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Specification of Infrared Gas Analyzers

红外线气体分析器 技术条件

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Specification of Infrared Gas Analyzers

1 Scope

This Standard specifies the requirements, test methods, inspection rules, marking, packaging, transportation and storage of infrared gas analyzers.

This Standard is applicable to the non-dispersive infrared gas analyzers (hereinafter referred to as the instrument) for the continuous determination of a certain or several components in mixed gas.

2 Normative References

Through the reference in this Standard, the clauses of the following documents become clauses of this Standard. In terms of references with a specified date, all the subsequent modification sheets (excluding the corrected content) or revised versions are not applicable to this Standard. However, the various parties that reach an agreement in accordance with this Standard are encouraged to explore the possibility of adopting the latest version of these documents. In terms of references without a specified date, the latest version is applicable to this Standard.

GB/T 191-2008 Packaging - Pictorial Marking for Handling of Goods (ISO 780:1997, MOD)

GB/T 2829-2002 Sampling Procedures and Tables for Periodic Inspection by Attributes (apply to inspection of process stability)

GB 4793.1-2007 Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use - Part 1: General Requirements (IEC 61010-1:2001, IDT)

GB/T 11606-2007 Methods of Environmental Test for Analytical Instruments

GB/T 13384-2008 General Specifications for Packing of Mechanical and Electrical Product

GB/T 18268-2000 Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements (idt IEC 61326-1:1997)

GB/T 25930 Test Method of Infrared Gas Analyzers

3 Terms and Definitions

The following terms and definitions are applicable to this Standard.

deposits, etc.

4.2.2 The surface of the instrument shall be smooth and flat, with uniform paint coating, and no peeling or corrosion.

4.2.3 The joints of the parts shall be neat, and free of burrs, sharp edges and roughness; the rigid connection parts shall not be loose.

4.2.4 All designations and markings shall be clear and durable; the fasteners shall be firm and reliable; no loosening or falling-off is allowed.

4.3 Safety

4.3.1 Markings and documents

The markings and documents shall comply with the relevant stipulations of Chapter 5 of GB 4793.1-2007.

4.3.2 Requirements for protection against electric shock

4.3.2.1 Contact current

The contact current of the instrument powered by the AC power grid shall comply with the relevant stipulations of 6.3 of GB 4793.1-2007.

4.3.2.2 Protective grounding

The protective grounding of the instrument powered by the AC power grid shall comply with the relevant stipulations of 6.5.1 of GB 4793.1-2007.

4.3.2.3 Dielectric strength

For the instrument powered by the AC power grid, apply a test voltage of 1,500 V between the power input terminal and the accessible conductive part for 1 min; there shall be no breakdown or repeated arcing.

NOTE: during the design of the instrument, Appendix A may be taken as a reference to determine the test voltage value.

4.3.3 Other requirements

If the instrument has safety-related mechanical hazards, mechanical shock and collision, flame spread, temperature and heat resistance, liquid hazards, radiation, sound pressure and ultrasonic pressure, release of gas, explosion or implosion, safety-related components, and interlocking devices specified in GB 4793.1-2007, then, it shall comply with the relevant stipulations of GB 4793.1-2007.

4.4 Preheating Time

4.10 Lag Time, Rise Time, Fall Time and Response Time

The lag time, rise time and fall time of the instrument shall be selected from the following times:

Lag time: 5 s, 10 s, 15 s, 30 s;

Rise time: 10 s, 20 s, 30 s, 40 s, 60 s, 90 s;

Fall time: 10 s, 20 s, 30 s, 40 s, 60 s, 90 s.

The response time T_{90} is the sum of the lag time and rise time (or fall time).

4.11 Influence of Ambient Temperature

The deviation of the instrument due to changes in ambient temperature shall not be greater than twice the linearity error.

4.12 Influence of Atmospheric Pressure

For every 1 kPa change in atmospheric pressure, the changes in the indicated value shall not exceed $\pm 1.5\%$ of the measuring range.

4.13 Influence of Voltage Changes

The deviation caused by voltage changes shall not exceed half of the linearity error.

4.14 Influence of Frequency Changes

The deviation caused by frequency changes shall not exceed half of the linearity error.

4.15 Influence of Tilt

The changes in the indicated value caused by the tilt of the instrument shall not be greater than the linearity error.

4.16 Interference Error

4.16.1 The interference error of water vapor shall not exceed $\pm 2\%$ of the measuring range.

4.16.2 The interference error caused by the interference component specified by the manufacturer and the user shall not exceed $\pm 2\%$ of the measuring range.

4.16.3 The interference error limit under special circumstances may be determined by the manufacturer and the user through negotiation.

4.17 Electromagnetic Compatibility

6.2.2 Type inspection

Under one of the following circumstances, type inspection shall be conducted in accordance with the requirements in 4.2 ~ 4.20:

- a) When instrument design or production is finalized;
- b) When the instrument is transferred to another factory or place of production;
- c) After the instrument is in official production, when there are relatively significant changes in structure, material and process that might affect the performance of the instrument;
- d) When the instrument production has been suspended for a long time, and then, resumed;
- e) When the instrument is in normal production, periodically, or after a certain amount of output is accumulated, an inspection shall be carried out once during the application period, which is generally 3 years;
- f) When the national quality supervision and inspection institutions at all levels requests;
- g) When there are relatively significant differences between the exit-factory inspection result and the previous type inspection.

6.2.2.1 The samples for the type inspection shall be randomly selected from the batches that pass the exit-factory inspection. The sample size is generally not less than 3 sets.

6.2.2.2 The sampling procedure of the type inspection shall comply with the stipulations of Chapter 5 in GB/T 2829-2002. The selected sampling scheme, rejectable quality level, discrimination level, sample size and determination array are shown in Table 2.

6.2.2.3 The determination of qualification and disqualification shall comply with the stipulations of 5.11 in GB/T 2829-2002.

6.2.2.4 If the product is disqualified in the type inspection, the reasons shall be analyzed and corrective measures shall be taken. After it is verified as effective, it shall be re-submitted for inspection. If it is still disqualified in the type inspection, then, the batch of sampled products shall be stopped from exiting factory, and the above-mentioned steps of analysis, correction, verification and re-submission shall be repeated, until it is qualified.

6.2.2.5 If the product is qualified in the type inspection, the batch of sampled products may be submitted for appraisal and finalization, or exit-factory and storage.

7 Marking, Packaging, Transportation and Storage of the Instrument

7.1 The instrument shall be marked with the following contents in a conspicuous position:

- a) Model, name, specification and trademark of the instrument;
- b) Name and address of the manufacturer;
- c) Exit-factory date and serial No. of the instrument;
- d) Voltage and frequency;
- e) Implemented standard;
- f) Important signs that must be marked.

7.2 The following contents shall be indicated on the instrument packaging box:

- a) Model, name and specification of the instrument;
- b) Name and address of the manufacturer;
- c) Dimensions: length (mm) × width (mm) × height (mm); gross weight and net weight (kg);
- d) The pictorial markings for packaging, storage and transportation: “FRAGILE”, “UPWARD”, “KEEP AWAY FROM RAIN” shall comply with the stipulations of GB/T 191-2008;
- e) Consignee and address.

7.3 The packaging of the instrument shall comply with the moisture-proof and shock-proof stipulations in GB/T 13384-2008.

7.4 The accompanying documents shall at least include:

- a) Packing list;
- b) List of accessories and spare parts;
- c) Certificate of qualification;
- d) Instruction manual.

7.5 During transportation and storage, the instrument must be protected from severe

Appendix A

(informative)

Determination of Test Voltage Value of Dielectric Strength

A.1 Purpose

Through the electrical clearance limit and creepage distance limit of the circuit of the instrument, determine the test voltage value of dielectric strength, and ensure the compliance with the relevant requirements of GB 4793.1-2007.

A.2 Steps of Determining Test Voltage Value

The basic steps are: identify the basic conditions – implement the electrical clearance limit and creepage distance limit – determine the test voltage value of dielectric strength.

A.2.1 Identification of basic states of the instrument

In accordance with the design conditions (power supply mode, voltage and working altitude, etc.) and structure (type, material and micro area environment, etc.) of the instrument, and combined with design drawings, identify the following states:

Categories of insulation: there are three categories of insulation: basic insulation, double insulation (basic insulation + additional insulation) and reinforced insulation.

Categories of circuit: there are three types of circuit: power grid circuit, non-power grid circuit and measurement circuit (including Type-I, Type-II, Type-III and Type-IV).

Degree of pollution: there are three degrees of pollution: 1, 2 and 3.

Grade of material: there are four grades of material: I, II, III B and III b.

A.2.2 In accordance with the identified basic state of the instrument, implement the electrical clearance limit and creepage distance limit.

A.2.2.1 The lower limit values of electrical clearance and creepage distance of power grid circuit (see Table 4 in GB 4793.1-2007).

For example:

the power supply is AC 220 V, pollution degree 1, material grade III b, thus, the electrical clearance is 1.5 mm and the creepage distance is 1.5 mm.

the power supply is DC 30 V, pollution degree 1, material grade III b, thus, the electrical clearance is 0.1 mm and the creepage distance is 0.1 mm.

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