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Electronic screw weigher

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(OIML R50-1:1997E, MOD)

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Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009.

This standard is redrafted and modified in relation to the International Recommendation of OIML R50-1 “Continuous totalizing automatic weighing instruments (belt weighers) - Part 1: Metrological and technical requirements - Tests” (1997E).

Since the current management mode of measuring products in China is different from the international ones, this standard has more adjustments in structure compared with R50 International Recommendations. For the convenience of comparison, a comparative list of the clauses of this standard to the clauses of International Recommendation is given in informative appendix A.

Due to the legal requirements of China and the special needs of the industry, this standard has been modified when international recommendations are adopted. These technical differences are indicated by a single vertical line in the margin of the clause to which they refer. A list of technical differences and their reasons is given in Appendix B for reference.

This standard is proposed by China National Light Industry Council.

This standard shall be under the jurisdiction of China Weighing Instrument Standardization Technical Committee (SAC/TC97).

Drafting organizations of this standard: Saimo Electric Co., Ltd., Jiangsu Institute of Metrology, Nanjing San’ai Industrial Control Co., Ltd., Tongling City SSS Electronics Co., Ltd.

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Electronic screw weigher

1 Scope

This standard specifies the terms, product models, requirements, test methods, inspection rules, marking, packaging, transportation, and storage of electronic screw weighers (also known as screw reamer scales, screw feeder scales, hereinafter referred to as “screw weighers”).

This standard also provides standardized requirements and test procedures for testing the metrological or technical characteristics of screw weighers in a traceable manner.

This standard is applicable to the continuous accumulating automatic weighing apparatus (electronic screw weighers) of the screw conveyor type, which works in a continuous weighing method by using the principle of gravity, is used with single speed, multi-speed, or variable-speed screw conveyors together, and can determine the flow rate and cumulative mass of bulk materials.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 191 Packaging - Pictorial marking for handling of goods (GB/T 191-2008, ISO 780:1997, MOD)

GB 755 Rotating electrical machines - Rating and performance (GB 755-2008, IEC 60034-1:2004, IDT)

GB/T 2423.1 Environmental testing - Part 2: Test methods - Tests A: Cold (GB/T 2423.1-2008, IEC 60068-2-1:2007, IDT)

GB/T 2423.2 Environmental testing - Part 2: Test methods - Tests B: Dry heat (GB/T 2423.2-2008, IEC 60068-2-2:2007, IDT)

GB 5226.1 Electrical safety of machinery - Electrical equipment of machines - Part 1: General requirements (GB 5226.1-2008, IEC 60204-1:2005, IDT)

GB/T 7551 Load cells

GB/T 7724 Electronic weighing meter

GB/T 13384 General specifications for packing of mechanical and electrical product

GB 14249.1 Safety requirements for electronic weighing instruments

GB/T 14250-2008 Terminology of weighing instruments

GB/T 17626.2 Electromagnetic compatibility - Testing and measurement techniques - Electrostatic discharge immunity test (GB/T 17626.2-2006, IEC 61000-4-2:2001, IDT)

GB/T 17626.3 Electromagnetic compatibility - Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test (GB/T 17626.3-2006, IEC 61000-4-3:2002, IDT)

GB/T 17626.4 Electromagnetic compatibility - Testing and measurement techniques - Electrical fast transient/burst immunity test (GB/T 17626.4-2008, IEC 61000-4-4:2004, IDT)

GB/T 17626.5 Electromagnetic compatibility - Testing and measurement techniques - Surge immunity test (GB/T 17626.5-2008, IEC 61000-4-5:2005, IDT)

GB/T 17626.6 Electromagnetic compatibility - Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields (GB/T 17626.6-2008, IEC 61000-4-6:2006, IDT)

GB/T 17626.11 Electromagnetic compatibility - Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests (GB/T 17626.11-2008, IEC 61000-4-11:2004, IDT)

GB 19517 National safety technical code for electric equipment

GB/T 26389-2011 Method of classified type of weighing instrument products

JB/T 5943 Construction machinery - General specifications for welding parts

JB/T 8828 Common specification for cutting

QB/T 1588.1 Light industry machinery - General specification for welding parts

3 Terms and definitions

The terms and definitions defined in GB/T 14250-2008 and the followings apply to this document.

3.1 screw weigher

It is an automatic weighing instrument that continuously weighs bulk materials on the screw conveyor with no need of subdividing the mass or interrupting the movement of the screw conveyor.

3.1.1 Classification of screw weighers

3.1.1.1 single speed screw weigher

A screw weigher that is designed to operate at a single speed (referred to in this standard as nominal speed).

3.1.1.2 variable speed screw weigher

A screw weigher that is designed to operate at more than one speed (the speed varies continuously).

3.1.1.3 multi-speed screw weigher

A screw weigher that is designed to operate at more than one speed (the speed varies intermittently).

3.2 Structure

3.2.1 load receptor

The load-bearing part of a screw weigher.

3.2.2 screw conveyor

The equipment for conveying materials with screws.

3.2.3 displacement transducer

A device on a screw conveyor that provides screw speed information.

3.3 Error

3.3.1 error (of indication)

The value, which is expressed in mass units, of the difference between the increment of the readings from the totalization indicating device of a screw weigher and the (conventional) true value of the mass of the material passing through the screw weigher.

3.3.2 intrinsic error

The error of a screw balance that is determined under reference conditions.

capacity is applied to or removed from the load receptor, there shall be an obvious difference between the no-load and the loaded zero indication value of the screw weigher:

--- 0.05% for class-0.5 screw weighers;

--- 0.1% for class-1 screw weighers;

--- 0.2% for class-2 screw weighers;

--- 0.5% for class-5 screw weighers.

5.8 Exit-factory test

5.8.1 Maximum permissible error of zero

The metrological requirements are the same as 5.7.2.

5.8.2 Discrimination of zero

The metrological requirements are the same as 5.7.3.

5.8.3 Repeatability

When the test conditions are the same and the simulated load of the same mass (usually hanging weight) is used, the relative error of several weighing results obtained under the actual equal flow rate shall meet the requirements of 5.2.1, and the difference shall not exceed the absolute value of the maximum permissible error of corresponding accuracy class for automatic weighing specified in 5.2.1.

6 Technical requirements

6.1 Technical requirements for the structure

The mechanical structure shall meet the following requirements:

--- The overall structure shall be firm and the operation shall be stable;

--- It shall be protected from corrosion;

--- The material blocking shall be avoided;

--- The load receptor shall be able to hold the standard weight easily and safely, if the weight cannot be placed, an additional support device shall be provided;

--- The blades of the screw weigher shall have sufficient wear resistance;

--- The driving motor of the screw weigher shall have a shaft output power that matches its workload and meet the technical requirements of GB/T 755. The enclosure protection levels of the driving motor, reducer, and transmission mechanism shall be suitable for their working environment, so as to facilitate the replacement of lubricating grease. The driving motor, reducer, and transmission mechanism shall be equipped with safety shields to prevent the rotating parts from being exposed;

--- Metal cutting parts shall meet the requirements of JB/T 8828;

--- Welding parts shall meet the requirements of JB/T 5943 and QB/T 1588.1;

--- The size of the main components used in the screw weigher shall meet the design requirements.

6.2 Safety of operation

6.2.1 Accidental maladjustment

For a screw weigher, there shall be no accidental failure or control component maladjustment that is not obvious and may interfere with the metrological performance and normal function of the screw weigher.

6.2.2 Operational adjustment

A screw weigher shall have a device to prevent the general totalization indicating device from returning to zero arbitrarily.

During the automatic weighing process, the operational adjustment or the reset of the indicating device related to the weighing result shall not be carried out.

6.2.3 Fraudulent use

A screw weigher shall not have features that might facilitate fraudulent use.

6.2.4 Remote indicating device

Any remote indicating device equipped for a screw weigher shall at least provide the “out-of-range indication” function specified in 6.4.

6.2.5 Interlocking function

If the weighing instrument has been turned off or disabled, the screw conveyor shall stop running, or an audible or visual alarm signal shall be issued.

7.4.4.2.4 Variable speed screw weighers

In addition to the tests specified in 7.4.4.2.2, 3 additional individual tests shall be performed at each feeding flow rate specified in 7.4.4.2.2; during each test, the speed shall be varied over the entire speed range.

7.5 Exit-factory inspection

7.5.1 Test conditions

The exit-factory inspection of the screw weigher is a test for the whole machine of the screw weigher. The screw weigher shall be assembled completely, and it shall be installed and fixed on the test site.

7.5.2 Maximum permissible error of zero

The test shall be carried out according to the steps and requirements of 7.4.2.

It shall comply with the provisions of 5.8.1.

7.5.3 Discrimination of the indication device used for zero-setting

The test shall be carried out according to the steps and requirements of 7.4.3.

It shall comply with the provisions of 5.8.2.

7.5.4 Repeatability

It shall comply with the provisions of 5.8.3.

a) Apply a weight of 20% of the maximum capacity (Max) to the screw weigher, and totalize Σ_{min}. Remove the weight, allow the screw weigher to run without load, and reset the indication to zero. Repeat the test with the same weight.

b) Repeat the entire test with a weight of 50% of the maximum capacity.

c) Repeat the entire test with a weight of 75% of the maximum capacity.

d) Repeat the entire test with a weight of the maximum capacity.

The maximum permissible error of each test shall be in accordance with the provisions of the corresponding accuracy class of the initial inspection for automatic weighing in Table 1 specified in 5.2.1.

For the “repeatability”, the relative error of each test shall not exceed the absolute value of the corresponding maximum permissible error of the initial inspection for automatic weighing in 5.2.1.

--- Volume.

9.2 Packaging

9.2.1 The packaging of weighing instruments shall meet the requirements of GB/T 13384.

9.2.2 The complete machine or parts shall be packed with firm materials. The parts in the box shall be fixed or padded to prevent movement and bumps. The packing box shall be strong, rain-proof, and moisture-proof.

9.2.3 When the totalization indicating device and the load cell are individually packaged and delivered, they shall be protected by loose cushioning materials.

9.2.4 Parts that are not convenient for packing shall be tightly bound and necessary protection measures shall be taken.

9.2.5 All packaging materials shall not cause the surface color change or corrosion of product paint or electroplated parts.

9.2.6 The technical information provided attached to the product shall include:

--- Instruction for use;

--- Product certification;

--- Packing list;

--- General assembly drawing or installation drawing.

9.3 Transportation

The weighing instruments shall be handled with care during transportation, loading, and unloading; throwing, bumping, and placing upside down are prohibited; they shall be protected from severe vibration and rain.

9.4 Storage

9.4.1 The storage of load cells shall comply with the relevant regulations in GB/T 7551. The storage of totalization indicating devices shall comply with the relevant regulations in GB/T 7724.

9.4.2 Other components shall be stored in a well-ventilated room with a temperature not lower than -25 °C and not higher than 50 °C, and relative humidity not greater than 90%; the room shall not contain corrosive gases.

9.4.3 Large bare parts shall be protected from rain or moisture during storage; supports

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