

JIS

JAPANESE INDUSTRIAL STANDARD

Precision surface plates

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In the event of any doubt arising,
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Precision surface plates

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1. Scope

This Japanese Industrial Standard specifies the rectangular or square precision surface plates (hereafter referred to as surface plates), of which sizes of working surfaces ranging from 160 mm x 100 mm to 2500 mm x 1600 mm.

Remarks 1. The applicable standards to this Standard are given in the following:

JIS G 5501-Grey iron castings

JIS Z 8103-Glossary of terms used in instrumentation

2. The equivalent International Standards to this Standard are the following:

ISO 8512-1-1990 Surface plates - Part 1: Cast iron

ISO 8512-2-1990 Surface plates - Part 2: Granite

2. Definitions

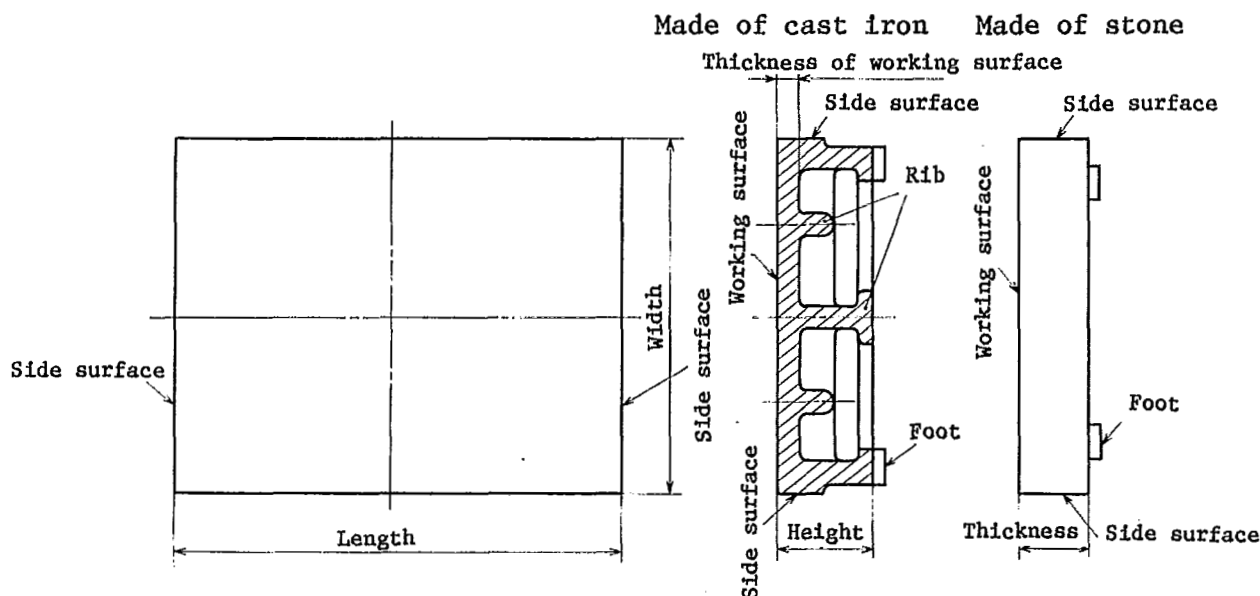
For the purposes of this Standard, the following definitions apply, and others are in accordance with JIS Z 8103.

- (1) precision surface plates The board shaped structures generally made of cast iron or stone, providing precise flat surfaces or datum flat surfaces for multipurposes on their upper surfaces as the working surfaces.
- (2) flatness of working surface The magnitude of the deviation from the working surface of the geometrically true plane. It is expressed by the dimension of the interval where the interval between the two parallel flat planes becomes the minimum, when the working surface has been put between two geometrically true parallel flat planes.

3. Names of respective parts

The names of respective parts of the surface plate to be used in this Standard shall be in accordance with Fig. 1.

Fig. 1. Names of respective parts



Remarks: These Figures are those for simply indicating the names of respective parts, but are not those for specifying the construction and shape.

4. Types and grades

4.1 Types The types of the surface plates shall be classified into made of cast iron and made of stone according to the materials, and the nominal sizes of the working surfaces shall be in accordance with Table 1.

Table 1. Nominal sizes of working surfaces
Unit: mm

Shape	Nominal size
Rectangular shape	160 × 100
	250 × 160
	400 × 250
	630 × 400
	1 000 × 630
	1 600 × 1 000
	2 000 × 1 000
	2 500 × 1 600
Square shape	250 × 250
	400 × 400
	630 × 630
	1 000 × 1 000

4.2 Grades The grades of the surface plates shall be the three grades of grade 0, grade 1 and grade 2 according to the flatnesses of working surfaces.

5. Performances

5.1 Flatnesses of working surface To the flatnesses of the working surfaces, two kinds of specifications of the flatness in respect to the overall surface of the working surface and the flatness of local area in respect to a local area of 250 mm x 250 mm at an arbitrary position of the working surface shall apply.

Remarks: The peripheral rim portion of the working surface corresponding to 2 % of the size of the surface plate width (however, it shall be 20 mm in maximum.) may be excluded from the application of the prescription of flatness, if its portion is in the condition where it does not cause any inconvenience in use.

5.1.1 Flatness of overall surface The tolerance values for the flatness of the overall surface of the working surface shall be in accordance with Table 2.

Informative reference: In the case where the size of the working surface is 2500 mm x 1600 mm or under and is different in size from the nominal size, the tolerance values for the flatness shall be calculated in accordance with Informative Reference 1.

Table 2. tolerance values for flatnesses of overall surfaces

Nominal size of working surface mm	Tolerance values for flatness of overall surface ⁽¹⁾⁽²⁾ μm			Excluding width of peripheral portion mm	Length of diagonal line mm (Informative reference)
	Grade 0	Grade 1	Grade 2		
160 × 100	3	6	12	2	188
250 × 160	3.5	7	14	3	296
400 × 250	4	8	16	5	471
630 × 400	5	10	20	8	745
1 000 × 630	6	12	24	13	1 180
1 600 × 1 000	8	16	33	20	1 880
2 000 × 1 000	9.5	19	38	20	2 236
2 500 × 1 600	11.5	23	46	20	2 960
250 × 250	3.5	7	15	5	354
400 × 400	4.5	9	17	8	566
630 × 630	5	10	21	13	891
1 000 × 1 000	7	14	28	20	1 414

Notes ⁽¹⁾ These shall be of at 20°C in temperature and 58 % in humidity.

⁽²⁾ The calculation formula shall be given in Informative Reference 1.

Furthermore, values have been rounded off to the nearer values of 0.5 μm for grade 0 and 1 μm for grades 1 and 2.

5.1.2 Flatness of local area The tolerance values for flatnesses of local area 250 mm x 250 mm at an arbitrary position shall be in accordance with Table 3.

Remarks: As the surface plate of which the length of the diagonal line is smaller than 354 mm has no measuring area of 250 mm x 250 mm, the prescription of the flatness of local area shall not be applicable.

Table 3. Tolerance values of flatness for local area
Unit: μm

Grade	Tolerance values of flatness for local area ⁽¹⁾
0	3.5
1	7
2	15

5.2 Rigidity of surface plate The surface plate of 400 mm x 250 mm or over in the size of working surface, when it has been subjected to a load on the center of its working surface, shall be that of having such a rigidity as not exceeding 1 μm per 200 N in the flexure at the loaded portion.

6. Shapes and dimensions

The tolerance values for respective sizes of the working surfaces of the surface plates shall be ± 5 % of its nominal sizes.

Furthermore, the heights, thicknesses and masses for the general surface plates shall be as given in Informative Reference Table 1.

Informative Reference Table 1.
Heights, thicknesses and masses for surface plates

Nominal size of working surface mm	Made of cast iron		Made of stone	
	Height mm (Informative reference)	Mass kg (Informative reference)	Minimum thickness mm (Informative reference)	Mass kg (Informative reference)
160 × 100	—	—	—	—
250 × 160	—	—	—	—
400 × 250	100	25	50	15
630 × 400	150	90	70	50
1 000 × 630	200	300	100	180
1 600 × 1 000	250	900	160	720
2 000 × 1 000	280	1 350	200	1 120
2 500 × 1 600	320	2 800	250	2 800
250 × 250	80	20	50	10
400 × 400	100	40	70	30
630 × 630	150	150	70	80
1 000 × 1 000	200	500	100	280

7. Construction and appearance

The construction and appearance of the surface plates shall be in accordance with the following:

- (1) The surface plates shall be provided with three feet.
- (2) The ribs of the cast iron surface plates shall be so constructed as to lessen the deformations of surface plates as far as possible.
- (3) The side surfaces of the cast iron surface plates shall be so constructed as to facilitate handling and transportation by providing such as grips or holes.
- (4) The working surfaces of the grade 0 and grade 1 cast iron surface plates shall be finished to good quality scraping or to the finish equal to or superior to this, and of the grade 2 may be by the same method or by machine finish.

Furthermore, the distribution of the touching faces of the scraper shall be uniform.