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NATIONAL METROLOGY VERIFICATION
REGULATION OF THE PEOPLE'S REPUBLIC OF CHINA

JJG 1036-2008

Electronic balance

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Issued on: February 20, 2008

Implemented on: May 20, 2008

Issued by: General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China

Table of contents

Verification regulation for electronic balance.....	4
1 Scope	4
2 References	4
3 Terms and units of measurement.....	4
3.1 Terms	4
3.2 Units of measurement.....	5
4 Overview	5
5 Measurement performance requirements.....	5
5.1 Actual interval value (d)	5
5.2 Verification interval value (e).....	5
5.3 Verification interval number (n).....	5
5.4 Accuracy level.....	6
5.5 Maximum permissible error (MPE)	7
6 General technical requirements.....	8
6.1 Appearance requirements.....	8
6.2 General requirements of structure	9
6.3 Indication of weighing results.....	11
6.4 Level indicator.....	12
6.5 Zero-setting device	12
6.6 Zero-tracking device	12
6.7 Tare device	12
7 Measurement device control	12
7.1 Verification conditions	12
7.2 Verification items.....	14
7.3 Verification method	14
7.4 Processing of verification results	16
7.5 Verification period	16
Appendix A Electronic balance verification record format	17
Appendix B Electronic balance verification certificate inside page format.....	19
Appendix C Electronic balance verification result notice inside page format .	20

Verification regulation for electronic balance

1 Scope

This regulation applies to the first verification, follow-up verification, and verification in use of the electronic balance (hereinafter referred to as the balance).

2 References

This regulation adopts the relevant contents of the international recommendations R76 Non-automatic weighing instruments of the International Organization Legal Metrology (OIML) from the aspects of measurement performance requirements and key technical indicators.

When using this regulation, care shall be taken to use the current valid version of the aforementioned references.

3 Terms and units of measurement

3.1 Terms

3.1.1 Zero-setting device: It refers to the device which sets the indication value to zero when there is no load on the scale pan.

3.1.2 Zero-tracking device: It refers to the device which automatically maintain the zero indication value within a certain limit.

3.1.3 Tare device: It refers to the device which sets the indication value to zero when there is load on the scale pan.

3.1.4 Multiple range: There are two or more weighing ranges, which have different maximum capacity and different actual intervals, AND each weighing range can be from zero to the corresponding maximum capacity.

3.1.5 Multi-interval: There is only one weighing range, which is divided into several local weighing ranges in accordance with different actual intervals. The local weighing range is automatically determined based on the increase or decrease in the load applied.

3.1.6 Maximum capacity: It refers to the maximum weighing capacity excluding the added tare weight.

3.1.7 Minimum capacity: It refers to the load value below which an excessive relative error may be caused.

3.1.8 Weighing range: It refers to the range between the minimum capacity and the maximum capacity.

3.2 Units of measurement

The units of measurement are kilograms (kg), grams (g), milligrams (mg), micrograms (μg), and tons (t).

4 Overview

The electronic balance is a metering device which determines the mass of the object by the gravity acting on the object, AND indicates the output result by the use of numerical values. It is used for weight mass value transfer, object mass measurement, volume measurement, and magnetic measurement. It can also be used to determine other magnitudes, quantity, parameters, or characteristics related to mass.

5 Measurement performance requirements

5.1 Actual interval value (d)

It refers to the difference between the two adjacent indication values.

5.2 Verification interval value (e)

It refers to the value which is used for balance grade division and metrological verification AND expressed in mass unit. The verification interval value e is selected by the manufacturer in accordance with the requirements of Table 1.

5.2.1 Verification interval value e may be in the form as followings:

$$1 \times 10^k \text{ OR } 2 \times 10^k \text{ OR } 5 \times 10^k$$

Wherein k is a positive integer, a negative integer or zero.

5.2.2 Verification interval value e is defined by:

$$d \leq e \leq 10d$$

In general, the verification interval value e shall also be subject to $e = 10^k \text{ kg}$, where k is a positive integer, a negative integer or zero.

5.3 Verification interval number (n)

The ratio of the maximum capacity to the verification interval value, $n = \text{Max}/e$.

- f) Marking of the certificate for measurement instrument manufacture;
- g) Maximum capacity: expressed as Max;
- h) Minimum capacity: expressed as Min;
- i) Actual interval value: d;
- j) Verification interval value: e;
- k) Exit-factory number;
- l) Exit-factory date (or given in some form).

6.1.1.2 Necessary markings at the appropriate time

- a) Power supply voltage ... V;
- b) Power frequency ... Hz;
- c) As for the balance which is composed by several independent but mutually related modules, each module shall have identification marking;
- d) Special temperature limits when complying with normal working requirements.

6.1.2 Requirements for marking

6.1.2.1 Handwriting size and shape must be clear and standardized;

6.1.2.2 Signage with illustrative markings must be firm and reliable, AND it must be difficult to rub, destroy or disassemble;

6.1.2.3 Signs shall be installed (placed) in a clearly readable position on the balance.

6.2 General requirements of structure

6.2.1 Applicability

6.2.1.1 The design of the balance shall be suitable for the intended use.

6.2.1.2 The structure of the balance shall be fine and strong, AND to maintain good measurement performance in its service period;

6.2.1.3 It shall be able to place the load easily and safely on the weighing pan of the balance. As for the balance equipped with the hanging pans, it must ensure that the hanging system is firm and reliable, AND it shall not produce slippage.

6.2.2 Reliability

6.2.4.3 The balance may be provided with an interface to connect it to an external device. The measurement function and measurement data of the balance shall not be affected by the peripheral equipment, other receiving instruments, OR the interface acting on the interface.

6.2.4.4 Under the normal use conditions, the balance shall have good pressure resistance and insulation performance.

6.3 Indication of weighing results

6.3.1 Reading device

6.3.1.1 Under normal conditions of use, the reading of the weighing results must be accurate, reliable and clear.

6.3.1.2 When the maximum capacity + 9e is exceeded, the balance shall have no numerical indication, OR otherwise indicate the overload overflow symbol.

6.3.2 Indication form

6.3.2.1 Weighing results must contain the units of measurement of mass or other symbols;

6.3.2.2 For the indication of any one of the weighing results, only one unit of measurement as selected shall be used;

6.3.2.3 When there is more than one indicating device on the balance, the indication of each indicating device must be consistent when measuring each load point.

6.3.2.4 The indication of the balance is consistent with the printed result.

6.3.3 Digital indication

6.3.3.1 The digital indication shall show at least one digit from the far right;

6.3.3.2 Decimal and integer shall be separated by a decimal mark (dot or comma); at the time of indication, the decimal mark shall have at least one digit to the left, and the remaining digits are on the right;

6.3.3.3 When the interval value is changed automatically, the decimal mark shall remain in its original place.

6.3.4 Printing

6.3.4.1 The printing results must be accurate, clear, easy to read, not erasable, and permanent;

6.3.4.2 The printing number height is at least 2 mm;

- b) Minimum capacity;
- c) The load corresponding to the maximum permissible error transition point (or approaching to the maximum permissible error transition point);
- d) Maximum capacity.

7.3.4.3 Whether for loading or unloading, it shall ensure sufficient number of measurement points is available; as for the balance for the first verification, the number of measurement points shall be not less than 10; as for the balance for the follow-up verification or verification in use, the number of measurement points may be appropriately reduced, BUT it shall be not less than 6.

$E_c \leq MPE$, the indication error shall be the error after zero correction.

7.4 Processing of verification results

The balance passing the verification as specified in this regulation will be awarded with the verification certificate (the inside page format is as shown in Appendix B); AND the balance failing to pass the verification as specified in this regulation will be issued of the verification result notice (the inside page format is as shown in Appendix C), AND the nonconformance items will be indicated.

7.5 Verification period

The verification period of balance is generally not more than 1 year.

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