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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 10591-2006

Replacing GB/T 10591-1989

**Specifications for high temperature / low air pressure testing
chambers**

高温/低气压试验箱技术条件

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Foreword

GB/T 10591-2006 was issued on 3 April 2006 by the General Administration of Quality Supervision, Inspection and Quarantine and the Standardization Administration of the People's Republic of China, and has been in force since 1 October 2006. The /T in the designation marks it as a recommended national standard.

This standard is one of the series 'Specifications for environmental testing equipment'. The series consists of GB/T 10586-2006 Specifications for damp heat testing chambers, GB/T 10587-2006 Specifications for salt mist testing chambers, GB/T 10588-2006 Specifications for mould growth testing chambers, GB/T 10589-1989 Specifications for low temperature damp heat testing chambers, GB/T 10590-2006 Specifications for high and low temperature / low air pressure testing chambers, GB/T 10591-2006 Specifications for high

temperature / low air pressure testing chambers, GB/T 10592-1989 Specifications for high and low temperature testing chambers and GB/T 11158-1989 Specifications for high temperature testing chambers.

From the date of its implementation this standard replaces GB/T 10591-1989 Specifications for high temperature / low air pressure testing chambers.

The main changes with respect to GB/T 10591-1989 are the following: a) a clause 'Terms and definitions' has been added, taking over the relevant content of IEC 60068-3-5; b) the concept of temperature fluctuation has been taken from IEC 60068-3-5 and the temperature fluctuation figure changed to 1 degree C (see Table 1); c) following the temperature data recording requirement of IEC 60068-3-5, data are now recorded once every minute (see 6.3); d) the test method for the rate of temperature rise has been revised in accordance with IEC 60068-3-5 (see 6.7); e) the range of atmospheric pressure in the conditions of use has been widened (see 4.1); f) a requirement for electrical insulation strength has been added (see 5.3.1); g) the test of the temperature performance is now carried out in the no-load condition (see 6.2.2); h) information on the method for evaluating the uncertainty of measurement of the temperature deviation and on its application has been added (see Annex B).

Annex A and Annex B of this standard are informative annexes.

This standard was proposed by the China Machinery Industry Federation and is under the jurisdiction of the Instrument and Meter Comprehensive Technical and Economic Research Institute of the machinery industry. The drafting was carried out by Chengdu Tianyu Test Equipment Co. Ltd., Chongqing Wanda Instrument Co. Ltd., the Fifth Electronics Research Institute of the Ministry of Information Industry and Chongqing Yinhe Test Instrument Co. Ltd.

1 Scope

China's national specification for the environmental test chamber that applies heat and reduced air pressure at the same time. The combination is worth a standard of its own because the two effects reinforce each other rather than cancelling out: at low pressure there is very little air left to carry heat away by convection, so a component that dissipates power runs far hotter than the air around it, and putting a high ambient on top of that produces the worst thermal case the equipment will ever meet. Anything intended for an aircraft, a high-altitude vehicle, a mountain radio site or an unpressurised cargo hold has to be shown to survive that case, and the only honest way to show it is to reproduce it. This standard specifies the terms and definitions, the recommended conditions of use, the technical requirements, the test methods, the inspection rules and the marking, packaging and storage of such chambers, and it applies to chambers used for high temperature and low air pressure testing of electrical and electronic products, of other products, and of parts and materials. It is one of a family of eight companion specifications covering the equipment

a Chinese environmental laboratory owns - damp heat, salt spray, mould growth, low temperature damp heat, high and low temperature with low pressure, high and low temperature, and high temperature. The 2006 edition rewrote the 1989 text against IEC 60068-3-5, adding a terms and definitions clause, tightening the temperature fluctuation figure, requiring temperature data to be logged once a minute and moving the temperature performance test to the no-load condition. What a buyer gets from it is a common yardstick: two chambers from two makers that both claim 200 degrees C at 1 kPa can actually be compared, because the standard fixes how temperature deviation, gradient, fluctuation and rate of change are measured and what the limits are.

This standard specifies the terms and definitions, the conditions of use, the technical requirements, the test methods, the inspection rules and the marking, packaging and storage of high temperature / low air pressure testing chambers (below referred to as 'testing chambers').

This standard applies to testing chambers used for carrying out high temperature and low air pressure tests on electrical and electronic products and other products, on parts and on materials.

2 Normative references

The provisions of the following documents become provisions of this standard through reference in this standard. For dated references, subsequent amendments (excluding corrections) or revisions do not apply to this standard; however, the parties to agreements based on this standard are encouraged to investigate whether the latest editions may be used. For undated references, the latest edition applies to this standard.

GB/T 191-2000 Packaging - Pictorial marking for handling of goods (eqv ISO 780:1997)

GB/T 14048.1-2000 Low-voltage switchgear and controlgear - Part 1: General rules (eqv IEC 60947-1:1999)

JB/T 9512-1999 Climatic environmental testing equipment and chambers - Determination of the noise sound power level

JJF 1059-1999 Evaluation and expression of uncertainty in measurement

3 Terms and definitions

The following terms and definitions apply to this standard.

3.1 test chamber: A closed cabinet or space in which some part is able to meet the specified test conditions.

3.2 temperature setpoint: The desired temperature set by means of the control device of the test chamber.

3.3 achieved temperature: After stabilization, the temperature at any point in the working space of the test chamber.

3.4 temperature stabilization: The condition in which the temperature at all points of the working space has reached the temperature setpoint and is held within the given tolerance range.

3.5 temperature fluctuation: After stabilization, the difference between the highest and the lowest temperature at any one point of the working space within a given interval of time.

3.6 working space: That part of the interior of the test chamber in which the specified conditions can be held within the specified tolerance.

3.7 temperature gradient: After stabilization, the largest value of the difference between the mean temperatures of any two points of the working space within any interval of time.

3.8 temperature rate of change: The rate of transition between two given temperatures measured at the centre of the working space, expressed in degrees C per minute.

3.9 temperature variation in space: After stabilization, within any interval of time, the difference between the mean temperature at the centre of the working space and the mean temperature at the other points of the working space.

3.10 temperature extremes: After stabilization, the highest and the lowest temperatures measured anywhere in the working space.

4.1 Ambient conditions

a) temperature: 15 degrees C to 35 degrees C; b) relative humidity: not greater than 85 per cent; c) atmospheric pressure: 80 kPa to 106 kPa; d) no strong vibration in the surroundings; e) no direct sunlight or direct radiation from other heat sources; f) no strong air currents in the surroundings, and where the surrounding air has to be forced into motion the air stream shall not blow directly onto the chamber body; g) no influence of strong electromagnetic fields in the surroundings; h) no high concentration of dust and no corrosive substances in the surroundings.

4.2 Power supply conditions

a) voltage: 220 V plus or minus 22 V, or 380 V plus or minus 38 V; b) frequency: 50 Hz plus or minus 0.5 Hz.

4.3 Load conditions

The load in the test chamber shall satisfy all of the following conditions at the same time: a) the total mass of the load placed in the working chamber shall not exceed 80 kg per cubic metre of working chamber volume; b) the total volume of the load shall not be greater than one fifth of the volume of the working chamber; c) on any cross-section perpendicular to the