

■ Performance evaluation method for the caliper

JIS B 7507 was revised and issued in 2016 as the Japanese Industrial Standards of the caliper, and the "Instrumental error" indicating the indication error of the caliper has been changed to "Maximum Permissible Error (MPE) of indication".

The "Instrumental error" of the old JIS adopts acceptance criteria that the specification range (precision specification) equals acceptance range, and the OK/NG judgment does not include measurement uncertainty. (Fig. 1)

The "Maximum Permissible Error (MPE) of indication" of the new JIS adopts the basic concept of the OK/NG judgment taking into account the uncertainty adopted in the ISO standard (ISO 14253-1).

The verification of conformity and nonconformity to the specifications is clearly stipulated to use the internationally recognized acceptance criteria (simple acceptance) when the specification range equals the acceptance range, and it is accepted that the specification range equals the acceptance range if a given condition considering uncertainty is met.

In this case, the internationally recognized acceptance criterion is ISO/TR 14253-6:2012. (Fig. 2)

The following describes the standard inspection method including the revised content of JIS 2016.

Fig. 1 Old JIS Instrumental error
JIS B 7507-1993

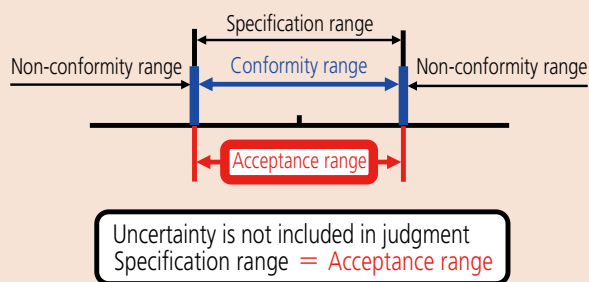
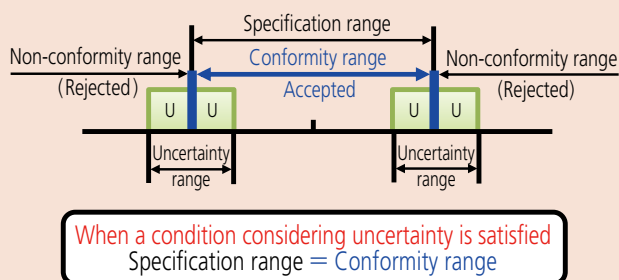


Fig. 2 New JIS Maximum Permissible Error (MPE)
JIS B 7507: 2016 (ISO/TR 14253-6: 2012)



■ Maximum Permissible Error of partial measuring surface contact error E_{MPE} [JIS B 7507:2016]

The partial measuring surface contact error of a caliper is an indication error applied to the outside measurement.

Table 1 shows the Maximum Permissible Error E_{MPE} of the indication value of the partial measuring surface contact error.

The value can be obtained by inserting a gauge block, or an equivalent or higher gauge, between the outside measuring surfaces (Fig. 3), measuring the different position along the jaw at an arbitrary position in the measuring range and then subtracting the dimension of the gauge from the indicated value.

■ Scale Shift Error S_{MPE} [JIS B 7507: 2016]

The scale shift error in a caliper is an indication error of the inside measurement, depth measurement, etc., if a measuring surface other than the outside measuring surface is used.

The Maximum Permissible Error S_{MPE} of the indication value of the inside measurement equals a value indicated in Table 1. The Maximum Permissible Error S_{MPE} of the depth measurement is obtained by adding 0.02 mm to a value indicated in Table 1.

The indication error of the inside measurement can be obtained by measuring the inside dimensions with the inside measuring surface of a gauge block, or using an equivalent or higher gauge, at an arbitrary position in the measuring range (Fig. 4), and then subtracting the dimension of the gauge from the indicated value.

Unit: mm

Measurement length	Scale interval, graduation or resolution	
	0.05	0.02
50 or less	± 0.05	± 0.02
Over 50, 100 or less	± 0.06	± 0.03
Over 100, 200 or less	± 0.07	
Over 200, 300 or less	± 0.08	± 0.04

Note: E_{MPE} includes the measurement error arising from the straightness, flatness and parallelism of the measuring surface.

Table 1: Maximum Permissible Error E_{MPE} of partial measuring surface contact error

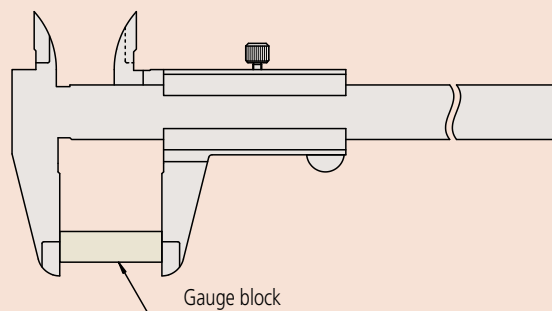


Fig. 3: Measurement of partial measuring surface contact error

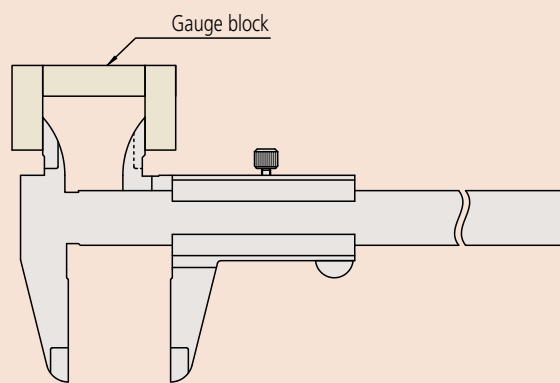


Fig. 4: Measurement of scale shift error (inside measurement)

The "Instrumental error" indicating the indication error of JIS has been changed to "Maximum Permissible Error (MPE) of indication" in the following three models:

- 530 Series M-Shape Standard Caliper described in D-11 (530-101 530-108 530-109)
- 532 Series M-Shape Fine-feed Caliper described in D-13 (All models)
- 531 Series M-Shape Automatic Stop Caliper described in D-13 (All models)