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Honeycomb sandwich structure product for automobile exterior decoration parts

汽车外饰件用蜂窝夹层结构制品

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Honeycomb sandwich structure product for automobile exterior decoration parts

1 Scope

This document specifies the structure and classification, technical requirements, test methods, inspection rules, packaging, labeling, transportation and storage of honeycomb sandwich structure products for automotive exterior decoration parts.

This document is applicable to compression-molded honeycomb sandwich structure products for automotive exterior decoration parts, such as battery covers, roof shrouds, door trim panels, etc.

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, for dated references, only the version corresponding to the date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

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

GB/T 1456-2005 Test method for flexural properties of sandwich constructions

GB/T 16422.2-2014 Plastics - Methods of exposure to laboratory light sources - Part 2: Xenon-arc sources

QC/T 15-1992 General test method for automobile plastic products

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Damage load

The force value, at which a specimen is damaged, when it is subject to the bending strength test, according to the provisions of GB/T 1456-2005.

3.2

Flexure stiffness

The ability of a specimen to resist deformation, under a bending load.

4 Structure and classification

4.1 Structure

Honeycomb sandwich structure products for exterior decoration parts are composed of: exterior panels (ABS, ASA, PC/ABS, PMMA and other materials or composite panels composed of two or more materials), glass fiber reinforced polyurethane foam materials, honeycomb core material (paper honeycomb, polypropylene honeycomb, aluminum honeycomb or other honeycomb structure materials), etc.

4.2 Classification

Honeycomb sandwich products are divided into the following three categories, according to the mass per unit area:

- Category a: Products which have a mass per unit area of less than 3000 g/m^2 AND are suitable for products with a bending stiffness higher than 9 x 10^6 N·mm^2, such as battery covers, etc.;

- Category b: Products which have a mass per unit area of 3000 g/m^2 ~ 4500 g/m^2 AND are suitable for products with a bending stiffness higher than 12 x 10^6 N·mm^2, such as roof spoilers, side spoilers, engine compartment covers, etc.;

- Category c: Products which have a mass per unit area greater than 4500 g/m^2 AND are suitable for products with a bending stiffness higher than 14 x 10^6 N • mm^2, such as lower door trim panels, top covers, rear doors, etc.

5 Technical requirements

5.1 Appearance quality

The outer surface of the product shall be smooth and flat, without defects such as collapse and cracks, or other defects that affect the service life.

5.2 Product performance

Product properties shall meet the requirements of Table 1.

Carry out the test, in accordance with the provisions of GB/T 1456-2005. The test speed is 2 mm/min ~ 5 mm/min. Record the maximum failure load. Take the arithmetic mean of 5 test data. Round the result to an integer.

6.4.2 Room temperature

Take a pretreated product. Conduct the test, according to the requirements of 6.4.1, at 23 °C ± 2 °C.

6.4.3 Long-term heat resistance

Take a pretreated product and place it in an incubator at 80 °C ± 2 °C for 168 hours. After taking it out, place it in an environment of 23 °C ± 2 °C for 0.5 hours. Conduct the test according to the requirements of 6.4.1.

6.4.4 Resistance to cyclic cold & heat

Take a pretreated product and put it in a high & low temperature test chamber. Take (80 ± 2) °C x 4 h → (23 ± 2) °C x 1 h →(-40 ± 2) °C x 4 h → (23 ±2) °C x 1 h as one cycle; carry out 4 cycles of tests. After taking it out, place it at 23 °C ± 2 °C for 0.5 h. Carry out test, according to 6.4.1.

6.4.5 Damp resistance

According to the provisions of 5.4.2 in QC/T 15-1992, take a pretreated product and put it in a humidity test chamber, at a temperature of 55 °C ± 2 °C and a relative humidity of (95 ± 5)% for 168 h. After taking it out, place it in an environment of 23 °C ± 2 °C for 0.5 h. Conduct the test according to the requirements of 6.4.1.

6.5 Bending stiffness

6.5.1 Sampling method

Take 5 specimens from the test product. The sampling position shall be selected as far as possible at a flat center position, which is more than 20 mm away from the edge. The specimen size is as shown in Table 3. The length, width, thickness of the specimen are accurately measured by a caliper which has an accuracy of 0.02 mm.

Table 3 -- Dimensions of specimens for bending stiffness

Unit in mm

Thickness	Length	Width	Span
< 10	320	60	120
10 ~ 21	400	60	160
> 21	480	60	200

6.5.2 Test method

6.7 Resistance to cyclic cold & heat

6.7.1 Test method

Take three pretreated products and put them into the high & low temperature test chamber. The test conditions are in accordance with the provisions in 6.4.4.

6.7.2 Appearance quality and dimensional change rate

Visually inspect the product for abnormal phenomena, such as deformation, warping, delamination, etc. Test the dimensional change rate, according to the provisions in 6.6.3.

6.8 Damp resistance

6.8.1 Test method

Take three pretreated products and put them into the damp test chamber. The test conditions are in accordance with the provisions in 6.4.5.

6.8.2 Appearance quality and dimensional change rate

Visually inspect the product for abnormal phenomena, such as deformation, warping, delamination, etc. Test the dimensional change rate, according to the provisions in 6.6.3.

6.8.3 Weight change rate

Carry out the damp resistance test, according to the provisions in 6.4.5. Use weighing tools, which have a division value not greater than 1 g, to weigh the pre-test mass and post-test mass of the three products, respectively. Calculate according to formula (3). The test results are taken as arithmetic mean of 3 test data. The result retains one decimal place.

$$\varepsilon = \frac{m_2 - m_1}{m_1} \times 100\% \qquad \cdots\cdots (3)$$

Where:

ε - Weight change rate, %;

m_1 - The weight before the test, in grams (g)

m_2 - The weight after the test, in grams (g).

6.9 Cold impact resistance

Take three pieces of pretreated products. Place them in a low-temperature box at -40 °C ± 2 °C for 24 h, according to the provisions of 5.1.4.3 in QC/T 15-1992. Take them out. Within 5 s, use 500 g ± 10 g steel balls to impact the outer surface of the product, at a

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