

# JIS

JAPANESE  
INDUSTRIAL  
STANDARD

1998年10月26日

Translated and Published by  
Japanese Standards Association

---

JIS Z 2201 : 1998

**Test pieces for tensile test for  
metallic materials**



2009年10月1日

---

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.

Date of Establishment: 1952-03-08

Date of Revision: 1998-02-20

Date of Public Notice in Official Gazette: 1998-02-20

Investigated by: Japanese Industrial Standards Committee  
Divisional Council on Iron and Steel

---

JIS Z 2201 :1998, First English edition published in 1998-08

Translated and published by: Japanese Standards Association  
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

---

In the event of any doubts arising as to the contents,  
the original JIS is to be the final authority.

© JSA 1998

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

Printed in Japan

## 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, No. 13B	
3 mm or less in thickness	—			
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
			No. 12B	
	Over 50 mm up to and incl. 170 mm in outside dia.	No. 14B	No. 12C	
	Over 170 mm in outside dia.			
	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.

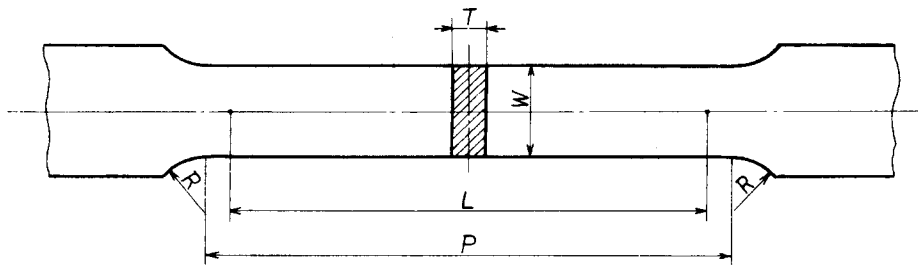
- Remarks 1 In the case of rectangular cross section, the ratio between sheet thickness and sheet width shall not exceed 8 : 1.
- 2 In the case of hexagonal cross section, the parallel length shall be  $P = L + 1.5\sqrt{A}$ .
  - 3 The parallel length, in the case of circular cross section and in other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

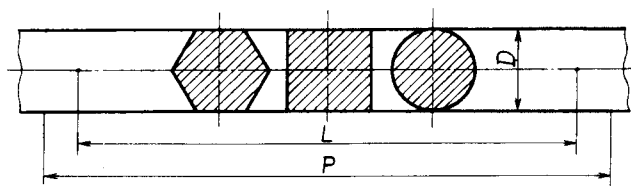


Unit : mm

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.

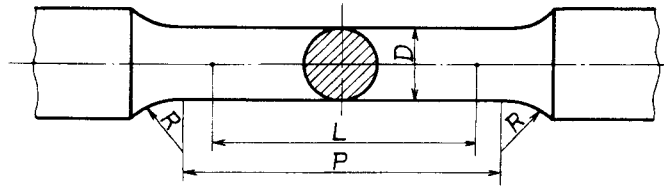


Dia. or width across flats $D$	Gauge length $L$	Distance between grips $P$
Size of material	$8D$	$(L + 2D)$ approx.

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

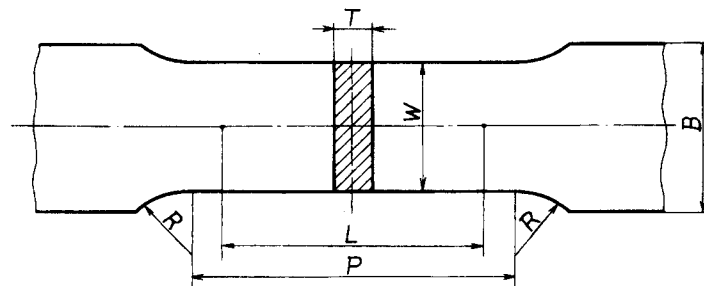
Diameter $D$	Gauge length $L$	Parallel length $P$	Radius of fillet $R$
14	50	60 approx.	15 min.

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.



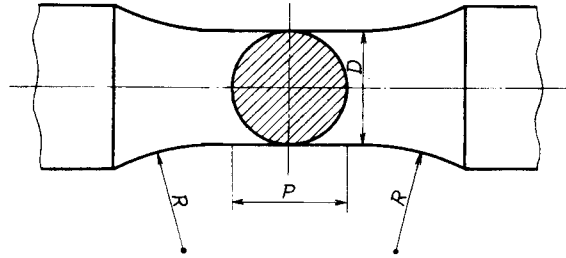
Unit : mm

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

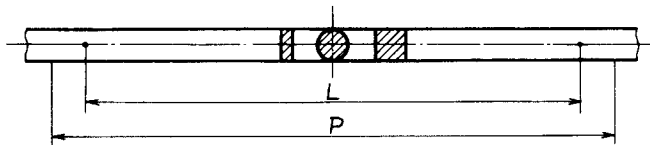
Type of test piece	Casting dimensions of test coupon (diameter)	Parallel length $P$	Diameter $D$	Radius of fillet $R$
8A	13 approx.	8 approx.	8	16 min.
8B	20 approx.	12.5 approx.	12.5	25 min.
8C	30 approx.	20 approx.	20	40 min.
8D	45 approx.	32 approx.	32	64 min.

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.



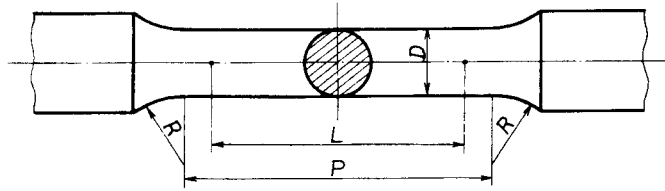
Unit : mm

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.

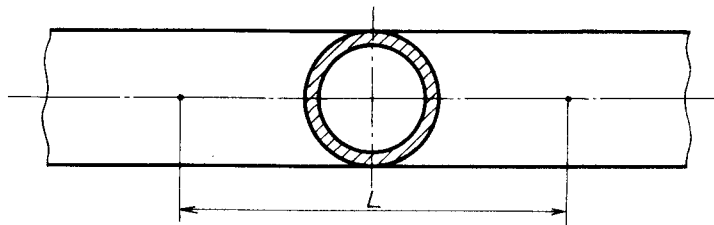


Unit : mm

Diameter <i>D</i>	Gauge length <i>L</i>	Parallel length <i>P</i>	Radius of fillet <i>R</i>
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.



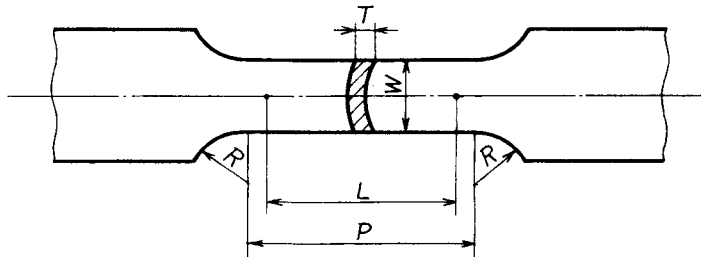
Gauge length  $L = 50$  mm

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**

- i) **No. 12 test piece** The form and dimensions of No. 12 test piece shall conform to Fig. 9.



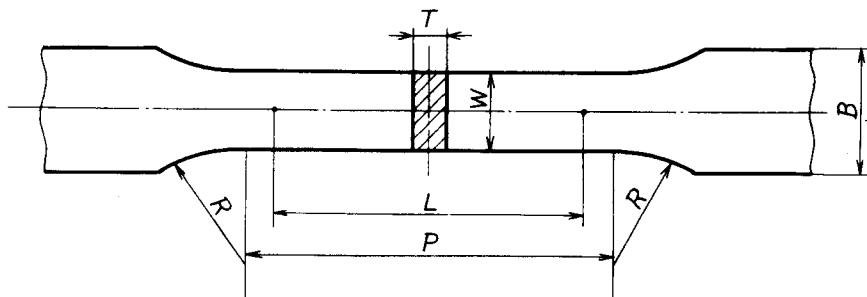
Unit : mm

Type of test piece	Width $W$	Gauge length $L$	Parallel length $P$	Radius of fillet $R$	Thickness $T$
12A	19	50	60 approx.	15 min.	Thickness of tube
12B	25	50	60 approx.	15 min.	Thickness of tube
12C	38	50	60 approx.	15 min.	Thickness of tube

Remarks : The cross section of parallel portion of No. 12 test piece shall be arc form as cutting out of the tubular material. However, the gripped ends of test piece may be hammered flat at the room temperature.

**Fig. 9 No. 12 test piece**

- j) **No. 13 test piece** The form and dimensions of No. 13 test piece shall conform to Fig. 10.



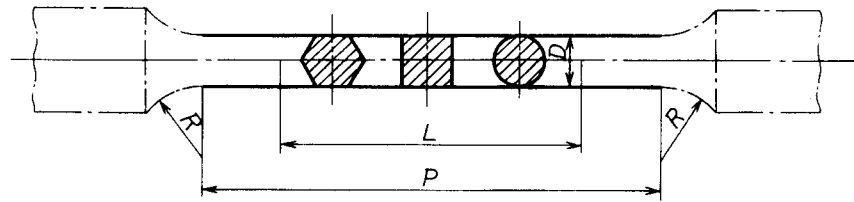
Unit : mm

Type of test piece	Width $W$	Gauge length $L$	Parallel length $P$	Radius of fillet $R$	Thickness $T$	Width of gripped portion $B$
13A	20	80	120 approx.	20 to 30	Thickness of material	—
13B	12.5	50	60 approx.	20 to 30	Thickness of material	20 min.

**Fig. 10 No. 13 test piece**

k) **No. 14 test piece**

- 1) **No. 14A test piece** The form and dimensions of No. 14A test piece shall conform to Fig. 11.



Unit : mm

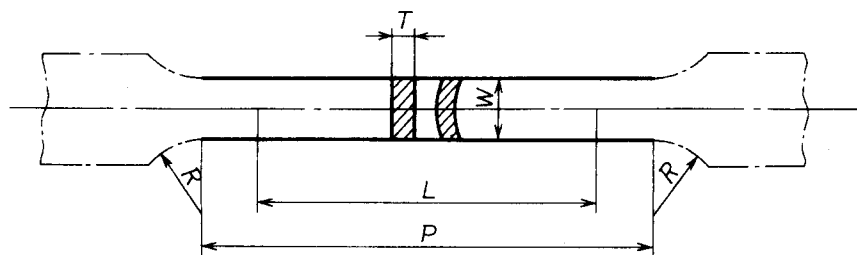
Gauge length <i>L</i>	Parallel length <i>P</i>	Radius of fillet <i>R</i>
$5.65\sqrt{A}$	$5.5D$ to $7D$	15 min.

*A* : cross-sectional area of parallel portion

- Remarks 1 The gauge length may be so determined that  $L = 5D$  for circular cross section of parallel portion, that  $L = 5.65D$  for square cross section, and that  $L = 5.26D$  for hexagonal cross section.
- 2 The length  $P$  of parallel portion should be  $7D$ , as far as practicable.
- 3 The diameter of gripped portions of No. 14 A test piece may be made the same dimension as that of the parallel portion. In this case, the distance of  $P$  between grips shall be so determined that  $P \geq 8D$ .
- 4 In the case of the materials specified in the International Standard, Remarks Table 1 in 4.2 applies.

**Fig. 11 No. 14A test piece**

2) **No. 14B test piece** The form and dimensions of No. 14B test piece shall conform to Fig. 12.



Unit : mm

Width $W$	Gauge length $L$	Parallel length $P$	Radius of fillet $R$	Thickness $T$
$8T$ max.	$5.65\sqrt{A}$	$L+1.5\sqrt{A}$ to $L+2.5\sqrt{A}$	15 min.	Thickness of material

$A$  : cross-sectional area of parallel portion

- Remarks 1 The length of parallel portion shall be so determined that  $P = L + 2\sqrt{A}$ , as far as practicable.
- 2 In the case of applying No. 14B test piece to the test of tubes, the cross section of parallel portion shall be as cut out of the tube.
- 3 The width of gripped portion of No. 14B test piece may be made the same as that of the parallel portion. In this case, the parallel length shall be  $P = L + 3\sqrt{A}$ .
- 4 No. 14B test piece, the standard dimensions of which are given in Remarks Table 2, should be used by unifying in every reasonable gauge of sheet width.
- 5 In the case of the materials specified in the International Standard, Remarks Table 1 in 4.2 applies.

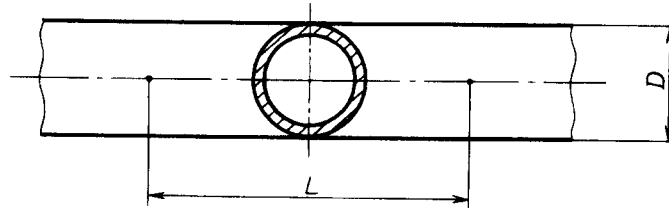
Fig. 12 No. 14B test piece

Remarks Table 2 Standard dimensions of 14B test piece

Unit : mm

Plate thickness	Width $W$	Gauge length $L$	Parallel length $P$
Over 5.5 mm up to and incl. 7.5 mm	12.5	50	80
Over 7.5 mm up to and incl. 10 mm		60	
Over 10 mm up to and incl. 13 mm	20	85	130
Over 13 mm up to and incl. 19 mm		100	
Over 19 mm up to and incl. 27 mm	40	170	265
Over 27 mm up to and incl. 40 mm		205	

- 3) **No. 14C test piece** The form and dimensions of No. 14C test piece shall conform to Fig. 13.



Gauge length  $L = 5.65\sqrt{A}$  (where  $A$  is the cross-sectional area of test piece)

- Remarks 1 The cross section of No. 14C test piece shall be as cut out of the tubular material.
- 2 This test piece shall be tested with its gripped ends inserted with metal plugs. In this case, the length of the part which is allowed to deform without touching the metal plugs shall be within the range from  $(L + \frac{D}{2})$  to  $(L + 2D)$ , but  $(L + 2D)$  is preferable.
- 3 In the case of the materials specified in the International Standard, Remarks Table 1 in 4.2 applies.

**Fig. 13 No. 14C test piece**

**5.2 Parallel length of test piece** In the case where the elongation value is not required in the tensile test, the length of parallel portion of each test piece prescribed in 5.1 may be so changed that  $P \geq 3D$  or that  $P \geq 3\sqrt{A}$ .

**5.3 Gauge length of proportional test piece** The gauge length of the proportional test piece shall be at least 25 mm. However in the case where the original sectional area of the test piece is too small and, therefore, the gauge length of the proportional test piece is less than 25 mm, it is allowed to make the proportional constant 5.65 or more or to use the non-proportional test piece.

The gauge length of the proportional test piece may be rounded off to the nearest 5 mm, within the tolerance of 10 % on the calculated proportional dimension.

**5.4 Change of parallel length of proportional test piece** When conducting the tests of proportional test pieces of varied dimensions at a time, they may be so made that the lengths of parallel portions shall be unified to the longest one.

## 6 Tolerances on the dimensions of parallel portion of test piece

**6.1 Tolerance on machined parallel portion in relation to nominal dimension** The tolerances on diameter, thickness and width of parallel portion after machining in relation to the respective nominal dimensions shall be as shown in Table 3.

**Table 3 Tolerance on parallel portion in relation to nominal dimension**

Unit : mm

Nominal dimension	Tolerance
Over 4 up to and incl. 16	$\pm 0.5$
Over 16 up to and incl. 63	$\pm 0.7$

**6.2 Variation of dimension of machined parallel portion** The diameter, thickness and width of mechanically-finished parallel portion of a test piece shall be uniform all over that portion, without variations (maximum value – minimum value) exceeding the tolerance given in Table 4 (for circular cross section) and Table 5 (for rectangular cross section).

**Table 4 Tolerance on variation of dimension of parallel portion (case of circular cross section)**

Unit : mm

Mechanically-finished diameter	Tolerance
Over 3 up to and incl. 6	0.03
Over 6 up to and incl. 18	0.04
Over 18	0.05

**Table 5 Tolerance on variation of dimension of parallel portion (case of rectangular cross section)**

Unit : mm

Mechanically-finished thickness or width	Tolerance
Over 3 up to and incl. 6	0.06
Over 6 up to and incl. 18	0.08
Over 18	0.10

Remarks : For example, if the minimum measured diameter of a parallel portion of a No. 4 test piece is 14.30 mm, the maximum diameter of the parallel portion should not exceed 14.34 mm (see Table 4).

Besides, the finished diameter of a No. 4 test piece of 14 mm nominal diameter shall be within 13.5 mm to 14.5 mm all over the parallel portion (see Table 3).

**6.3 Taper of parallel portion of test piece** If necessary, the parallel portion of a test piece may be tapered towards the middle within the tolerance on form specified in 6.2.

**Annex (normative)**  
**Special tensile test piece for metallic materials**

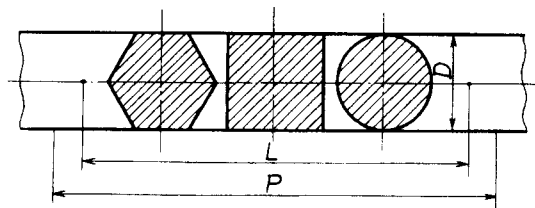
**1 Scope** This Annex specifies the special tensile test piece used in the tensile test of metallic materials (hereafter referred to as "special test piece").

**2 Term of application** This Annex applies until December 31, 2004.

**3 Shape and dimension of special test piece**

**3.1 Shape and dimension of special test piece** The special test piece shall be classified into No. 3 test piece, No. 6 test piece and No. 7 test piece, the shapes and dimensions of which are as follows ;

a) **No. 3 test piece** The shape and dimension of No. 3 test piece shall be as shown in Annex Fig.1.

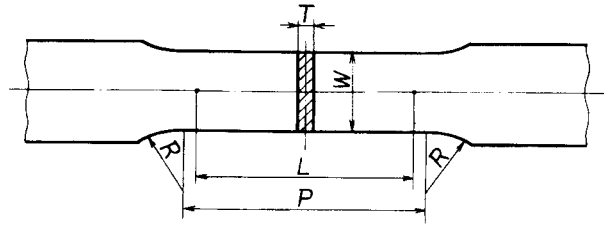


Dia. or width across flats $D$	Gauge length $L$	Distance between grips $P$
Size of material	$4D$	Approx. $(L + 2D)$

- Remarks 1 No. 3 test piece is used for bar materials the nominal diameter (or width across flats) of which exceeds 25 mm.
- 2 No. 3 test piece may be machined to be the test piece having the parallel portion provided that, in this case, the diameter of parallel portion is 25 mm or more and the length of parallel portion  $P$  is approximately  $4.5 D$ .

**Annex Fig. 1 No. 3 test piece**

- b) **No. 6 test piece** The shape and dimension of No. 6 test piece shall be as shown in Annex Fig. 2.



Unit : mm

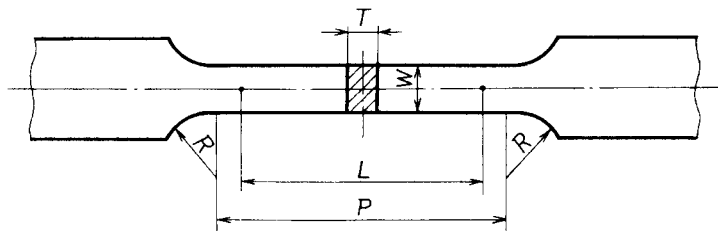
Width $W$	Gauge length $L$	Parallel length $P$	Radius of fillet $R$	Thickness $T$
15	$8\sqrt{A}$	$L + \text{approx. } 10$	15 or over	Thickness of material

$A$  : cross section area of parallel portion ( $W \times T$ )

Remarks : No. 6 test piece is used for sheet materials and shape materials the thickness of which is 6 mm or under.

**Annex Fig. 2 No. 6 test piece**

- c) **No. 7 test piece** The shape and dimension of No. 7 test piece shall be as shown in Annex Fig. 3.



Unit : mm

Width $W$	Gauge length $L$	Parallel length $P$	Radius of fillet $R$	Thickness $T$
$T$ or over	$4\sqrt{A}$	Approx. $1.2L$	15 or over	Thickness of material

$A$  : cross section area of parallel portion ( $W \times T$ )

**Annex Fig. 3 No. 7 test piece**

**3.2 Parallel length of special test piece** If elongation value is unnecessary in tensile test, the parallel length of each special test piece is allowed to be  $P \geq 3D$  or  $P \geq 3\sqrt{A}$ .

**3.3 Gauge length of special test piece** As for the gauge length of special test piece, the fraction may be rounded off up to 5 mm within a range not exceeding the tolerance of 10 % with respect to the calculated proportional dimension.



**3.4 Change of parallel length of special test piece** When carrying out the test at the same time using the special test pieces of different dimensions, they may be prepared in such a way that the parallel lengths are adjusted to the longest one.

**4 Tolerance on the dimension of parallel portion of special test piece** The tolerance on the dimension of parallel portion of the special test piece shall be as specified in 4 of the body.

---

Related standard :

JIS Z 2241 *Method of tensile test for metallic materials*

Errata for JIS (English edition) are printed in *Standardization Journal*, published monthly by the Japanese Standards Association, and also provided to subscribers of JIS (English edition) in *Monthly Information*.

Errata will be provided upon request, please contact:  
**Standardization Promotion Department, Japanese Standards Association**  
4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN  
TEL. 03-3583-8002      FAX. 03-3583-0462