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Replacing GB/T 18250-2000

Graduations and test method for performance of deformation between stories of curtain wall

建筑幕墙层间变形性能分级及检测方法

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Foreword

This Standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaces GB/T 18250-2000 *Test method for performance in plane deformation of curtain walls*. Compared with GB/T 18250-2000, the main technical modifications in this Standard are as follows:

- provided the definition of deformation performance of curtain wall (see 3.2);
- added the graduations for performance of deformation between stories of curtain wall (see Clause 4);
- added the outer plane (Y axis dimension) and vertical direction (Z axis dimension) deformation performance and test method (see 10.3, 10.4);
- added the test method for displacement performance between stories of curtain wall (see Annex A).

This Standard was proposed by Ministry of Housing and Urban-Rural Development of the People's Republic of China.

This Standard shall be under the jurisdiction of National Technical Committee on Building Facades Windows and Doors of Standardization Administration of China (SAC/TC 448).

The drafting organizations of this Standard: China Academy of Building Research, China Construction Metal Structure Association, Guangdong Provincial Institute of Building Science, Shenyang Yuanda Aluminum Engineering Co., Ltd., Guangzhou Aluminum Decoration Engineering Co., Ltd., Beijing Industry University, Shanghai Institute of Building Science (Group) Co., Ltd., Shandong Provincial Institute of Building Science, Guangdong Kennedy Lang Hardware Products Co., Ltd., Guangzhou City Building Science Research Institute Co., Ltd., Shanghai Construction Supervision Co., Ltd., Zhongshan Shengxing Co., Ltd., Shenzhen Shenye Tailan Construction Engineering Co., Ltd., Henan Construction Science Research Institute Co., Ltd., Hebei Austrian Run Shunda Window Industry Co., Ltd., Tianjin Jin Bell Construction Engineering Testing Technology Co., Ltd., Zhejiang New Century Engineering Inspection Co., Ltd., Tianjin Jianke Building Energy-saving Environmental Testing Co., Ltd., Ningbo and State Testing Research Limited, Hubei Product Quality Supervision and Inspection Research Institute, China Building Materials Inspection and Certification Center, Jangho Curtain Wall Co., Ltd., Shanghai Timalco Curtain Wall Engineering Technology Co., LTD.

Graduations and test method for performance of deformation between stories of curtain wall

1 Scope

This Standard specifies the terms and definitions, graduations, general provisions, inspection principle, testing equipment, loading method, specimen and mounting requirements, testing steps, test results and assessment and testing report for performance of deformation between stories of curtain wall.

This Standard is applicable to grading testing and engineering testing for performance of deformation between stories of curtain wall.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 15227, *Test method of air permeability, water tightness, wind load resistance performance for curtain walls*

GB 50011, *Code for seismic design of buildings*

JGJ/T 97, *Standard for terminology in earthquake engineering*

3 Terms and definitions

For the purposes of this document, the terms and definitions defined in GB 50011, JGJ/T 97 and the following ones apply.

3.1 deformation between stories

relative displacement between two adjacent building stories at horizontal direction (X axis), out plane horizontal direction (Y-axis, perpendicular to X-axis direction) and vertical direction (Z-axis) within the curtain wall plane under the effects of earthquake, wind load, etc.; X axis, Y axis, Z axis directions are shown in Figure 1.

parts from damage and dysfunction when the story is repeatedly displaced in the Y-axis dimension

3.6 deformation performance vertical direction of curtain wall

curtain wall Z-axis dimension deformation performance

the ability that the curtain wall maintains its own and the main connection parts from damage and dysfunction when the story is repeatedly displaced in the Z-axis dimension

3.7 deformation performance combined direction of curtain wall

the ability that the curtain wall maintains its own and the main connection parts from damage and dysfunction when the story, in the X-axis, Y-axis, Z-axis dimensions, simultaneously produces two or three dimensions of the repeated displacements

3.8 drift angle between stories

the ratio of the inter-story displacement value to the height of the story along with X-axis, Y-axis dimension directions

3.9 vertical displacement between stories

the height change between adjacent stories along with Z-axis dimension direction

4 Graduations

4.1 Graduation indexes

4.1.1 The deformation performance in plane of curtain wall shall take the drift angle between stories of X-axis dimension direction as graduation index value, in γ_x.

4.1.2 The deformation performance out plane of curtain wall shall take the drift angle between stories of Y-axis dimension direction as graduation index value, in γ_y.

4.1.3 The deformation performance vertical direction of curtain wall shall take the vertical displacement between stories of Z-axis dimension direction as graduation index value, in δ_z.

4.2 Graduations for performance of deformation between stories of curtain wall

The graduations for performance of deformation between stories of curtain

9.1.6 The point support curtain wall specimen shall have at least four glass plates and a complete cross seam same with the actual construction. The support structure shall have at least one typical bearing unit. The point support curtain wall which uses glass rib support shall comply with the provisions of full glass curtain wall simultaneously.

9.2 Mounting requirements

The mounting of the specimen shall meet the design requirements. No special attachments or other measures shall be taken. The assembly, mounting method and force of specimen shall be in accordance with the actual conditions. The specimen shall be mounted on a fixed beam or movable beam according to the actual connection method. The fixed beam or movable beam shall be mounted on the mounting bracket.

10 Testing steps

10.1 Preparation before testing

10.1.1 The specimen shall be inspected after mounting. After the inspection is completed, the openable part of the specimen shall be switched off five times then fastened up.

10.1.2 Inspect that the pendulum or movable beam is not constrained in the range along the displacement direction. At the same time, there shall be a corresponding limit measure outside the range so as to ensure that the pendulum or movable beam does not produce displacement in any other direction.

10.1.3 Mount the test static loader according to the selected loading method. The arrangement of the loading device should be reasonable so as to ensure the effectiveness of the displacement produced.

10.2 X-axis dimension deformation testing

10.2.1 Mounting displacement measuring device

Mount the displacement measuring device at the bottom of the swing lever or at the end of the movable beam. And make the displacement measuring device in normal operation. At the same time, the displacement measuring device can be added to the side of curtain wall component at the connection corner connector of the curtain wall specimen and the movable beam. X-axis dimensional deformation performance displacement measurement device mounting is shown in Figure 5.

H - story height, in millimeters (mm);

δ_x - X-axis dimension direction horizontal displacement absolute value, in millimeters (mm).

11.1.2 X-axis dimension drift angle between stories γ_y shall be calculated according to equation (2):

$$\gamma_y = \frac{\delta_y}{H} \qquad \cdots\cdots(2)$$

where,

H - story height, in millimeters (mm);

δ_y - Y-axis dimension direction horizontal displacement absolute value, in millimeters (mm).

11.1.3 Z-axis dimension vertical displacement between stories is represented by Z-axis direction vertical displacement absolute value δ_z, in millimeters (mm).

11.2 Assessment

11.2.1 A pre-level graduation of the graduation index value when a damage or dysfunction occurs. When the fifth level of deformation passes the testing sequentially, it can be graduated as level 5. And it shall also indicate the testing deformation value when no damage or obstruction occurs.

11.2.2 When the engineering inspection reaches the design displacement value, if there is no damage or dysfunction, it shall be determined to meet the engineering requirements. Otherwise it shall be regarded to fail the requirements of engineering use.

11.2.3 For special requirements, the airtight, watertight performance test can be carried out respectively according to GB/T 15277 before and after each testing of deformation performance between stories. Compare two testing results and make assessment according to design technical requirements.

12 Testing report

The testing report shall contain the following information:

a) specimen’s name, type, series and specifications;

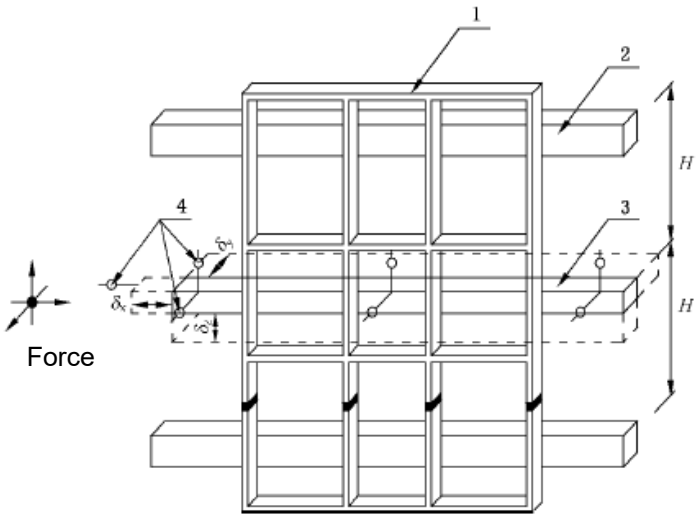
b) the client, manufacturer, constructer, engineer’s name, testing category

the horizontal displacement absolute value in the Y-axis direction; H refers to the story height.

Figure A.1 -- Testing loading method of X-axis, Y-axis deformation performance combined direction and displacement measuring device

A.2 Three-dimensional displacement deformation performance testing

Simulate the pendulum or movable beam of the main structure. Driven by the loading device, along the horizontal X-axis, Y-axis and Z-axis in vertical direction, it shall perform a low-cycle relative repetitive movement, three cycles in total. See Figure A.2 for testing loading method of three-dimensional displacement deformation performance and displacement measuring device. The testing steps shall refer to 10.2.2 ~ 10.2.4.



Keys:

1 - curtain wall specimen;

2 - fixed beam;

3 - movable beam;

4 - displacement measuring device.

NOTE δ_x refers the horizontal displacement absolute value in the X-axis direction; δ_y refers the horizontal displacement absolute value in the Y-axis direction; δ_z refers the horizontal displacement absolute value in the Z-axis direction; H refers to the story height.

Figure A.2 -- Testing loading method of three-dimensional displacement deformation performance and displacement measuring device

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