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Hopper scales

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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 B 7603:1986** is replaced with **JIS B 7603:1997**.

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Hopper scales

Introduction This Japanese Industrial Standard has been prepared, on a basis of OIML International Recommendation R 107 (Hopper scales), by the revision of **JIS B 7603**, established in 1986, with the purpose not only to supplement the environmental tests to conform to the Recommendation but also to make consideration of such actual conditions as electronic development.

1 Scope This Japanese Industrial Standard specifies the electronic automatic balance by which the masses of various type of raw materials under bulk condition, and of products are dividedly weighed, having function capable of carrying out accuracy inspection among performance inspections at the set place.

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards indicated below shall be applied.

JIS Z 8103 *Glossary of terms used in instrumentation*

JIS Z 8306 *General rules for scale of industrial instruments*

3 Definitions For the purpose of this Standard, the definitions in **JIS Z 8103** apply, and the rest of the terms are as follows:

- a) **measured value** Value that has been obtained by one weighing.
- b) **integrated value** Value that has been obtained by integration of measured values.
- c) **definite mass** Mass preliminarily set to be measured at one time.

Remarks : The apparatus by which the definite mass is preliminarily set is called a definite-mass setting apparatus.

- d) **total mass** Total mass obtained by integrating measured values.

Remarks : The apparatus by which the total mass is preliminarily set is called a total-mass setting apparatus.

- e) **the minimum integrated mass** The minimum mass which can integrate with satisfying the performance of this Standard.
- f) **measuring range** The range of mass measurable by one weighing under the dynamic condition satisfying the performance of this Standard.
- g) **maximum capacity** When, after the mass to be measure at a time is set at the maximum value, weighing is repeatedly carried out, the mass that is weighed or integrated per unit time is called the maximum capacity, and obtained by the following formula.

$$Q = M_{\max} \times \frac{3600}{T}$$

where, Q : the maximum capacity (t/h or kg/h)

$M_{\max}$: the maximum set value (t or kg)

T : average time needed for one weighing (s)

- h) **integration device** Device to integrate measured values.
- i) **supply device** Device to supply the substances to be weighed in a measuring hopper.
- j) **hopper for measuring** Container for receiving the substances for making measuring.
- k) **exhaust device** Device to exhaust the substances measured from measuring hopper.
- l) **measuring apparatus** Apparatus to transmit the information about the mass of substances to be measured.
- m) **control apparatus** Apparatus to control and manage the operation of hopper scales.

4 Classification Hopper scales are classified into the following four types according to the way for measuring.

4.1 Type to measure supplied amount The mass supplied in a measuring hopper is measured.

- a) **Definite-amount measuring type** The definite mass is set, and then it can be repeatedly measured.
- b) **Cumulative measuring type** Corresponding to the previously set definite mass of different substances to be measured, the different substances are successively accumulated on one hopper scale, and measured.

4.2 Type to measure passed amount The mass exhausted from a measuring hopper is measured.

- a) **Net-weight calculating type** Both the mass supplied in a measuring hopper and the mass left in it after exhausting are measured, and the difference of two measurements is set as measured value.
- b) **Exhausted-mass measuring type** After measuring the mass supplied into a measuring hopper, definite mass that was previously set is exhausted.

5 Grades The grades of hopper scales are classified to Grade 0.1, Grade 0.2, Grade 0.5, Grade 1, and Grade 2, depending on its performances.

6 Performances

6.1 Accuracy The accuracy of hopper scale is as follows depending on its grade.

a) Dynamic accuracy

- 1) **Dynamic accuracy of measured value** The dynamic allowable error of measured value shall be as shown in Table 1 according to its grade.

Table 1 Dynamic allowable error of measured value

Grade	Allowable error (%)
Grade 0.1	± 0.1 of upper limit of measuring range
Grade 0.2	± 0.2 of upper limit of measuring range
Grade 0.5	± 0.5 of upper limit of measuring range
Grade 1	± 1.0 of upper limit of measuring range
Grade 2	± 2.0 of upper limit of measuring range

- 2) **Dynamic accuracy of integrated value** The dynamic allowable error of integrated value shall be as shown in Table 2 according to its grade. This is applicable to the integrated value that is not less than the minimum integrated mass.

Table 2 Dynamic allowable error of integrated value

Grade	Allowable error (%)
Grade 0.1	± 0.1 of integrated value
Grade 0.2	± 0.2 of integrated value
Grade 0.5	± 0.5 of integrated value
Grade 1	± 1.0 of integrated value
Grade 2	± 2.0 of integrated value

- b) **Static accuracy** The static allowable error of measured value shall be as shown in Table 3 according to its grade.

Table 3 Static allowable error of measured value

Grade	Allowable error (%)
Grade 0.1	± 0.05 of upper limit of measuring range
Grade 0.2	± 0.1 of upper limit of measuring range
Grade 0.5	± 0.25 of upper limit of measuring range
Grade 1	± 0.5 of upper limit of measuring range
Grade 2	± 1.0 of upper limit of measuring range

6.2 The minimum integrated mass The minimum integrated mass shall be the value the same or more as shown in Table 4 according to its grade.