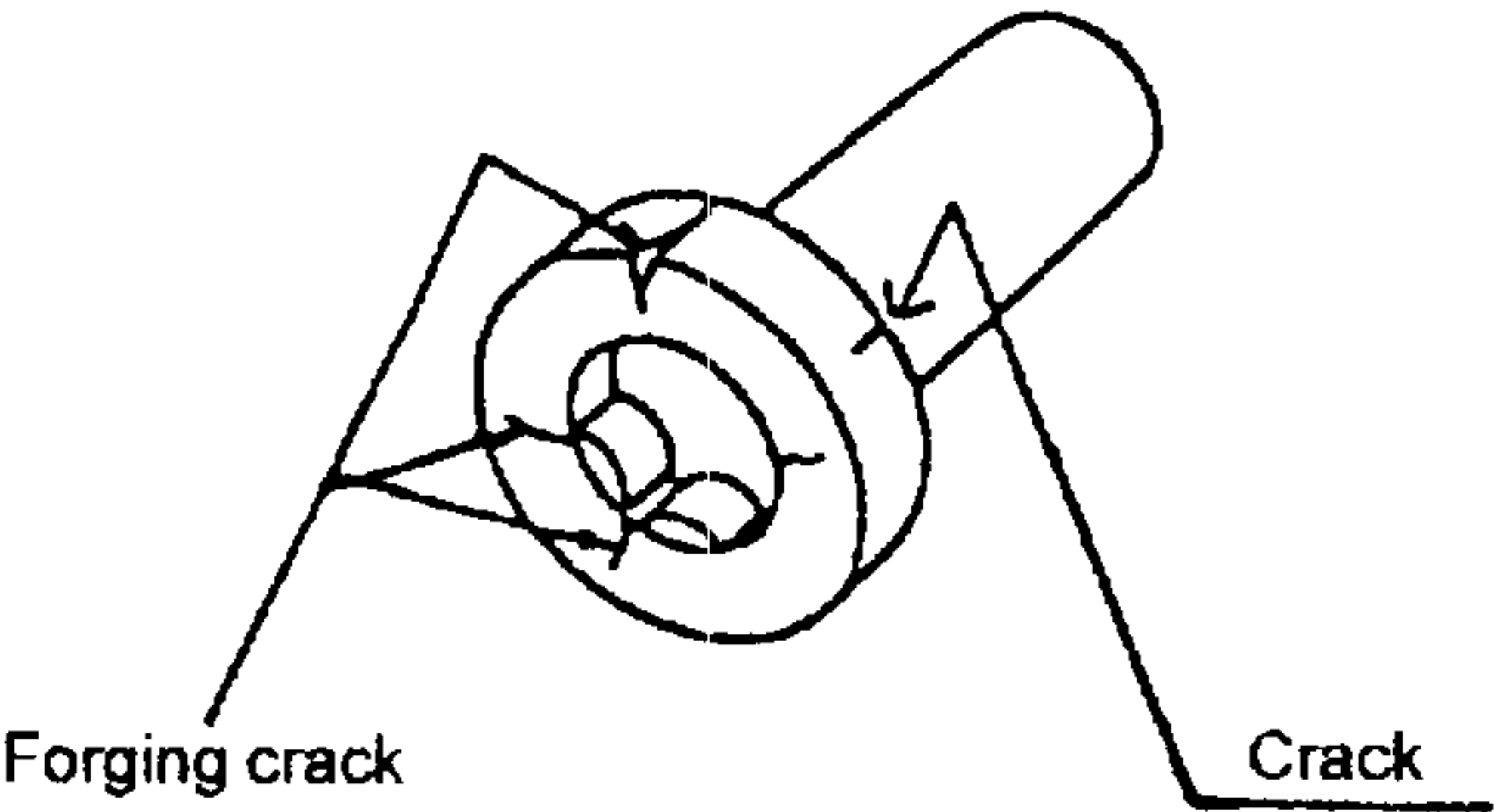


Figure 4

- (2) The washer assembled to the small screw shall swivel freely and shall not disassemble easily from the thread part of the small screw. There shall not be harmful interference between the inside diameter of the washer and the underhead fillet of the small screw, that have bad effect on maintenance.
- (3) There shall not be harmful defect on the surface of the small screw, that have bad effect on maintenance ,like extrusion, processing trace, rough surface or rust.
- (4) The surface of the washer shall be smooth and shall not have forging crack or harmful defect that have bad effect on maintenance, like excessive scratch, processing trace, rough surface or rust.

10. Material Heat Treatment

10.1 Small Screw

The material and the heat treatment for the small screw shall be generally according to Table 8.

Table 8

Strength classification	Material		Heat treatment
	Symbol	Applied standard	
4.8	SWRM10	KS D 3554	—
	S10C, S12C	KS D 3752	
	SWCH8R ~ SWCH17R SWCH8A ~ SWCH20A SWCH10K ~ SWCH20K	KS D3697	
8.8	SWCH38K ~ SWCH38A Equivalent		Quenching and tempering ^{*8}
	S43C	KS D 3752	
	SWCH45K	KS D3697	
	S45C	KS D 3752	
	TSMnB125HX	KES B-B029	Minimum tempering temperature : Over than 480°C ^{*8}

^{*8} : The material in this classification shall be about 90% of martensite composition under quenching condition before tempering or in the center part of the thread part.