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Feeler gauges

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Precision Measuring Instruments Manufactures Association (JMA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently JIS B 7524:1992 is replaced with this Standard.

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.

Feeler gauges

Introduction

This Japanese Industrial Standard was established in 1962 and revised in 1992 afterwards. The revision of this time is to respond to the requests thereafter from consumers.

The corresponding International Standard has not yet been established at this point.

1 Scope

This Standard specifies the feeler gauges of 3 mm or under in thickness and 300 mm or under in length.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 0651 *Geometrical Product Specifications (GPS) — Surface texture : Profile method — Nominal characteristics of contact (stylus) instruments*

JIS B 0680 *Geometrical Product Specifications (GPS) — Standard reference temperature for geometrical product specification and verification*

JIS B 7506 *Gauge blocks*

JIS B 7507 *Vernier, dial and digital callipers*

JIS B 7516 *Metal rules*

JIS B 7725 *Vickers hardness test — Verification of testing machines*

JIS G 4401 *Carbon tool steels*

JIS Z 2244 *Vickers hardness test — Test method*

JIS Z 8103 *Glossary of terms used in measurement*

3 Terms and definitions

For the purposes of this Standard, the definitions given in JIS Z 8103 and the following definitions apply.

3.1 feeler gauge

a gauge made of durable material having two parallel measuring surfaces with rectangular cross sections, which measures the gap dimension by inserting it into the gap of the product etc. using one gauge or two or more gauges in combination

3.2 leaf

single feeler gauge

3.3 feeler gauge set

a gauge in which two or more leaves of different thickness are combined and fixed with a case and others

3.4 nominal size

nominal thickness of a leaf

3.5 camber in width direction

camber of a leaf curved in a width direction (see figure 1)

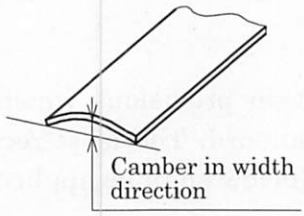
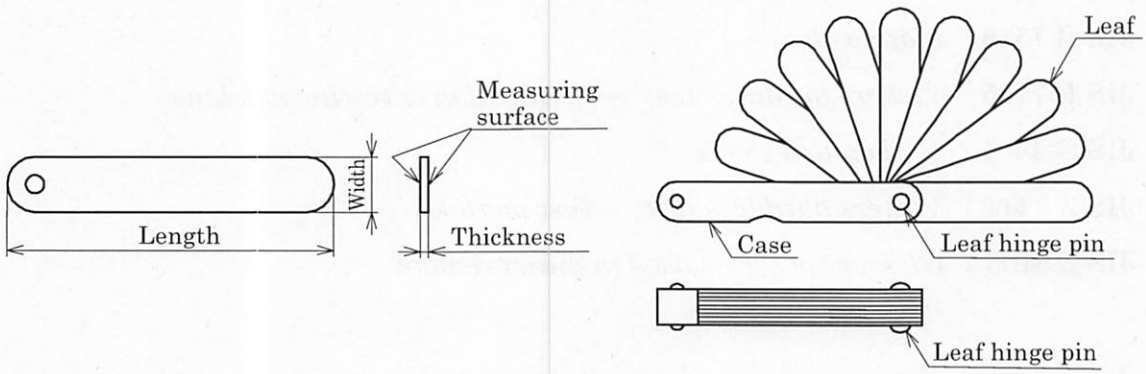


Figure 1 Camber in width direction

4 Name of principle parts

The name of principle parts of feeler gauges shall be in accordance with figure 2.



a) Leaf b) Feeler gauge set

NOTE : This figure is to show names only and does not purport to show the reference of shape and structure.

Figure 2 Name of principle parts

5 Types of leaves

Leaves shall be classified into two types, Type A and Type B, according to shapes thereof and shall be in accordance with table 1.

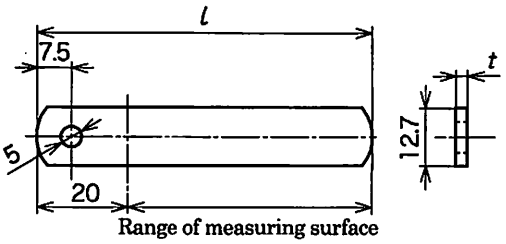
6 Shapes and dimensions of leaves

Shapes and dimensions of leaves shall be in accordance with table 1.

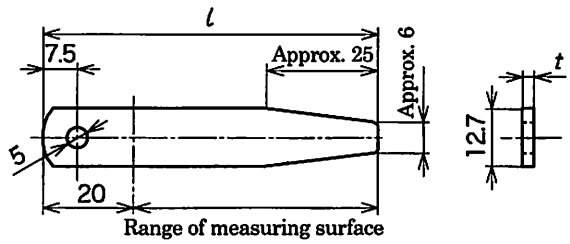
Table 1 Types, shapes and dimensions of leaves

Unit : mm

Type A



Type B



Thickness t		Length l
Nominal size	Step of nominal size	
0.01, 0.02 to 0.14, 0.15	0.01	75
0.20, 0.25 to 0.95, 1.00	0.05	100
1.10, 1.20 to 2.90, 3.00	0.10	150 200 300

7 Constitution of leaves of feeler gauge set

The constitution of leaves of the feeler gauge set shall be in accordance with table 2.

Table 2 Constitution of leaves of feeler gauge set

Unit : mm

Designation of type		Length of leaf	Number of leaves	Nominal size of leaf combined and combining order
Type A	Type B			
75 A 10	75 B 10	75	10	0.30, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.10, 0.15, 0.20
100 A 10	100 B 10	100		
150 A 10	150 B 10	150		
200 A 10	200 B 10	200		
300 A 10	300 B 10	300		
75 A 11	75 B 11	75	11	1.00, 0.05, 0.10, 0.20, 0.30, 0.40, 0.50, 0.60, 0.70, 0.80, 0.90
100 A 11	100 B 11	100		
150 A 11	150 B 11	150		
75 A 12	75 B 12	75	12	0.30, 0.01, 0.02, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.10, 0.20
100 A 12	100 B 12	100		
150 A 12	150 B 12	150		
75 A 13	75 B 13	75	13	3.00, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.10, 0.15, 0.20, 0.30, 1.00, 2.00
100 A 13	100 B 13	100		
150 A 13	150 B 13	150		
75 A 19	75 B 19	75	19	1.00, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.10, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40, 0.45, 0.50, 0.70, 0.80
100 A 19	100 B 19	100		
150 A 19	150 B 19	150		
75 A 25	75 B 25	75	25	1.00, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.10, 0.11, 0.12, 0.13, 0.14, 0.15, 0.20, 0.25, 0.30, 0.35, 0.40, 0.45, 0.50, 0.60, 0.70, 0.80, 0.90
100 A 25	100 B 25	100		
150 A 25	150 B 25	150		

8 Tolerances on thickness, width and length

The tolerances on thickness, width and length of leaves shall be in accordance with table 3.

Table 3 Tolerances on thickness, width and length

Unit : mm

Range of nominal size	Tolerances on thickness [a)]	Tolerances on width	Tolerances on length
0.01 or over to and incl. 0.06	± 0.003	± 0.5	± 1
Over 0.06 to and incl. 0.10	± 0.004		
Over 0.10 to and incl. 0.30	± 0.005		
0.35			
Over 0.35 to and incl. 0.65	± 0.008		
Over 0.65 to and incl. 3.00	± 0.010		

Dimension values in this table shall be in accordance with those at 20 °C specified in **JIS B 0680.**

Note [a)] This shall apply to the range of measuring surface specified in table 1.

9 Tolerances on camber in width direction

The tolerances on camber in width direction shall be in accordance with table 4.

Table 4 Tolerances on camber in width direction

Unit : mm

Range of nominal size	Tolerances on camber in width direction [a]
0.01 or over to and incl. 0.06	–
Over 0.06 to and incl. 0.10	
Over 0.10 to and incl. 0.30	
0.35	0.003
Over 0.35 to and incl. 0.65	0.004
Over 0.65 to and incl. 3.00	0.005

Dimension values in this table shall be in accordance with those at 20 °C specified in JIS B 0680.

Note [a] This shall apply to the range of measuring surface specified in table 1.

10 Hardness

The hardness of measuring surface of a leaf shall be 400 HV or over.

11 Surface roughness

The surface roughness of a leaf shall be *Ra* 0.4 for that of which the nominal size is 0.50 mm or under and *Ra* 0.8 for that of which the nominal size is over 0.50 mm.

12 Material

The material of a leaf shall be SK85, SK95 and SK120 specified in JIS G 4401 or that at least equivalent in mechanical properties.

13 Measurement method

The measurement method of a leaf shall be in accordance with table 5 or the method at least equivalent in measurement accuracy.

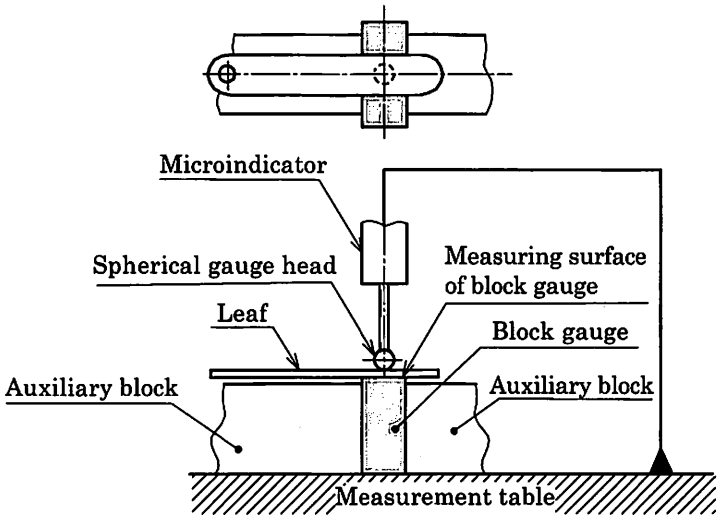
Measurement shall be carried out in the range of measuring surface shown in table 1 excluding width and length.

Table 5 Measurement method of leaf

No.	Item	Measurement method	Measurement apparatus
1	Thickness	Place a block gauge with its measuring surface in up-and-down direction on the measurement table by inserting between two auxiliary blocks. Place a block gauge (size T) equivalent to the nominal size of a feeler gauge further on the measuring surface of the block gauge, put the spherical gauge head of a microindicator [a] here and read the indicated value a. When the measurement range of the microindicator is sufficiently satisfied with respect to the nominal size, do not use the block gauge equivalent to the nominal size, and take the indicated value on the measuring surface as a (T= 0). Next, place a leaf on the measuring surface of the block gauge perpendicular to the longitudinal direction of the block gauge, read the indicated value b with the microindicator and calculate $t_1 = (b - a) + T$. In succession, turn over the leaf, carry out the measurement on the same position, read c and calculate $t_2 = (c - a) + T$. Take the smaller value of t_1 or t_2 as the thickness. Carry out above measurement at predetermined points of measurement [b] (see figure 3).	Block gauge of Grade 1 or better specified in JIS B 7506 Auxiliary block Microindicator [a] (scale interval 1 μm max., instrumental error 0.5 μm max., measuring force 0.5 N max.)
2	Width	Measure with vernier callipers or metal rules.	Vernier callipers specified in JIS B 7507 or metal rules specified in JIS B 7516
3	length		
4	Camber in width direction	Take the maximum value among the absolute values of difference between t_1 and t_2 obtained from the measurement of thickness as camber in width direction.	—
5	Hardness	Measure in accordance with Vickers hardness test method specified in JIS Z 2244.	Vickers hardness tester conforming to JIS B 7725
6	Surface roughness	Measure using the stylus instrument or the roughness measurement instrument equivalent to this. The measurement may be replaced by the comparative observation with the criteria sample in which the surface roughness is specified.	Stylus instrument specified in JIS B 0651 Criteria sample

Notes [a] The microindicator refers to a measurement apparatus of length which indicates the micro displacement of a gauge head on the scale by a pointer or by a digital display.

[b] The measurement points shall be at least five at almost equal intervals in the longitudinal direction including the tip part but excluding 20 mm from the end (see table 1) for a leaf of 100 mm or under in length, and at least seven for a leaf exceeding 100 mm in length in the same sense.



NOTE : It is desirable that the difference in height between the gauge block and auxiliary blocks is as small as possible.

Figure 3 Measurement method of thickness

14 Inspection

14.1 General

The inspection of the feeler gauge shall be classified into the type inspection[1)] and the delivery inspection[2)] and carried out as specified in clause 13. When the feeler gauge conforms to the specification of clause 6 to clause 11, it shall be accepted.

Notes [1)] The inspection for determining whether all characteristics of the product quality showed in design are satisfied.

[2)] The inspection for determining whether the characteristics recognized to be required are satisfied in the case where the product obtained by the same design and manufacture as those of the product which has passed the type test is delivered.

14.2 Type inspection

a) Shape and dimension (thickness, width and length)

b) Constitution of leaves

c) Camber in width direction

d) Hardness

e) Surface roughness

14.3 Delivery inspection

a) Shape and dimension (thickness, width and length)

b) Constitution of leaves

c) Camber in width direction

15 Designation of product

15.1 Designation of leaf

The designation of leaf shall be in accordance with the number of this Standard or title of this Standard, nominal size, length and type.

Example 1 **JIS B 7524** 0.03 75 A

Example 2 Feeler gauges 1.00 100 B

15.2 Designation of feeler gauge set

The designation of feeler gauge set shall be in accordance with the number of this Standard or title of this Standard and designation of type.

Example 1 **JIS B 7524** 150 A 13

Example 2 Feeler gauges 100 B 25

16 Marking

16.1 Marking on leaf

The following items shall be indelibly marked on the leaf. For the marking on the feeler gauge set, a) and c) may be omitted for each leaf.

a) Manufacturer's name or its abbreviation

b) Nominal size

c) Serial number

16.2 Marking on feeler gauge set

The following items shall be indelibly marked on the surface of the case of the feeler gauge set.

a) Manufacturer's name or its abbreviation

b) Designation of type

c) Serial number

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*.

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