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Gaskets for Doors, Windows and Curtain Walls of Buildings

建筑门窗、幕墙用密封胶条

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Gaskets for Doors, Windows and Curtain Walls of Buildings

1 Scope

This Document specifies the classification, code and signing, technical requirements, test methods, inspection rules and marking, packaging, transportation and storage of gaskets for doors, windows and curtain walls of buildings.

This Document is applicable to the design, production and inspection of gaskets for doors, windows and curtain walls of buildings.

2 Normative References

The provisions in following documents become the essential provisions of this Document through reference in 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 Document.

GB/T 250 Textiles - Tests for color fastness - Grey scale for assessing change in color

GB/T 528-2009 Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties

GB/T 529-2008 Rubber vulcanized or thermoplastic - Determination of tear strength （Trouser, angle and crescent test pieces）

GB/T 531.1 Rubber, vulcanized or thermoplastic - Determination of indentation hardness - Part 1: Durometer method (Shore hardness)

GB/T 533-2008 Rubber vulcanized or thermoplastic - Determination of density

GB/T 1682 Rubber, vulcanized - Determination of low-temperature brittleness - Single test piece method

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 3512 Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests - Air-oven method

GB/T 3672.1-2002 Rubber - Tolerances of products - Part 1: Dimensional tolerances

GB/T 3672.2-2002 Rubber - Tolerances of products - Part 2: Geometrical tolerances

GB/T 6343 Cellular plastics and rubbers - Determination of apparent density

GB/T 7759.1-2015 Rubber, vulcanized or thermoplastic - Determination of compression set - Part 1: At ambient or elevated temperatures

GB/T 7762 Rubber, vulcanized or thermoplastic - Resistance to ozone cracking - Static strain testing

GB/T 8627 Test method for density of smoke from the burning or decomposition of building materials

GB/T 9881-2008 Rubber - Vocabulary

GB/T 10707 Rubber - Determination of the burning

GB/T 16422.2-2022 Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc lamps

GB 16776-2005 Structural silicon sealants for building

GB/T 18173.3-2014 Polymer water-proof materials - Part 3: Hydrophilic expansion rubber

GB/T 20739 Rubber products - Guidelines for storage

GB/T 21282-2007 Rubber/Plastics weatherstrip for automobile

QC/T 941-2013 Test Method for Mercury in Automobiles Materials

QC/T 942-2021 Test methods of hexavalent chromium in automotive materials

QC/T 943-2013 Test methods of lead and cadmium in automobiles materials

QC/T 944-2013 The methods of polybrominated biphenyls and polybrominated diphenyl ethers in automotive materials

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in GB/T 9881-2008 and the following apply.

3.1 Gaskets

The seal, installed in the opening or fixed part of doors, windows and curtain walls, has a sealing function.

5.4.10 Brittle temperature

The specimen of the coated sponge complex weatherstrip shall not have cracks or breaks after the test at -20 ℃.

5.4.11 Repeated water absorption performance

After the water absorption test of the coated sponge complex weatherstrip is repeated for 4 cycles, the product shall meet the following requirements:

a) The mass change rate is no greater than 5%;

b) The deflection recovery is no less than 90%;

c) The compression force change value is no greater than 30%.

5.4.12 High and low temperature resistance

After the high and low temperature test of the coated sponge complex weatherstrip is repeated for 4 cycles, the product shall meet the following requirements:

a) The deflection recovery is no less than 90%;

b) The compression force change value is no greater than 30%.

5.4.13 Fatigue resistance

After 200,000 fatigue tests on the coated sponge complex weatherstrip, the product shall meet the following requirements:

a) The deflection recovery is no less than 90%;

b) The compression force change is no greater than 30%;

c) The surface coating film shall not be damaged, fractured or cracked; and the coating film shall not be separated from other composite materials.

5.4.14 Compression force

The compression force shall meet the sealing requirements of doors, windows and curtain walls. The classification shall be agreed upon by the supplier and the purchaser according to the needs. The compression force (D_N) classification shall comply with the provisions of Table 14.

The test shall be performed in accordance with the provisions of GB/T 528-2009, using a type 1 dumbbell-shaped specimen (sponge rubber extruded foam sheet), and the test speed is 500 mm/min±50 mm/min.

6.2.3 Tear strength

The test shall be performed in accordance with the provisions of GB/T 529-2008, using a right-angle, uncut specimen.

6.2.4 Compression permanent deformation

The test shall be performed in accordance with the provisions of GB/T 7759.1-2015, using type A specimen, test temperature 100 ℃ (thermoplastic elastomer test temperature 70 ℃), test time $22^{0.5}_{0}$ h, specimen compression (25±2)%.

6.2.5 Aging in hot air

The test shall be performed in accordance with the provisions of GB/T 3512; test temperature 100 ℃, test time 168 h ± 1 h. Prepare and test the specimens according to the hardness and tensile strength requirements.

6.2.6 Hardness change

Put the specimen (with diameter no less than 30 mm, thickness no less than 6 mm) in a constant temperature container at -20 ℃ ±2 ℃, 0 ℃ ±2 ℃, 23 ℃ ±2 ℃, 70 ℃ ±2 ℃; take it out after 2 h±0.25 h; measure the hardness within 10 s according to the method specified in GB/T 531.1; and calculate the hardness difference of each temperature section according to Tables 3, 4, 6, 7.

6.2.7 Low temperature brittleness

The test shall be performed according to the provisions of GB/T 1682.

6.2.8 Oxygen index

The test shall be performed according to the provisions of GB/T 10707.

6.2.9 Vertical combustion performance

The test shall be performed according to the provisions of GB/T10707.

6.2.10 Smoke density

The test shall be performed according to the provisions of GB/T 8627; the specimen size is (25.4±0.3)mm × (25.4±0.3)mm × (6.2±0.3)mm.

6.2.11 Water-swelling performance

6.2.11.1 Volume swelling ratio

The test shall be performed according to the provisions of Appendix A in GB/T 18173.3-2014.

6.2.11.2 Repeated immersion test

The test shall be performed according to the provisions of 6.3.5 in GB/T 18173.3-2014.

6.3 Product appearance

Visually inspect the product appearance quality under natural light or equivalent artificial light source at a distance of 0.3 m.

6.4 Product dimension tolerance

Take a 2 mm to 3 mm thick cross-section test piece of the product and test it with a non-contact measuring instrument with corresponding graduation value (such as a projector or scanner that can magnify 5× or 10×).

6.5 Product performance

6.5.1 Product density

Dense gaskets shall be tested in accordance with the provisions of Method A in 7.1 of GB/T 533-2008. Sponge gaskets shall be tested in accordance with the provisions of GB/T 6343. Five specimens of 200 mm ± 10 mm shall be cut from the gasket product. The volume of the specimen is the product of the cross-sectional area of the sponge gasket and the actual length of the tested specimen.

6.5.2 Deflection recovery

Cut three specimens of 100 mm in length from the gasket product. Perform the test and calculation according to the following steps.

a) Use a non-contact measuring instrument to measure the free height (H_0) of the specimen, accurate to 0.05 mm.

b) Fix the specimen on the test device; apply a uniform load on the pressure-bearing working surface; compress the specimen to the maximum value of the design working range (W). And place it in an environment of 70 ℃ ± 2 ℃ for 24^{0}_{-2}h; after taking it out, cool it to ambient temperature and unload it.

c) Place the specimen in a standard temperature and humidity environment in a horizontal state without pressure and with the working surface facing upward for 24^{0}_{-2}h; and measure the average free height (H_1) after the test according to the method in a).

d) Calculate according to Formula (1); take the arithmetic mean of the three specimens; and retain 3 significant figures for the result.

specimen to expose the added wire with a length of 10 mm; and peel off the other side of the specimen to remove the added wire with a length of 10 mm. Place one group of specimens after treatment in 70 ℃ ± 2 ℃ and -20 ℃ ± 2 ℃ environments, respectively; and take them out after 1 h. Under standard temperature and humidity conditions, clamp 6 mm at both ends of the product in the longitudinal (length) direction; and pull at a uniform speed of 100 mm/min ± 10 mm/min until it is broken. After the test, check whether the added wire of the specimen is pulled out.

6.5.9 Friction coefficient

The test shall be performed according to the provisions of Appendix C in GB/T 21282-2007.

6.5.10 Brittle temperature

The test shall be performed according to the provisions of GB/T 1682.

6.5.11 Repeated water absorption performance

Cut 6 specimens of 100 mm±10 mm from the gasket product; and measure the compression force and deflection recovery grade of the product before testing 3 specimens. Soak the other 3 specimens in 23 ℃±2 ℃ distilled water for 16 h; take them out and dry them at 70 ℃±2 ℃ for 8 h. Then soak them in distilled water for 16 h; take them out and dry them for another 8 h. This is one cycle. And the test time deviation is ±0.25 h. After 4 repeated cycles, measure the deflection recovery and compression force; and calculate the rate of change.

6.5.12 High and low temperature resistance

Cut six specimens of 100 mm ± 10 mm from the gasket product. Measure the compression force and deflection recovery grade of the product before the test of three specimens. Place the other three specimens in the air at 23 ℃ ± 2 ℃ for 18 h; and then the specimens were placed in a -20 ℃ ± 2 ℃ low temperature box for 3 h. The specimens were taken out of the low temperature box and immediately placed in a 50 ℃ ± 2 ℃ constant temperature box for 3 h. This is one cycle; and the test time deviation is ± 0.25 h. After 4 repeated cycles, measure the deflection recovery and compression force; and calculate the rate of change.

6.5.13 Fatigue resistance

Cut six specimens of 100 mm ± 10 mm from the gasket product. Measure the compression force and deflection recovery grade of the product before the test of three specimens. Place the other 3 specimens on the fatigue testing machine; adjust the amplitude of the fatigue testing machine to the specimen working range, accurate to 0.1 mm. Compress the working surface of the specimen from the zero-compression position to the designed working range. Repeat the test, the specimen frequency is (600±30) times per hour. After the test, remove the specimen; place it in a standard temperature and humidity environment for 24^{0}_{-2}h in a horizontal state without compression and with the working surface facing up; measure the deflection recovery and compression force; and calculate the rate of change.

7.2.2 Qualification judgment rules

When the inspection items do not meet the requirements of Clause 5, the batch of products is judged to be unqualified.

7.3 Type inspection

7.3.1 Inspection timing

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

a) When new products or old products transferring to other factory for trial design and identification production;

b) When there are major changes in cross-section, materials, and processes that may affect product performance, after formal production;

c) When production is resumed after product discontinuation;

d) When during normal production, it is carried out once a year; light aging test is carried out once every 3 years;

e) When the exit-factory inspection results are significantly different from the last type inspection.

7.3.2 Batching and sampling plan

The continuous production with the same raw materials, process, formula, and specification are considered as a batch; and the mass of each batch is no less than 5,000 kg. If the output is less than 5,000 kg, the output of 7 days is considered as a batch. Samples and products are taken for inspection at 3 times the number of samples and products in the test method of Clause 6.

7.3.3 Qualification judgment rules

When the product does not meet the requirements of this Document, the samples shall be doubled from the original batch for re-inspection; if it still does not meet the requirements, it will be judged as unqualified.

8 Marking, Packaging, Transportation and Storage

8.1 Marking

8.1.1 The finished product should be marked with the manufacturer's information.

8.1.2 The obvious part of the product packaging or the certificate of conformity attached with the box shall indicate the following:

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