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JIS Z 2201 : 1998

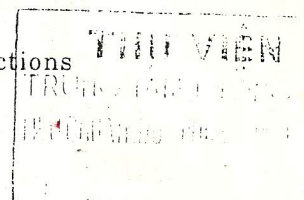
Test pieces for tensile test for  
metallic materials

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ICS 77.040.10

Descriptors : metals, tensile testing, test specimens, metal sections

Reference number : JIS Z 2201 : 1998 (E)



## Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently, JIS Z 2201:1980 is replaced with JIS Z 2201:1998.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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# Test pieces for tensile test for metallic materials

**Introduction** This Japanese Industrial Standard is based on ISO 6892 : 1984, *Metallic materials—Tensile testing*. However, this Standard specifies the non-proportional test piece not included in ISO 6892. This is because that the sudden abortion of the non-proportional test piece which has been specified so far in the Japanese Industrial Standard for a long time is considered to affect a commercial transaction to a great extent. Nevertheless, taking this circumstance into account the division of use and the dimension of test piece specified in ISO 6892 are included newly in Remarks Table 1 to contribute to the use, when testing the materials specified in ISO Standard with a view to seeking the conformity with the International Standard.

**1 Scope** This Japanese Industrial Standard specifies test pieces for tensile test for metallic materials (hereafter referred to as "test piece").

Remarks 1 When the tensile test values are required to be compared between the test pieces of different materials or different dimensions, or when the tensile test results are used in international trade, it is preferable to use the proportional test piece specified in this Standard.

2 The following standard is corresponding International Standard to this Standard :

ISO 6892 : 1984 *Metallic materials—Tensile testing*

**2 Normative references** The following standard contains provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent edition of the standard indicated below shall be applied.

JIS G 0202 *Glossary of terms used in iron and steel (testing)*

**3 Definitions** For the purpose of this Standard, the definitions given in JIS G 0202 apply.

**4 Types of test piece**

**4.1** The test pieces shall be classified as specified in 5.1 depending upon the form and size. These are classified into the proportional test piece and the non-proportional one as given in Table 1.

Table 1 Classification of test piece

Form of test piece	Flat form test piece	Bar form test piece	Tubular form test piece	Arc section test piece	Wire form test piece
Proportional test piece	No.14B	No.2, No.14A	No.14C	No.14B	
Non-proportional test piece	No.1A, No.1B, No.5, No.13A, No.13B	No.4, No.10, No.8A, No.8B, No.8C, No.8D	No.11	No.12A, No.12B, No.12C	No.9A, No.9B

Remarks : In addition to Table 1, the special test pieces are specified in Annex.

4.2 The selection of a type of test piece to be used shall be in accordance with the requirements of the standard for particular material. but it is recommended to be selected as given in Table 2.

Table 2 Division of use of test pieces

Material		Test piece		Remarks
Form	Dimensions	Proportional	Non-proportional	
Sheet, plate, shape, strip	Over 40 mm in thickness	No. 14A	No. 4, No. 10	For bar form test piece
		No. 14B	—	For flat form test piece
	Over 20 mm up to and incl. 40 mm in thickness	No. 14A	No. 4, No. 10	For bar form test piece
		No. 14B	No. 1A	For flat form test piece
	Over 6 mm up to and incl. 20 mm in thickness	No. 14B	No. 1A, No. 5	
	Over 3 mm up to and incl. 6 mm in thickness		No. 5, No. 13A,	
3 mm or less in thickness	—	No. 13B		
Bar	—	No. 2, No. 14A	No. 4, No. 10	—
Wire	—	—	No. 9A, No. 9B	—
Pipe	Pipe of small outside dia.	No. 14C	No. 11	For tubular form test piece
	50 mm or less in outside dia.	No. 14B	No. 12A	For arc section test piece
	Over 50 mm up to and incl. 170 mm in outside dia.		No. 12B	
	Over 170 mm in outside dia.		No. 12C	
	200 mm or over in outside dia.	No. 14B	No. 5	For flat form test piece or arc section test piece
	Thick wall pipe	No. 14A	No. 4	For bar form test piece
Cast- ing	—	No. 14A	No. 4, No. 10	—
	—	—	No. 8A, No. 8B No. 8C, No. 8D	To be used when elongation value is not required. To be taken from test coupon casted for test piece.
Forg- ing	—	No. 14A	No. 4, No. 10	—

Remarks 1 No. 1B test piece shall be used in the case where the test pieces shown in Table 2 are not suitable to be used.

- 2 No. 3, No. 6 and No. 7 test piece specified in Annex should be used when the use of test pieces given in Table 2 is not suitable.
- 3 For the materials specified in the International Standard, the division of use shown in the following remarks Table 1 may be used.

**Remarks Table 1 Division of use and dimension of test piece  
based on International Standard**

Unit : mm

Shape of cross section of product	Dimension	Width <i>W</i>	Gauge length <i>L</i>	Parallel length <i>P</i>	Distance from end of parallel portion to grip
Sheet	Less than 3 mm in sheet thickness	12.5 20	50 80	75 120	87.5 140
	3 mm or more in sheet thickness <sup>(1)</sup>	—	$5.65\sqrt{A}$	$L+2\sqrt{A}$	—
Bar	Less than 4 mm in outside diameter	— —	200 100	— —	250 150
	4 mm or more in outside diameter <sup>(1)</sup>	—	$5D$	$L+2D$	—
Wire	Less than 4 mm in outside diameter	— —	200 100	— —	250 150
	4 mm or more in outside diameter <sup>(1)</sup>	—	$5D$	$L+2D$	—
Pipe	Less than 3 mm in pipe thickness	12.5 20	50 80	75 120	87.5 140
	3 mm or more in pipe thickness	—	$5.65\sqrt{A}$	$L+2\sqrt{A}$	—
Shape	Less than 4 mm in thickness	— —	200 100	— —	250 150
	4 mm or more in thickness <sup>(1)</sup>	—	$5D$	$L+2D$	—

*D*: diameter of parallel portion, *A*: sectional area of parallel portion

Note <sup>(1)</sup> When using a test piece of circular cross section, *D* = 5 mm, 10 mm, or 20 mm is recommended.

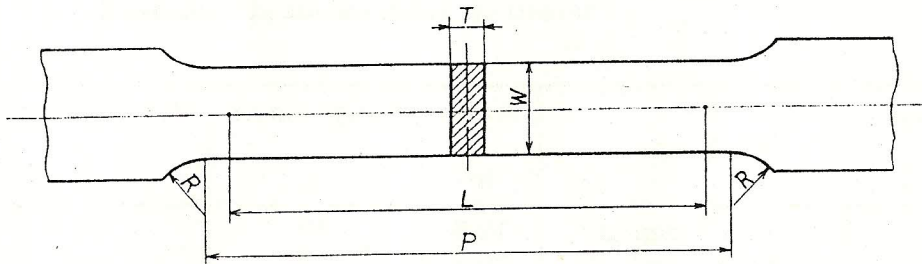
- Remarks 1 In the case of rectangular cross section, the ratio between sheet thickness and sheet width shall not exceed 8 : 1.
- 2 In the case of hexagonal cross section, the parallel length shall be  $P = L + 1.5\sqrt{A}$ .
  - 3 The parallel length, in the case of circular cross section and in other cases, shall be  $P = L + 0.5D$  and  $P = L + 1.5\sqrt{A}$  or more respectively, even in the minimum.

## 5 Form and dimensions of test piece

5.1 Form and dimensions of test piece The forms and dimension of the test pieces

shall be as follows.

- a) **No. 1 test piece** The form and dimensions of this test piece shall conform to Fig. 1.

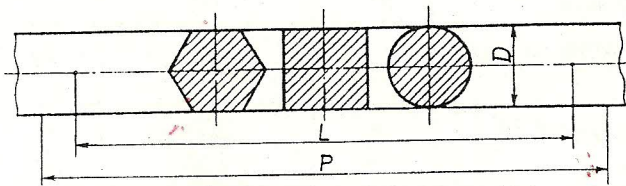


Unit : mm

Type of test piece	Width $W$	Gauge length $L$	Parallel length $P$	Radius of fillet $R$	Thickness $T$
1A	40	200	220 approx.	25 min.	Thickness of material
1B	25	200	220 approx.	25 min.	Thickness of material

Fig. 1 No. 1 test piece

- b) **No. 2 test piece** The form and dimensions of this test piece shall conform to Fig. 2.

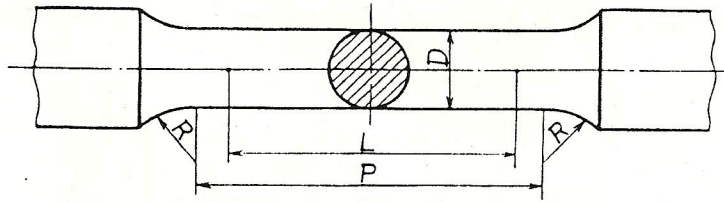


Dia. or width across flats $D$	Gauge length $L$	Distance between grips $P$
Size of material	$8D$	$(L + 2D)$ approx.

Remarks : For No. 2 test piece, the bars of not more than 25 mm in nominal diameter (or width across flats) shall be used.

Fig. 2 No. 2 test piece

- c) **No. 4 test piece** The form and dimensions of No. 4 test piece shall conform to Fig. 3.



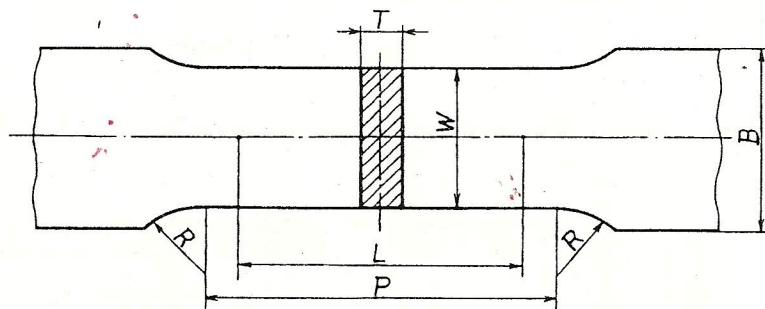
Unit : mm

Diameter $D$	Gauge length $L$	Parallel length $P$	Radius of fillet $R$
14	50	60 approx.	15 min.

- Remarks 1 The parallel portion of No. 4 test piece shall be machine-finished.
- 2 If No.4 test piece of the dimensions as specified in Fig. 3 can not be obtained, the diameter of parallel portion and the gauge length may be determined in accordance with the formula  $L = 4\sqrt{A}$ , where  $A$  is the cross-sectional area of parallel portion.

Fig. 3 No. 4 test piece

- d) **No. 5 test piece** The form and dimensions of No. 5 test piece shall conform to Fig. 4.



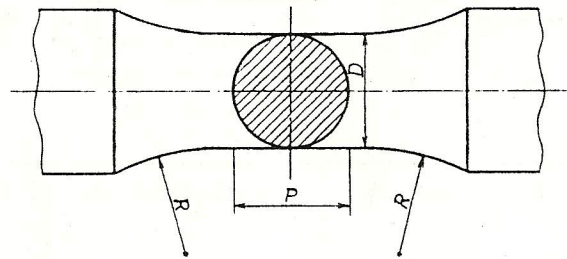
Unit : mm

Width $W$	Gauge length $L$	Parallel length $P$	Radius of fillet $R$	Thickness $T$
25	50	60 approx.	15 min.	Thickness of material

- Remarks : In the case of applying No. 5 test piece to steel sheets not more than 3 mm thick, the radius  $R$  of fillet shall be 20 mm to 30 mm, and the width  $B$  of gripped ends shall be 30 mm or over.

Fig. 4 No. 5 test piece

- e) **No. 8 test piece** The form and dimensions of No. 8 test piece shall conform to Fig. 5.



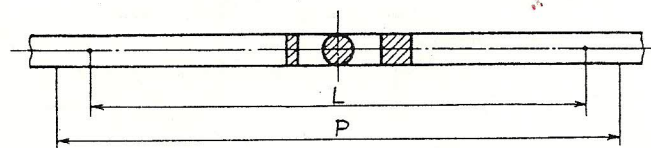
Unit : mm

Type of test piece	Casting dimensions of test coupon (diameter)	Parallel length $P$	Diameter $D$	Radius of fillet $R$
8A	13 approx.	8 approx.	8	16 min.
8B	20 approx.	12.5 approx.	12.5	25 min.
8C	30 approx.	20 approx.	20	40 min.
8D	45 approx.	32 approx.	32	64 min.

- Remarks 1 No. 8 test piece shall be used for the tensile testing of the materials such as iron castings which do not require elongation values.
- 2 No. 8 test piece shall be sampled from the specimen cast to the dimensions given in the Table.

Fig. 5 No. 8 test piece

- f) **No. 9 test piece** The form and dimensions of No. 9 test piece shall conform to Fig. 6.

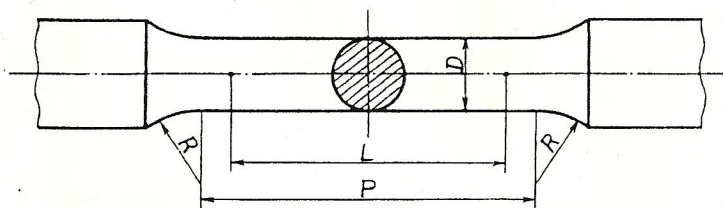


Unit : mm

Type of test piece	Gauge length $L$	Distance between grips $P$
9A	100	150 min.
9B	200	250 min.

Fig. 6 No. 9 test piece

- g) **No. 10 test piece** The form and dimensions of No. 10 test piece shall conform to Fig. 7.

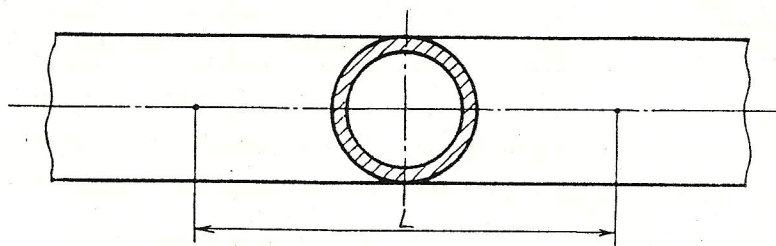


Unit : mm

Diameter $D$	Gauge length $L$	Parallel length $P$	Radius of fillet $R$
12.5	50	60 approx.	15 min.

Fig. 7 No. 10 test piece

- h) **No. 11 test piece** The form and dimensions of No. 11 test piece shall conform to Fig. 8.



Gauge length  $L = 50$  mm

Remarks : The cross section of No. 11 test piece shall be as cut from the tubular material, and the gripped ends shall be inserted with metal plugs or pressed flat by hammering.

In the latter case, the length of parallel portion shall be not less than 100 mm.

Fig. 8 No. 11 test piece

