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

GB/T 14207-2024

Replacing GB/T 14207-2008

**Test method for water absorption of sandwich constructions or
cores**

夹层结构或芯子吸水性试验方法

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4 Principle and apparatus

Clause 4 states the principle: when a sandwich construction or a core material meets water, water molecules diffuse into the material and are held there physically or chemically, while part of the material dissolves in the water, so that the mass of the material rises or falls; measuring the change in mass before and after contact with water therefore measures the water absorption of the material. Clause 3 refers the terms and definitions to GB/T 3961.

Clause 5 lists the apparatus: a forced air oven controlling temperature to 2 °C; a vacuum oven controlling temperature to 2 °C and reaching a vacuum of at least minus 0.095 MPa; a climatic chamber controlling temperature to 2 °C and relative humidity to 5 percent; a desiccator; a balance reading to 0.001 g; a constant temperature water bath accurate to 0.5 °C; and a vernier caliper or other measuring instrument reading to 0.01 mm.

6 Specimens and laboratory conditions

6.1 The upper and lower faces of the specimen are square and its thickness is that of the sandwich product or of the core. For continuous cores and sandwich constructions such as foamed plastics and balsa the side is 60 mm; for cellular cores and sandwich constructions such as honeycomb and corrugated cores the side is 60 mm or large enough to take in at least four complete cells. Where the thickness of the sandwich product is not settled, the core thickness is taken as 15 mm.

6.2 and 6.3 Specimens are machined according to GB/T 1446. Adjacent faces are square to one another, the parallelism tolerance of the upper and lower faces is not greater than 0.10 mm and the perpendicularity tolerance between a side face and the upper and lower faces is not greater than 0.20 mm. At least five valid specimens are tested.

Clause 7 fixes the standard laboratory conditions as a temperature of 23 °C $\pm$ 2 °C and a relative humidity of 50 percent $\pm$ 10 percent.

8 Procedure

8.1 and 8.2 The specimens are examined visually according to GB/T 1446. The accepted specimens are numbered and the lengths of two adjacent sides and the thickness are measured, each dimension at no fewer than three positions spread evenly over the specimen, the arithmetic mean being taken to 0.01 mm.

8.3 The edges of a sandwich specimen are sealed with resin, paraffin wax or sealing tape, or treated to suit the conditions of actual use or by another method, so that water cannot enter through the cut edges.

8.4 For the room temperature immersion test and the room temperature saturation test, a specimen whose water absorption is not affected by temperatures up to 110 °C, such as a phenolic specimen, is dried for 2 h in a forced air oven at 105 °C $\pm$ 2 °C, and a specimen whose water absorption is affected at such temperatures is dried for 24 h in a forced air oven at 50 °C $\pm$ 2 °C; the specimen is then moved to a desiccator, cooled to room temperature, taken out and weighed at once to 0.001 g. For the humid heat test the same drying is carried out in a vacuum oven in the non-vacuum state, after which the oven is brought to full vacuum and drying continues for 30 min before the specimen is cooled in the desiccator and weighed in the same way. A note states that a vacuum better than minus 0.095 MPa counts as the full vacuum state.

8.5.1 In the room temperature immersion test the specimen is fully immersed in distilled water at 23 °C $\pm$ 0.5 °C with no air bubbles clinging to its surface and without touching the other specimens or the wall of the vessel, a specimen that floats being held under a coarse net; it lies at least 30 mm below the surface and is soaked for 24 h $\pm$ 0.5 h. It is then taken out, the surface water blotted off with filter paper until none is visible, immersed in absolute

ethanol for about 1 min, taken out, blotted free of ethanol, left in a draught for about 1 min and weighed at once to 0.001 g.

8.5.2 In the humid heat test the specimen is held for 30 d in a climatic chamber at 70 °C +/- 2 °C and 85 percent +/- 5 percent relative humidity, unless another agreement has been reached, then cooled to room temperature, taken out and blotted, rinsed in ethanol and weighed as in the immersion test.

8.5.3 In the room temperature saturation test the specimen is immersed as in the room temperature immersion test but for 48 h +/- 0.5 h, and is then blotted, rinsed in ethanol and weighed. The immersion and weighing are repeated until, in the nth period of 48 h +/- 0.5 h, the change of mass over that period is less than 2 percent of the total change of mass over the whole absorption process, the last mass then being taken as the mass after immersion.

8.6 Where the water absorption is to be considered together with the mass loss of water soluble matter, the specimen is dried again after immersion by the procedure of 8.4 and weighed to 0.001 g.

9 Test results and their treatment

9.1 The water absorption is computed by Formula (1) from the mass of the specimen before immersion and its mass after immersion, both in grams, and is expressed as a percentage.

9.2 Where the mass loss of water soluble matter is taken into account, Formula (2) gives the water absorption referred to the mass of the specimen before immersion and Formula (3) the water absorption referred to the mass of the specimen dried again after immersion; the three masses used are those before immersion, after immersion and after drying again, all in grams, and both results are percentages.

9.3 The water absorption per unit volume is computed by Formula (4) in kilograms per cubic metre from the masses before and after immersion in grams and the volume of the specimen in cubic millimetres, the volume itself being the product of the two side lengths and the thickness in millimetres by Formula (5). 9.4 Where the mass loss of water soluble matter is taken into account, Formula (6) gives the water absorption per unit volume from the mass after immersion, the mass after drying again and the volume.

9.5 The mass loss rate of water soluble matter is computed by Formula (7) as a percentage from the mass of the specimen before immersion and its mass after drying again. 9.6 The results are treated according to GB/T 1446.

10 Test report

The test report carries the name of the test and the number of this document; the test method chosen, with the water temperature, the humidity where relevant and the time noted where these have been agreed otherwise; a full description of the specimen material; the

type, dimensions and surface condition of the specimens; the result for each specimen and the arithmetic mean of the set; the temperature and relative humidity of the test environment; any observation on the appearance of the specimens, such as warping or cracking; and the operator, the date and other particulars.

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