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THE PEOPLE'S REPUBLIC OF CHINA

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Building hardware of windows and doors - Hinges

建筑门窗五金件 合页（铰链）

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Building hardware of windows and doors - Hinges

1 Scope

This standard specifies the terms and definitions, classification and marking, requirements, test methods, inspection rules, signs, packaging, transportation, storage of hinges for building doors and windows.

This standard applies to hinges for building side-hung doors and inner side-hung windows. It is not applicable to hinges for frameless side-hung glass doors, hinges for screen doors and windows, hinges for folding doors and windows.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 2828.1 Sampling procedures for inspection by attributes - Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection

GB/T 5823 Terminology for building windows and doors

GB/T 14436 General principles of industrial product guarantee documents

GB/T 29048 Operating forces - Test method - windows

GB/T 29555-2013 Test method of operating forces for doors

GB/T 32223 Building hardware for windows and doors - General requirements

3 Terms and definitions

The terms and definitions as defined in GB/T 5823 and GB/T 32223, as well as the following terms and definitions, apply to this document.

3.1

Hinge

A device, which is used to connect the door and window frame and the door and window sash, AND support the door and window, to realize the rotation of the door and window sash indoors or outdoors.

[GB/T 32223-2015, Terms and definitions 3.10]

3.2

Visible hinge

The hinge, which has visible part, when the door and window sash is closed.

3.3

Concealed hinge

The hinge, which has no visible part, when the door and window sash is closed.

4 Classification and marking

4.1 Classification and code

4.1.1 Classification by purpose

It is divided into two categories, according to purpose:

- a) Door hinge, codenamed MJ;
- b) Window hinge, codenamed CJ.

4.1.2 Classification by installation form

It is divided into two categories, according to the installation form:

- a) Visible hinge, codenamed MZ;
- b) Concealed hinge, codenamed YC.

4.1.3 Classification by load-bearing level

When classified by the bearing capacity of a set (2) of hinges, which are used for a single door and window, take weight that is an integer multiple of 10 kg, to indicate the bearing level (for example, when the bearing is 26 kg, it is expressed as a level of 20 kg).

4.1.4 Classification by frequency of use

6.4 Mechanical properties

6.4.1 Rotation force

6.4.1.1 Door hinge with use frequency I

Install a set of hinges on the steel test simulated door. Apply the weight to the load-bearing level. Open and close the door leaf 20 times. Follow the test method of 8.1 in GB/T 29555-2013, to carry out the test, when the door leaf is opened to $90^\circ \pm 5^\circ$ OR the during the process of reaching to the design maximum opening angle.

6.4.1.2 Visible door hinges with use frequency II, window hinges with use frequency III

Install a set of hinges, on the test simulation door and window of corresponding size, according to its actual load. The door hinge is tested, according to the test method of GB/T 29555; the window hinge is tested, according to the test method of GB/T 29048.

6.4.2 Load-bearing performance

6.4.2.1 Door hinge with use frequency I

For the door hinge specimen, with the use frequency I, after the test of the rotational force performance, it is tested for the load-bearing performance, according to the following requirements. The schematic diagram of the position of the measurement point of the load deformation test, is as shown in Figure 5.

- a) When loading to the load-bearing level, at the center of gravity of the door leaf, record the horizontal distance h_0 and the vertical distance v_0 ;
- b) After loading the door leaf, at the center of gravity, to 2 times the load-bearing level AND opening and closing the door leaf 20 times, record the horizontal distance h_1 and vertical distance v_1 , after deformation;
- c) Calculate the horizontal deformation Δh_1 , under the load-bearing level, according to formula (1). Calculate the vertical deformation Δv_1 , under the load-bearing level, according to formula (2);
- d) After unloading, open and close the door for another 5 times. Then record the horizontal distance h_2 and vertical distance v_2 , after unloading and recovery. Use the formula (3), to calculate the residual horizontal deformation Δh_2 after unloading. Use the formula (4), to calculate the residual vertical deformation Δv_2 , after unloading;

$$\Delta h_1 = h_1 - h_0 \quad \dots\dots\dots (1)$$

Where:

Δh_1 - The horizontal deformation, under 2 times the load-bearing level, in millimeters (mm);

h_1 - The horizontal distance, under 2 times the load-bearing level, in millimeters (mm);

h_0 - The horizontal distance, in the initial state, in millimeters (mm);

$$\Delta v_1 = v_1 - v_0 \quad \dots\dots\dots (2)$$

Where:

Δv_1 - The vertical deformation, under 2 times the load-bearing level, in millimeters (mm);

v_1 - The vertical distance, under 2 times the load-bearing level, in millimeters (mm);

v_0 - The vertical distance, in the initial state, in millimeters (mm);

$$\Delta h_2 = h_2 - h_0 \quad \dots\dots\dots (3)$$

Where:

Δh_2 - The horizontal residual deformation after unloading, in millimeters (mm);

h_2 - The horizontal distance after unloading, in millimeters (mm);

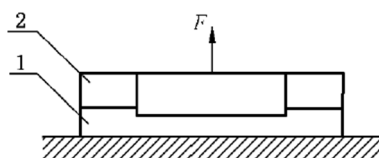
$$\Delta v_2 = v_2 - v_0 \quad \dots\dots\dots (4)$$

Where:

Δv_2 - The vertical residual deformation after unloading, in millimeters (mm);

v_2 - The vertical distance after unloading, in millimeters (mm).

- e) Load 3 times the actual load-bearing weight, at the center of gravity of the door leaf. After opening and closing the door leaf 5 times, keep it for 1 min ~ 2 min. After unloading, check the hinge for visible damage and cracks. The whole process shall be completed, within 5 minutes.



Legends:

1 - Parts connected with the frame; 2 - Parts connected with the leaf; F - Load.

Figure 7 -- Schematic diagram of static load test of parts on upper hinge frame

6.4.4 Repeated opening-closing

6.4.4.1 Door hinge with use frequency I

The door hinge, with use frequency I, after the test of load-bearing performance, is repeatedly opened and closed, according to the following requirements:

- a) Measure and record the rotation force, according to the test method in 6.4.1.1. Record the horizontal distance h_0 and vertical distance V_0 in Figure 5;
- b) Open the door leaf to the $90^\circ \pm 5^\circ$ position OR the designed maximum opening angle, through the test device. Open and close the door leaf at a speed of (600 ± 30) times/h, for 200000 times. During the test, always maintain the weight of the load-bearing level in 6.4.1.1. After every 10000 times, follow the requirements of instruction manual, to lubricate the product;
- c) Record the horizontal deformation distance h_3 and vertical deformation distance v_3 , after repeated opening and closing. Calculate the horizontal deformation Δh_3 , according to formula (6). Calculate the vertical deformation Δv_3 , according to formula (7);

$$\Delta h_3 = h_3 - h_0 \quad \dots\dots\dots (6)$$

Where:

Δh_3 - The horizontal deformation after repeated opening and closing, in millimeters (mm);

h_3 - The horizontal distance after repeated opening and closing, in millimeters (mm);

$$\Delta v_3 = v_3 - v_0 \quad \dots\dots\dots (7)$$

Where:

Δv_3 - The vertical deformation, after repeated opening and closing, in millimeter (mm);

v_3 - The vertical distance after repeated opening and closing, in millimeters (mm).

- d) Repeat 6.4.1.1 again, to check whether the rotation force meets the requirements;
- e) Repeat item e) in 6.4.2.1 again, to check the hinge for visible damage and cracks.

6.4.4.2 Visible door hinges with use frequency II and window hinges with use frequency III

After testing the load-bearing performance, the visible door hinge with use frequency II and the window hinge with use frequency III shall be repeatedly opened and closed, according to the following requirements:

- a) Use a displacement measuring instrument, which has a precision of 0.01 mm, to measure the initial position L_0' of the measuring point A, as shown in Figure 6, before the test;
- b) Where there is no other device with limit function, open the door and window leaf to the $90^\circ \pm 5^\circ$ position OR the designed maximum opening angle, through the test device; the leaf stops at (50 ± 5) mm, when it returns to the closed position. The test frequency is 250 times/h ~ 275 times/h. In the process of repeated opening and closing tests, after completing every 5000 test cycles, the adjustment and lubrication can be carried out, according to the requirements in the installation method, to observe whether the test piece has deformation or damage;
- c) Use a displacement measuring instrument, which has a precision of 0.01 mm, to measure the vertical change position L_1' , after the test. Use the formula (8) to calculate the change $\Delta L'$:

$$\Delta L' = L_1' - L_0' \quad \dots\dots\dots (8)$$

Where:

$\Delta L'$ - The change, in millimeters (mm);

L_1' - The position reading after the test at test point, in millimeter (mm);

L_0' - The initial position reading of the test point, in millimeters (mm).

7	Lifting weight of suspension end	-	-	√	√	√
8	Opening-impact	-	√			
9	Obstacle-impact	-	√			
Note: "√" indicates items that need to be inspected; "-" indicates items that do not need to be inspected.						

7.2 Exit-factory inspection

7.2.1 Group-batching and sampling

In accordance with the provisions of GB/T 2828.1 for the same batch, use the normal inspection one-time sampling plan; adopt the general inspection level II; the acceptance quality limit AQL is 4.0.

7.2.2 Judgment rules

If an inspection item does not meet the requirements of the standard, it shall take double quantity of samples from the original batch, for re-inspection. When the re-inspection is still unqualified, this batch of products shall be determined as unqualified.

7.3 Type inspection

7.3.1 Timing of inspection

Type inspection shall be carried out, in one of the following situations:

- When the new product OR the old product after trans-plant production, is subject to trial type identification;
- After formal production, when major changes in structure, materials, and processes may affect product performance;
- When the production is resumed, after suspension for half a year;
- During normal production, it is carried out once a year;
- When there is a major difference, between the exit-factory inspection result and the last type inspection.

7.3.2 Group-batching and sampling scheme

Based on the same product batch and specifications, one testing unit is randomly selected, from 3000 groups or less; two testing units are randomly selected, from 3001 ~ 10000 groups; three testing units are randomly selected, from 10000 groups or more. The sampling amount of each testing unit shall be implemented, according to the following requirements:

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