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GB/T 11605-2026

Replacing GB/T 11605-2005

Methods of humidity measurement

湿度测量方法

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Foreword

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1.Scope This document describes the use of the following methods. expansion and contraction method, wet and dry bulb method, condensation dew point method, resistance and capacitance method, electrolysis method, gravimetric method, Karl Fischer method, and spectroscopy. Methods for measuring the humidity of gases using the quartz crystal oscillation method. This document applies to the measurement of gas humidity in industries such as industry, agriculture, meteorology, power, and environment.

4 Expansion/Extension Method

4.1 Overview This method specifies a procedure for measuring relative humidity using the expansion and contraction method. The expansion and contraction method works by utilizing the principle of the elongation and contraction of a hygroscopic element. The relative humidity of air is measured, typically within a range of 10% to 100% under conditions of -35°C to 45°C. This measurement is based on the stretching method. Hygrometers based on the principle of hair hygrometer are generally called "hair hygrometer" or "mechanical hygrometer" (hereinafter referred to as "hygrometer").

4.2 Measurement Principle By utilizing the changing geometric dimensions of organic polymer materials such as hair, nylon, and polyimide with variations in relative humidity, phase... Humidity measurement. Hygrometers based on the stretching method utilize this property, using the aforementioned materials to create linear or strip-shaped moisture-sensing elements or coatings. A hairline-like humidity-sensing element is wound onto an elastic material, and then the geometric change caused by the change in humidity is indicated by a pointer using a mechanical amplification device. The humidity can be directly indicated by either drawing the sample out or recording it with a pen. A schematic diagram of a telescopic hygrometer is shown in Figure 1.

4.3 Measuring Instruments The relative humidity reading error of the hygrometer shall not exceed.

a) ±5% (40%~70%, 20°C);

b) ±7% (below 40% or above 70%, 20°C).

4.4.1 Measurement Preparation and Precautions

4.4.1.1 The hygrometer should be suspended vertically on the bracket or fixed to the bracket, and the bracket base should be kept horizontal.

4.4.1.2 The wind speed at the installation site should not exceed

0.2 m/s, and the temperature should not exceed 45°C.

4.4.1.3 The humidity-sensitive material of the hygrometer should be kept clean.

4.4.1.4 If the hygrometer has been stored in an environment with a relative humidity below 10% for an extended period, it should be placed in an environment with a relative humidity greater than 95% before use. It must be restored to environmental conditions and calibrated before it can be used.

4.4.2 Measurement Method Observe the readings by marking the position of the recording curve with the pointer or pen tip.

4.4.3 Measurement Results Read the value as half of the smallest division of the hygrometer.

4.5 Precision Perform in accordance with the provisions of GB/T 6379.2.

4.6 Test Report The test report is attached as Appendix A.

5 Dry and wet bulb method

5.1 Overview This method specifies the measurement of relative humidity of air using a ventilated hygrometer (or humidifier) under conditions of -10°C to 45°C, with a measurement range of The relative humidity is typically 10% to 100%.

5.2 Measurement Principle Use two thermometers of the same type and size. Use one as a dry bulb thermometer and wrap a layer of clean gauze around the bulb of the other thermometer. It is kept moistened with distilled water and used as a wet-bulb thermometer. Under specified ventilation conditions, the temperature of the airflow indicated by the dry-bulb thermometer is called the dry-bulb thermometer. Temperature; a wet-bulb thermometer, due to the heat absorption by the evaporation of moisture from the gauze in the bulb, indicates a lower temperature, called the wet-bulb temperature. Dry-bulb temperature and wet-bulb temperature... The temperature difference depends on the relative humidity of the ambient air at that time, so the relative humidity value of the air can be obtained by using the dry-bulb temperature and the wet-bulb temperature.

5.3 Measuring Instruments The maximum permissible absolute error of the relative humidity of the ventilated hygrometer should not exceed ±5%.

5.4.1 Measurement Preparation and Precautions

5.4.1.1 The wet bulb should be wrapped with special gauze (or cotton gauze sleeve), with only one layer of gauze. The overlapping part should not exceed 1/3 of the bulb's circumference. Tie the cotton yarn from the gauze at both ends, as shown in Figure

2.The wrapped gauze should fit snugly against the ball without any wrinkles. Figure

2.Schematic diagram of the wet-bulb and dry-bulb test.

5.4.1.2 The ventilation humidifier should be hung vertically on the bracket.

5.4.1.3 The installation location should be free from direct sunlight or other sources of heat radiation.

5.4.1.4 When wet-bulb gauze becomes contaminated, it should be replaced.

5.4.1.5 The gas sample should not contain impurities, oil, or other destructive components.

5.4.1.6 When the gas sample is a toxic or harmful gas, the waste gas should be properly treated or recycled.

5.4.2 Measurement Method

5.4.2.1 Thoroughly wet the wet bulb gauze with distilled water and start the ventilator. When using a mechanical ventilator, the spring must be fully wound in one go.

5.4.2.2 Take readings 2 minutes after the ventilator has been running. First read the wet-bulb temperature, then the dry-bulb temperature, and record the atmospheric pressure simultaneously. Repeat this process if necessary. Take the readings according to the instruction manual.

5.4.3.1 Calculation Method

5.4.3.2 Table Lookup Method Using the obtained dry-bulb temperature, wet-bulb temperature, and atmospheric pressure, find the required relative humidity in the humidity lookup table provided with the hygrometer. Humidity value; you can also refer to C.2 to find the humidity value in other units (the same applies to the other methods).

5.5 Precision Perform in accordance with the provisions of GB/T 6379.2.

5.6 Test Report The test report is attached as Appendix A.

6 Condensation Dew Point Method

6.1 Overview This method specifies the measurement of humidity of non-corrosive gases using a cold mirror dew point meter (hereinafter referred to as "the instrument"). The measurement range is typically (Frost) Point -90°C~90°C.

6.2 Measurement Principle The water vapor in the gas sample is cooled by isobaric cooling so that it floats on the surface of the platinum resistance temperature sensor (cold mirror) against the flat surface of water (or ice). When a gas is in thermodynamic equilibrium, the temperature at which it reaches this equilibrium is the dew (frost) point. A schematic diagram of the measurement principle of a cold mirror dew point meter is shown in Figure