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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 13979-2008

Replacing GB/T 13979-1992

Mass spectrometer leak detector

质谱检漏仪

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1 Scope

GB/T 13979-2008 is the Chinese national standard on mass spectrometer leak detector, in the field of chemical technology. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 28 July 2008 by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China; Standardization Administration of China, and has been in force since 1 February 2009. Classification: ICS 71.040.10, CCS N60. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This Standard specifies the requirements, test methods, inspection rules, marks, packaging, transportation, storage, quality assurance for mass spectrometer leak detector (hereinafter referred to as the leak detector). This Standard applies to leak detector that uses mass spectrometry as a detection method.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrigendum) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 191-2008, Packaging and storage marks (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 15464-1995, General-purpose specification for the packaging of instrumentation products

3 Requirements

3.1 Normal working conditions The working conditions of the leak detector shall meet:

a) Temperature: 5°C~35°C;

3.6 Leak rate audio alarm function of leak detector The leak detector shall have an audio alarm function for the leak rate of the tested workpiece.

3.7 Leak detector test port pressure measurement and control circuit For leak detectors with rough pumps, there shall be a pressure indicating instrument at the leak detection port. The error of the pressure indicating instrument shall conform to the manufacturer's standard. And it shall have the function of automatically (or manual) switching from rough extraction to leak detection within the pressure range specified by the manufacturer.

3.8 Filament protection circuit of mass spectrometer chamber of leak detector The high vacuum pumping system connected to the mass spectrometer chamber in the leak detector shall have a pressure indicating instrument and a filament protection circuit for the mass spectrometer chamber. The parameter range shall meet the manufacturer's regulations.

3.9 Time to reach the optimal working pressure of the leak detector

3.9.1 The time when the pressure of the leak detector using the oil diffusion pump reaches the best working pressure specified by the manufacturer after the high vacuum system is turned on:

a) The leak detector with liquid nitrogen shall not be longer than 0.5h;

b) The leak detector without liquid nitrogen shall not be longer than 2h.

3.9.2 For leak detectors using molecular pumps, the time for the high vacuum system to reach the optimal working pressure specified by the manufacturer shall not exceed 10min after the high vacuum system is turned on.

3.10 Minimum detectable leak rate of leak detector Under the condition of full pumping speed with the conventional leak detector, the minimum detectable leak rate of the leak

detector shall not be greater than 2x10-11Pa·m3·s-1 (to air). For leak detectors using the reverse diffusion leak detection method, the minimum detectable leak rate of the leak detector shall not be greater than 2x10-10Pa·m3·s-1 (to air).

3.11 Influence of power supply voltage change on minimum detectable leak rate of leak detector When the power supply voltage changes by ±10% from the rated value, the minimum detectable leak rate of the leak detector shall still reach the requirements in 3.10.

3.12 Time constant of leak detector The clearing time or response time of the leak detector shall be no more than 3s.

3.13 Own leakage of leak detector The high vacuum system of the leak detector shall not have leaks that can be detected by spraying helium by itself.

3.14 Complete set of leak detector According to the manufacturer's regulations.

3.15 Leak detector transportation, transportation and storage conditions In the state of transport and packaging, the leak detector is tested in accordance with the items of the alternating damp heat test, low temperature storage test, high temperature storage test and drop test of GB/T 11606-20072.4, of which the high temperature is 55°C, the low temperature is -40°C; alternating heat and humidity: relative humidity is 95%, temperature is 40°C; inclined drop height is 250mm. After the test is completed, the leak detector is placed under normal working conditions for inspection, and it shall be able to work normally.

4 Test methods

4.1 Test conditions This test method shall be carried out under the conditions specified in 3.1.

4.2 Appearance Use visual inspection and hand-touching to inspect.

4.3 Safety test

4.3.1 Insulation resistance Equipment: 500V insulation resistance meter. The power plug of the instrument is not connected to the grid. The power switch is in the on position. Use an insulation resistance meter to apply a 500V DC test voltage between the power plug phase, the middle link and the ground wire. Measure the insulation resistance after 5s of stability.

4.3.2 Insulation strength accordance with the function of automatic (or manual) switching from rough extraction to leak detection within the pressure range specified by the manufacturer. For example, set the switching point to 10Pa. When the test port is roughly drawn to 10Pa, the leak detection valve shall automatically open.

4.8 Filament protection function of mass spectrometer chamber of leak detector Adjust the throttle valve or pumping speed valve of the leak detector (or install a needle valve at the test port), so as to change the pressure in the mass spectrometer chamber. Check the

function of the filament protection circuit.

4.9 Time test to reach optimal working pressure The leak detector has been pumped to the best working pressure before the test. Then stop for more than 8h, but not more than 24h. The system is kept at low pressure. After the leak detector is turned on, write down the time and run it according to the normal operating procedure. Measure the time when the pressure of the height vacuum system reaches the value specified by the manufacturer.

4.10 Minimum detectable leak rate Install the calibrated leak on the test port of the leak detector. Connect the leak detector to the power supply via the voltage regulator. Use an appropriate voltmeter to monitor one phase of the power supply connected to the mass spectrometer room. Adjust the power supply voltage to 220V. When the mass spectrometer chamber of the leak detector is at the best working pressure specified by the manufacturer, adjust the zero position. Adjust it to helium peak. Connect a recording device to the output terminal of the display system.

a) Measure signal: Open the calibrated leak valve. Read the signal value U's at this time after 3min. Close the leak valve. Read the background value U'o after 1min. Then the signal value Us generated by the leak is: . NOTE: Select the calibration leak so that the Us value is not less than 50 times the minimum detectable signal.