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Rubber/plastics weatherstrip for automobile

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Rubber/plastics weatherstrip for automobile

1 Scope

This Standard specifies the requirements, test methods, inspection rules and marking, packaging, transportation and storage of rubber/plastics weatherstrips for automobile (hereinafter referred to as weatherstrips).

This Standard applies to weatherstrips for passenger vehicles, which are made using rubber, plastics or rubber-plastics compounds as main materials. It can be used for reference for rubber/plastics weatherstrips for commercial vehicles.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrigenda) or revisions do not apply to this Standard, however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 528-1998, *Rubber, vulcanized or thermoplastic – Determination of tensile stress-strain properties* (eqv ISO 37:1994)

GB/T 529-1999, *Rubber, vulcanized or thermoplastic – Determination of tear strength (Trouser, angle and crescent test pieces)* (eqv ISO 34-1:1994)

GB/T 531-1999, *Rubber - Determination of indentation hardness by means of pocket hardness meters* (idt ISO 7619:1986)

GB/T 1040-1992, *Plastics – Determination of tensile properties*

GB/T 1633-2000, *Plastics--Thermoplastic materials--Determination of Vicat softening temperature (VST)* (idt ISO 306:1994)

GB/T 2411-1980 (1989), *Plastics – Shore hardness test* (eqv ISO 868:1978)

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 2828.1-2003, ISO 2859-1:1999, IDT)

GB/T 2917.1-2002, *Determination of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures – Congo red method* (eqv ISO 182-1:1990)

GB/T 3512-2001, *Rubber, vulcanized or thermoplastic – Accelerated ageing and heat resistance tests - Air-oven method* (eqv ISO 188:1998)

GB/T 3672.1, *Rubber – Tolerances of products – Part 1: Dimensional tolerances* (GB/T 3672.1-2002, ISO 3302-1:1996, IDT)

GB/T 5470-1985, *Test method for brittleness temperature of plastics by impact*

GB/T 5721, *General rules of marking, packaging, transportation and storage for rubber sealing products*

GB/T 7141-1992, *Plastics – Methods of exposure to thermal air*

GB/T 7759-1996, *Rubber, Vulcanized or thermoplastic – Determination of compression set at ambient elevated or low temperatures* (eqv ISO 815:1991)

GB/T 7762-2003, *Rubber, vulcanized or thermoplastic – Resistance to ozone cracking – Static strain test* (ISO 1431-1:1989, MOD)

GB 8410, *Flammability of automotive interior materials*

GB/T 9286-1998, *Paints and varnishes – Cross cut test for films* (eqv ISO 2409:1992)

GB/T 12831-1991, *Rubber, vulcanized – Test method of resistance to artificial weathering (xenon lamp)* (neq ISO 4665-3:1987)

GB/T 15256-1994, Rubber, vulcanized – Determination of low-temperature brittleness (multiple test piece method) (eqv ISO 812:1991)

GB 15763.2, *Safety glazing materials in building – Part 2: Tempered glass*

GB/T 19243-2003, *Rubber, vulcanized or thermoplastic – Methods of test for staining in contact with organic material*

HG/T 2369, *Technical specifications for rubber/plastics tension tester*

HG/T 3055-1988 (1997), *Latex foam – Determination of apparent density*

QC/T 709-2004, *Test method of compression set for automobile weatherstrips*

QC/T 710-2004, *Test method of compression load for automobile weatherstrips*

QC/T 716-2004, *Retention strength and insertion resistance test method for automobile weatherstrips*

3 Requirements

3.1 Dimensions and tolerances

The cross-section shapes, dimensions and tolerances of products, and the lengths and tolerances of products shall be as required by design drawings; if it is not explicitly specified in drawings, the supplier and the purchaser shall choose and use in accordance with the classes specified in GB/T 3672.1.

3.2 Appearance quality

The appearance quality of weatherstrips shall be as specified:

-- no defect is permitted which affects the appearance and usability of products, such as impurities, bubbles, cracks, scratches, tears, hungry joints, damages, distortions or flattening deformations and so on;

-- surface treated parts (including surface coating treatment, fit treatment, flocking treatment) shall be uniform, clean and free from contamination, and no defects are permitted including falling-off, stains and irregularities etc.;

-- the offsets of joining parts of products shall be as required by drawings, which shall be formed uniformly with a flat surface;

-- the colours and patterns of weatherstrips shall be designed as required by the purchaser, which shall be free from the defects including stains and contaminations;

-- for products which are equipped with reinforcing strips, reinforcing strips shall be free from falling off, uniform caulking and defects which affect the quality and installation of products;

-- other appearance defects of products shall comply with the approved sample piece requirements as agreed by the supplier and the purchaser.

3.3 Performance requirements for materials

The matrix materials of weatherstrips can be based on EPDM, PVC and TPE, whose performance requirements shall be as specified in Tables 1 ~ 4. The performance requirements for other matrix materials shall be as agreed by the supplier and the purchaser.

3.3.1 Performance requirements for EPDM solid rubber material

4.3.1 The determination of the hardness of rubber materials shall be carried out using the method specified in GB/T 531-1999; the determination of the hardness of plastic and TPE materials shall be carried out using the method specified in GB/T 2411-1980(1989).

4.3.2 The determination of the tensile strength and elongation at break of rubber materials shall be carried out using the method specified in GB/T 528-1998; the determination of the tensile strength and elongation at break of plastic and TPE materials shall be carried out using the method specified in GB/T 1040-1992.

4.3.3 The test of the tear strength shall be carried out using the method specified in GB/T 529-1999. Use right angle type test pieces (without cut).

4.3.4 The test of the hot air ageing of rubber materials shall be carried out using the method specified in GB/T 3512-2001; the test of the hot air ageing of plastic and TPE materials shall be carried out using the method specified in GB/T 7141-1992.

4.3.5 The test of the ozone ageing shall be carried out using the method specified in GB/T 7762-2003; the elongation at break 20% ± 2% is recommended.

4.3.6 The test of the compression set shall be carried out using the method specified in GB/T 7759-1996; use test specimens of type A.

4.3.7 The test of brittleness temperature of rubber materials shall be carried out using the method specified in GB/T 15256-1994; the test of the impact brittleness temperature of plastic materials, and the brittleness temperature of TPE materials shall be carried out using the method specified in GB/T 5470-1985.

4.3.8 The test of the stain resistance shall be carried out using method A1 in method A of GB/T 19243-2003.

4.3.9 The test of the apparent density shall be carried out using the method specified in HG/T 3055-1988 (1997).

4.3.10 The test of the Vicat softening temperature shall be carried out using method B of GB/T 1633-2000.

4.3.11 The test of the heating loss shall be carried out as specified in Annex A.

4.3.12 The test of the thermal stability shall be carried out using the method specified in GB/T 2917.1-2002.

4.4 Performance test methods of finished products

4.4.1 Quantity of test specimens

Unless specified otherwise, three test specimens shall be cut out from different finished

change of length in accordance with equation (1), where the numerical value is expressed by "%". Take the arithmetic mean value, which shall be rounded off to the first decimal place.

$$\text{Length change} = \frac{L_1 - L_0}{L_0} \times 100 \qquad \cdots\cdots(1)$$

where,

L_0 – the length of the test specimens, in mm;

L_1 – the length of the test specimens after heating, in mm.

4.4.6 The cross-cut test for coating shall be carried out using the method specified in GB/T 9286-1998.

4.4.7 Artificial weathering ageing test

4.4.7.1 Give priority to the methods specified in drawings; if not specified, the method of 4.4.7.2 is recommended.

4.4.7.2 The test of the artificial weathering ageing shall be carried out using the method specified in GB/T 12831-1991. The test conditions for glass guide weatherstrips: blackboard temperature (55 ± 3)°C; relative humidity 60% ~ 70%; rainfall cycle 120 min, including rainfall for 18 min and dry period for 102 min in between; radiation intensity (1,000 ± 200) W/m^2; test duration 300 h. The test conditions for door frame weatherstrips: blackboard temperature (55 ± 3)°C; relative humidity 60% ~ 70%; radiation intensity (1,000 ± 200) W/m^2; test duration 150 h. The test conditions for other weatherstrips shall be as agreed by the supplier and the purchaser.

4.4.8 The test of the friction coefficient shall be carried out using the method specified in Annex C.

4.4.9 The test of the compression set shall be carried out using the method specified in QC/T 709-2004; the compression conditions are as required in drawings.

4.4.10 Ozone ageing test

Cut out test specimens 150 mm long from products; use enameled wire or equivalent to fix them on a glass plate; carry out the test using method A of GB/T 7762-2003. The concentration of test ozone: (200 ± 20) × 10^{-8}; the test temperature: (40 ± 2)°C; the test duration: 48 h. Then, take out the specimens and use 10x magnifying lens to examine whether the surface has any crack or breakage.

4.4.11 The test of the stain resistance shall be carried out using A1 in method A of GB/T 19243-2003.

performance test for each batch. Products which are made continuously from the same production line, the same materials and the same process constitute a batch of products. Three pieces shall be sampled for the performance test for finished products.

5.2.2 Sampling plans and criteria

5.2.2.1 Exit-factory inspection

5.2.2.1.1 Inspection for appearance quality and product length

According to the normal inspection single sampling plan of GB/T 2828.1, use AQL 1.5 and general inspection level II to carry out random sampling for the inspection. If the result of the inspection is a fail, then the batch of products shall be sent back to the production department for inspection piece by piece; after rework, carry out tightened inspection, using AQL 1.5 and inspection level II of the single sampling plan to carry out random sampling for reinspection; they can only be permitted to leave factory after the reinspection is a success.

5.2.2.1.2 Sectional shapes and dimensions shall be subjected to inspection by batch. If it is a fail, then the batch of products is a rejected.

5.2.2.1.3 The corner binding force (joint breaking force), compression load, insertion force and pullout force of finished products shall be subjected to inspection by batch. In case one item is a fail, then a double quantity of test specimens shall be sampled for reinspection; if it is still a fail, then the batch of products are rejected.

5.2.2.2 Type inspection

5.2.2.2.1 In normal production, the ozone ageing performance and stain resistance of materials shall be subjected to inspection once a year; all other performances shall be subjected to inspection by batch. All indexes of the physical performance shall meet the technical requirements; in case on item is a fail, then a double quantity of test specimens shall be sampled for reinspection; in case it is still a fail, then the batch of materials are rejected.

5.2.2.2.2 In normal production, the appearance quality, sectional shapes and dimensions and product length shall be subjected to inspection by batch; if it is a fail, then the batch of products is rejected.

5.2.2.2.3 The corner binding force (joint breaking tenacity), compression load, insertion force and pullout force of finished products shall be subjected to inspection by batch; the wear resistance shall be subjected to inspection once a month; the compression set shall be subjected to inspection once every quarter; the friction coefficient, low temperature resistance, length change, cross cut and breaking tenacity of solid rubber and cellular rubber shall be subjected to inspection once every half year; the artificial weathering ageing, ozone resistance, stain resistance and fire resistance shall be

Annex A

(Normative)

Method of test for the heat loss of PVC materials

A.1 Test apparatus

The test apparatus include analytical balance (accurate to 0.001 g) and thermostat.

A.2 Preparation of test specimens

Cut out three test specimens of dimeter (25 ± 5) mm × thickness (2 ± 0.2) mm from test pieces.

A.3 Test temperature and duration

The test shall be carried out according to the temperature and humidity specified in the technical requirements. If not specified, the recommended test temperature is (100 ± 1)°C; the test duration is 72 h.

A.4 Test procedures

Weigh the mass of each test specimen m_1 (accurate to 0.001 g) on an analytical balance; start timing after placing the specimens in the thermostat at the temperature specified; take them out after the specified test duration is reached; let them to stand for 30 min at the standard temperature; use the analytical balance to weigh the mass of each test specimen m_2.

A.5 Expression of results

The heat loss X (whose numerical value is expressed by “%”); the test results shall be expressed by the arithmetic mean value, which shall be rounded off to the first decimal place.

$$X = \frac{m_1 - m_2}{m_1} \times 100 \qquad \cdots\cdots (A.1)$$

where,

m_1 – the mass of the test specimens before heating, in g;

m_2 – the mass of the test specimens after heating, in g.

Annex C

(Normative)

Method of test for the friction coefficient of weatherstrips

C.1 Test equipment

The tensile testing machine shall be as specified in HG/T 2369, whose testing accuracy shall not be lower than grade B.

C.2 Test instruments and materials

C.2.1 Balance: accurate to 0.1 g;

C.2.2 Glass plate: dimensions 200 mm × 100 mm × 6 mm;

C.2.3 Sliding metal block: of mass (260 ± 5) g;

C.2.4 Double-faced adhesive tape;

C.2.5 Non-woven fabrics.

C.3 Preparation of test specimens

Cut out three groups of test specimens (two for each group), 110 mm long and 15 mm wide (or of the maximum possible sample width), form the flocking or coating parts of weatherstrips.

C.4 Test procedures

C.4.1 Weigh the mass of a group of test specimens and double-faced adhesive tape (if double-faced adhesive tape is needed for fixing test specimens), and a sliding metal block (accurate to 0.1 g); convert the total mass by adding them up into the positive pressure *P*.

C.4.2 Fix a group of test specimens flatwise onto the sliding metal block as shown in Figure C.1. If the test specimens are taken from the curved parts, double-faced adhesive tape, etc., needs to be used to fix them flatwise on the sliding block.

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