

**INVOICE FOR ISSUE OF
TOYOTA ENGINEERING STANDARD**

NO. : TSZ2202G

TITLE : GENERAL DIMENSIONAL TOLERANCES FOR PARTS FORMED BY PRESS
WORKING FROM SHEET METAL

CLASS : **C**

PUBLICATION RECORD

This standard has been revised in consequence of the modification of terms and explanations in the Appendix 2 "General Dimensional Tolerances for Parts Formed by Press Working From Sheet Metal".

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Sales


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TOYOTA ENGINEERING STANDARD
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NOTE: In the case of revision, the old standard which has been issued before should be discarded in proper manner (such as shredding or fire) to avoid possible use of obsolete standards information.

	TOYOTA ENGINEERING STANDARD	TSZ2202G	CLASS C
<u>GENERAL DIMENSIONAL TOLERANCES FOR PARTS FORMED BY PRESS WORKING FROM SHEET METAL</u>			
<p>1. Scope</p> <p>This standard covers general dimensional tolerances, in three tolerance classes, applicable to punching, bending, deep drawing and hole diameter dimensions of parts press-formed from sheet metals. Although this standard applies to dimensions for which tolerances are not individually allocated, following instances are excluded from the scope.</p> <p>(1) Dimensions covered by other standards on general tolerances (for example, general tolerances for dimensions of machined parts)</p> <p>(2) Dimensions given for reference</p> <p>(3) Theoretically exact dimensions.</p> <p>If smaller tolerances are required or larger tolerances are permissible and more economical for any individual feature, such tolerances should be indicated directly following their basic sizes. In case general tolerances for other working process are specified in other standards, such tolerances shall be referred to on drawings or associated specifications. In such a case, however, the greater of the two shall apply. "Parts formed from sheet metal" referred to in this standard represents parts press-formed by either punching, bending or deep-drawing from sheet metal and do not include parts formed from metal plate by shearing. This standard may also be applied to punching dimensions of plastic sheets with workability and hardness equivalent to or better than those of metal plates.</p> <p>Remark 1: The general dimensional tolerances are applicable to dimensions shown on drawings and associated specifications, for which the function requires relatively small tolerances.</p> <p>Remark 2: General dimensional tolerances for machined parts are as specified in TSZ2207G.</p> <p>Remark 3: General tolerances for sheared sheet metal parts are as specified in TSZ2211G.</p>			
Prepared and Written by: Engineering Information Management Dept. Engineering Administration Div.		Engineering Administration Div. TOYOTA MOTOR CORPORATION Established/4 Revised: Dec.1999	

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2. Definitions

Definitions of terms referred to in this standard are as follows or as specified in TSZ1001G.

(1) Punching dimensions

Refers to the dimensions as punched out from sheet metals to the specified forms using stamping machines (dimensions "A" and "B" in Fig. 1).

(2) Hole diameter

Refers to the diameter of the round hole punched out by stamping machines (dimension "C" in Fig. 1).

(3) Pitch

Refers to the dimension, as punched out by stamping machines, representing the distance between centers of adjacent features designated as constituting one feature by the practical reason of functional requirements (dimensions "D" and "E" in Fig. 1).

(4) Bending dimensions

Refers to the dimensions of a sheet metal bent to the specified form by stamping machines (dimensions "H" and "J" in Fig. 1).

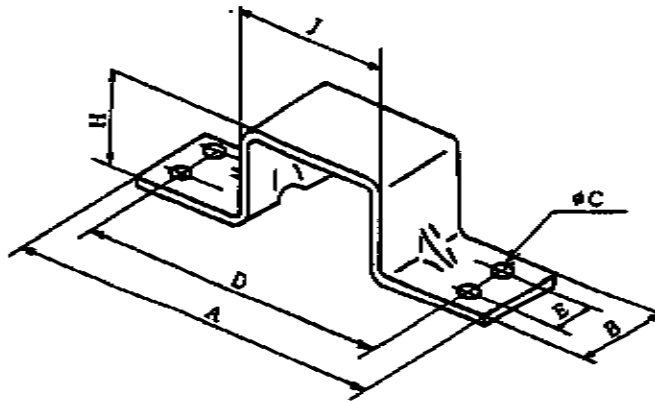


Fig. 1 Punching and Bending Dimensions

(5) Deep drawing dimensions

Dimensions of a sheet metal formed and drawn to the shape of cup by stamping machines.

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3. General Dimensional Tolerances for Punching

Except for the diameter of round holes⁽¹⁾, general dimensional tolerances for punching (including pitch) shall be classified into classes of PTA, PTB or PTC, with the permissible dimensional deviations as given in Table 1.

Note: (1)

General dimensional tolerances on diameters of round holes are as given in Table 3.

Table 1 General Permissible Dimensional Deviations for Punching (Including Pitch) (Unit: mm)

Permissible deviations for basic size range	Permissible dimensional deviations		
	Class		
	PTA	PTB	PTC
Up to 6 ⁽²⁾	±0.05	±0.1	±0.3
Over 6 up to incl. 30	±0.1	±0.2	±0.5
Over 30 up to incl. 120	±0.15	±0.3	±0.8
Over 120 up to incl. 400	±0.2	±0.5	±1.2
Over 400 up to incl. 1000	±0.3	±0.8	±2
Over 1000 up to incl. 2000	±0.5	±1.2	±3

Note: (2)

For basic sizes up to 0.5 mm, dimensional tolerances shall be individually specified.

4. General Dimensional Tolerances for Bending and Deep Drawing

General dimensional tolerances for bending and deep drawing shall be classified into tolerance class of PTA, PTB and PTC, with the permissible dimensional deviations as given in Table 2.

Table 2 General Permissible Dimensional Deviations for Bending and Deep Drawing (Unit: mm)

Permissible deviations for basic size range	Permissible dimensional deviations		
	Class		
	PTA	PTB	PTC
Up to 6 ⁽²⁾	±0.1	±0.3	±0.5
Over 6 up to incl. 30	±0.2	±0.5	±1
Over 30 up to incl. 120	±0.3	±0.8	±1.5
Over 120 up to incl. 400	±0.5	±1.2	±2.5
Over 400 up to incl. 1000	±0.8	±2	±4
Over 1000 up to incl. 2000	±1.2	±3	±6

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5. General Dimensional Tolerances for Diameters of Round Holes

General dimensional tolerances for the diameters of round holes shall be classified into tolerance classes of PTA, PTB or PTC, with the permissible dimensional deviations as given in Table 3.

Table 3 Permissible Dimensional Deviations for Diameters of Round Holes (Unit: mm)

Permissible deviations for basic size range	Permissible dimensional deviations		
	Class		
	PTA	PTB	PTC
From 3 ^{mm} and up to incl. 6	+0.15 0	+0.3 0	+0.5 0
Over 6 up to incl. 30	+0.3 0	+0.5 0	+0.7 0

Note: (3)

For size smaller than 3 mm, permissible dimensional deviations shall be individually specified, if necessary, because of difficulty in working process.

6. Indications on Drawings

General dimensional tolerances for parts press-formed from sheet metals shall be indicated on drawings or associated specifications by the standards number of this standard, followed by the symbol for the tolerance class. Only the symbol for the tolerance class, however, shall be marked if indicating on the title block on the drawing. In the case general dimensional tolerances of different classes are given to punched features and bent or deep drawn features, it shall be clearly noted.

Examples of marking:

General dimensional tolerances for punching: TSZ2202G-PTB

General dimensional tolerances for bending and deep drawing: TSZ2202G-PTC

Applicable Standards

- TSZ1001G Glossary of Technical Drawing Terms
- TSZ2207G General Dimensional Tolerances for Machined Parts
- TSZ2211G General Tolerances for Parts Formed by Shear from Metal Plates

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APPENDIX 1 DIMENSIONAL TOLERANCES FOR PRESS-FORMED PARTS

1. Scope

This standard covers general dimensional tolerances for press-formed parts specified in the already issued drawings, which were subjected to the old standards. It is advisable, however, that the drawing be revised by engineering change for those existing parts that mate with the parts covered by the text of this standard, such that those existing parts can also be covered by the text of this standard.

2. General Dimensional Tolerances for Punching, Hole Diameter and Pitch

General dimensional tolerances for punching, hole diameter and pitch are as given in Appendix 1 Table 1.

Appendix 1 Table 1 General Permissible Dimensional Deviations for Punching, Hole Diameter and Pitch (Unit: mm)

Class	Designation	Permissible deviations for basic size range					
		Up to 7; for round punched hole	Up to 10	Over 10 up incl. 30	Over 30 up incl. 50	Over 50 up incl. 120	Over 120 up to incl. 180 up to incl. 500
Medium	PB	+0.7 -0	±0.7		±1.2		±1.8
Fine	PA	+0.5 -0	±0.5			±0.8	±1.2
Very fine	---	+0.3 -0		±0.3			±0.5

Remark:

In case where punching, hole diameter and pitch are to be worked before bending or deep drawing process, it may be necessary to apply dimensional tolerances for bending or deep drawing on dimensions "A" and "D" in Fig. 1 given in the Text of this standard. In such a case, adequate consultation shall be made between parties concerned for the proper adjustment.

3. General Permissible Dimensional Deviations for Bending and Deep Drawing

Permissible dimensional deviations for bending and deep drawing without individual tolerance indication shall be as given in Appendix 1 Table 2.

Appendix 1 Table 2 General Permissible Dimensional Deviations for Bending and Deep Drawing (Unit: mm)

Class	Designation	Permissible deviations for basic size range			
		Up to 6 to 10	Over 6 up to incl. 10	Over 10 up to incl. 50	Over 50 up to incl. 120 incl. 500
Medium	PB	±1.0	±1.6		±2.4
Fine	PA				
Very fine	---	±0.7		±1.2	±1.8

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APPENDIX 2 GENERAL DIMENSIONAL TOLERANCES FOR PARTS FORMED BY PRESS WORKING FROM SHEET METAL

1. Scope

This Appendix 2 covers the system of dimensional tolerances for parts press-formed from sheet metals specified in already issued drawings which were subjected to the application of TTDS[§]5-3.

Remark 1:

The content of the Text of this standard is same as that of TTDS[§]5-3. The content of Appendix 1 of this standard is same as that of Appendix of TTDS[§]5-3.

Remark 2:

It is desirable to change the standard to be applied from TTDS[§]5-3 to the Text of this standard for the drawings which were subjected to the application of TTDS[§]5-3, when they are issued as renewed drawing or revised drawing for the purpose of engineering change. Newly issued drawings shall be subjected to the application of the Text of this standard.

2. Definitions

Same as the Text of this standard.

3. General Dimensional Tolerances for Punching

Same as the Text and the Appendix 1 of this standard.

4. General Dimensional Tolerances for Bending and Deep Drawing

Same as the Text and the Appendix 1 of this standard.

5. General Dimensional Tolerances for Diameters of Round Holes

Same as the Text of this standard.

6. Indication on Drawings

General dimensional tolerances for parts press-formed from sheet metals shall be indicated on drawings or related specifications by the standards number of TTDS and the symbol for the tolerance class. Only the symbol for the tolerance class, however, shall be marked if indicating on the title block of the drawing. In the case general dimensional tolerances of different classes are given to punched features and bent or deep drawn features, it shall be clearly noted.

Examples of marking:

General dimensional tolerances for punching: TTDS[§]5-3-PTB

General dimensional tolerances for bending and deep drawing: TTDS[§]5-3-PTC

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