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Thermoplastic polyolefin sheets for waterproofing

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Foreword

Chapter 5.3 of this standard is mandatory, AND the rest is recommended.

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

The consistency of standard to ASTM D6878:2008 “Standard specification for thermoplastic polyolefin based sheet roofing” is not equivalent.

This standard was proposed by the China Building Materials Federation.

This standard shall be under the jurisdiction of the National Light Decoration and Decoration Building Materials Standardization Committee, Building Waterproof Material Subcommittee (SAC/TC 195/SC 1).

The main drafting organizations of this standard: China Building Materials Science Research Institute Suzhou Waterproof Research Institute, China Building Waterproofing Association.

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Thermoplastic polyolefin sheets for waterproofing

1 Scope

This standard specifies the terms and definitions, classification and identification, requirements, test methods, inspection rules, marking, packaging, storage and transportation of thermoplastic polyolefin sheets for waterproofing.

This standard applies to the waterproof sheets which use the ethylene and α -olefin polymer as the main raw material for the purposes of building engineering.

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) are applicable to this Standard.

GB/T 328.5-2007 Test methods for building sheets for waterproofing - Part 5: Plastic and rubber sheets for waterproofing - Thickness and mass per unit area

GB/T 328.7 Test methods for building sheets for waterproofing - Part 7: Plastic and rubber sheets for waterproofing length, width, straightness, and flatness

GB/T 328.9-2007 Test methods for building sheets for waterproofing - Part 9: Plastic and rubber sheets for waterproofing - Tensile properties

GB/T 328.10-2007 Test methods for building sheets for waterproofing - Part 10: Bitumen plastic and rubber sheets for waterproof - Water tightness

GB/T 328.13 Test methods for building sheets for waterproofing - Part 13: Plastic and rubber sheets for waterproofing - Dimensional stability

GB/T 328.15 Test methods for building sheets for waterproofing - Part 15: Plastic and rubber sheets for waterproofing - Foldability at low temperature

GB/T 328.19 Test methods for building sheets for waterproofing - Part 19: Plastic and rubber sheets for waterproofing - Resistance to tearing

GB/T 328.21 Test methods for building sheets for waterproofing - Part 21: Plastic and rubber sheets for waterproofing - Resistance to peeling of joints

GB/T 328.25-2007 Test methods for building sheets for waterproofing - Part 25: Bitumen plastic and rubber sheets for waterproofing – Resistance to static loading

GB/T 528 Rubber, vulcanized or thermoplastic – Determination of tensile stress – Stain properties

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

GB 12952-2011 Polyvinyl chloride plastic sheets for waterproofing

GB/T 18244 Test methods for resistance to weathering of building waterproofing materials

GB/T 18378 Terminology for waterproof bitumen and waterproof sheet

GB/T 20624.2 Paints and varnishes – Rapid-deformation (impact resistance) tests – Part 2: Falling-weight test small area indenter

GB 50009 Load code for the design of building structures

3 Terms and definitions

The terms and definitions as defined in GB/T 18378 AND the following terms and definitions apply to this document.

3.1

Homogeneous thermoplastic polyolefin waterproofing sheets

It refers to the thermoplastic polyolefin waterproofing sheets that do not employ an inner reinforcing material or a backing material.

3.2

Thermoplastic polyolefin waterproofing sheets backed with fabric

It refers to the thermoplastic polyolefin waterproofing sheets which compound the fabric such as polyester nonwoven fabric at the lower surface.

3.3

Thermoplastic polyolefin waterproofing sheets with internally reinforced fabric

It refers to the thermoplastic polyolefin waterproofing sheets which is reinforced with polyester or fiberglass meshes in the middle of the sheet.

6.4 Appearance

Visual inspection.

6.5 Tensile performance

The test sample size of type L and P product is 150 mm × 50 mm; PERFORM test in accordance with the method A of GB/T 328.9-2007; the fixture spacing is 90 mm; the elongation is calculated using the 70 mm marking line spacing; the type P elongation is taken as the elongation L at the maximum tension, AND the type L elongation is taken as the elongation at fracture. If the sample does not fracture when the product testing machine travels to its end, CHANGE the fixture spacing to 50 mm and the marking line spacing to 30 mm; PERFORM test again; AND all the tensile performance tests of the same sample shall be made using the same method.

The type H is tested in accordance with the method B in GB/T 328.9-2007, it uses the dumbbell type I test piece which complies with GB/T 528, AND the tensile speed is (250 ± 50) mm/min.

The arithmetic mean of the 5 test samples in the longitudinal or transverse direction is calculated as the test result.

6.6 Heat treatment dimensional change rate

PERFORM test in accordance with GB/T 328.13 in the $80\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ blast oven; it is not allowed to stack them; AND it is remained at this constant temperature for 24 h. TAKE it out; PLACE it at the standard test conditions for 24 h; MEASURE the length.

6.7 Low temperature bending performance

PERFORM test in accordance with GB/T 328.15.

6.8 Water tightness

PERFORM test in accordance with the method B of GB/T 328.10-2007; USE the cross metal slotted plate, AND the pressure is 0.3 MPa, which is maintained for 2 h.

6.9 Impact resistance

PLACE the perforator on the surface of the test sample; LET the steel ball at the lower end of the punch head position at the center of the test sample; MAKE the spherical surface in contact with the test sample. ADJUST the hammer to the specified drop height of 500 mm and POSITION it. LET the hammer fall down freely to impact the punch head at the test sample surface; TAKE the sample out; CHECK whether the test sample is perforated; TEST 3 samples in total.

When there is no obvious perforation, USE the device as shown in Figure 1 to perform water tightness test against the sample. PLACE the round glass tube vertically at the center of the test hole of the sample; USE the sealant to seal the gap between the glass tube and the sample. PLACE the test sample on a 150 mm × 150 mm filter paper; PLACE the filter paper on a glass plate; ADD the stained water into the glass tube; LET it stand for 24 h; CHECK the filter paper; AND if there is color change or water traces, it indicates that the sample is perforated.

6.10 Static load resistance

PERFORM test in accordance with the test method A in GB/T 328.25-2007; USE the 20 kg load.

6.11 Peel strength at joint

MAKE overlap in accordance with the requirements of the production plant; if the adhesive overlap is used, it shall be placed at the standard test conditions for a period as specified by the production plant, which shall not exceed 7 d. CUT the test sample (200 mm × 50 mm); PERFORM test in accordance with GB/T 328.21; AND as for the type H and L products, USE the maximum peel force to calculate the peel strength. As for the type G, P and GL products, if the sample is hollowed out, it shall use knife to immediately cut off the hollow part, AND use the average peel strength of the second half of the tensile stress strain curve to calculate the peel strength.

6.12 Right angle tear strength

PERFORM test in accordance with GB/T 529; USE the non-cut right angle tear method, AND the tensile speed is 250 mm/min ± 50 mm/min.

The arithmetic mean of the 5 samples in the longitudinal or transverse direction is calculated as the test result.

6.13 Trapezoidal tear strength

PERFORM test in accordance with GB/T 328.19.

The arithmetic mean of the 5 samples in the longitudinal or transverse direction is calculated as the test result.

6.14 Water absorption

T - The maximum tension before treatment, in Newton per centimeter (N/cm) [or tensile strength, in megapascal (MPa)];

T₁ – The maximum tension after sample treatment, in Newtons per centimeter (N/cm) [or tensile strength, in megapascal (MPa)];

The elongation retention rate after treatment is calculated in accordance with formula (3), accurate to 1%:

$$R_e = (E_1 / E) \times 100 \quad \dots\dots\dots (3)$$

Where:

R_e – The elongation retention rate after sample treatment, expressed as a percentage (%);

E - The average elongation of the sample before treatment, expressed as a percentage (%);

E₁ - The average elongation of the sample after treatment, expressed as a percentage (%).

6.16 Chemical resistance

6.16.1 Test procedure

In accordance with the requirements of Table 4, USE the distilled water and chemical reagent (analytical pure) to prepare the homogeneous solution; respectively CONTAIN it into vessels having different labels; AND the temperature is 23 °C ± 2 °C. Test vessels can be resistant to acid, alkali, and salt corrosion, it can be closed, AND the volume is determined in accordance with the number of samples.

In each solution, IMMERSE a group of 3 test pieces which are cut in accordance with Table 3; LET the upper surface of the test piece at least 20 mm away from the solution level; SEAL the vessel; after immersing it for 28 d, TAKE it out and USE clean water to rinse it; WIPE it dry. PLACE it at standard test conditions for 24 h; TAKE two pieces of longitudinal and transverse tensile performance test respectively from each sample. As for the low temperature bending performance test, CUT two longitudinal test pieces from one sample, AND two transverse test pieces from the other sample. PERFORM test respectively in accordance with 6.5 and 6.7. As for the tensile performance test for the type P sheet, CUT the test pieces from the position at least 10 mm away from the sample edge.

Table 4 -- Solution concentration

Reagent name	Solution mass fraction
NaCl	(10 ± 2) %
Ca(OH) ₂	Saturated solution
H ₂ SO ₄	(5 ± 1) %

- b) During normal production, the type inspection is carried out once a year. AND the wind lift resistance and artificial climate accelerated aging test is carried out once every two years;
- c) The changes in raw materials and processes, etc., may affect the quality of products;
- d) When the exit-factory inspection results are quite different from the previous type inspection results;
- e) When the production is restored after production suspension for over 6 months.

7.2 Sampling

USE the 10000 m² sheet of the same type as a group; AND the sheet less than 10000 m² can also be treated as a batch. From this batch of products, randomly TAKE 3 coils to perform dimensional deviation and appearance inspection; from the qualified test pieces, randomly TAKE one coil; CUT 3 m (1.5 m for exit-factory inspection) at a position 500 mm away from the external layer end to perform material performance test.

7.3 Determination rules

7.3.1 Dimensional deviation and appearance

It is deemed as qualified when the dimensional deviation and appearance comply with 5.1 and 5.2. If there is disqualified item, it is allowed to randomly take 3 coils from this batch of products to perform reinspection; if the reinspection is qualified, it is qualified; however, if there is still disqualified item, this batch of products will be deemed as disqualified.

7.3.2 Material properties

7.3.2.1 When the arithmetic MEANS of the resin layer thickness above the intermediate tread base, tensile performance, heat treatment dimensional change rate, peel strength at joint, tear strength, and water absorption COMPLIES with the requirements of standard, then these items are deemed as qualified.

7.3.2.2 When all the test pieces for the low temperature bending performance, water tightness, impact resistance, static load resistance, and wind uplift resistance comply with the requirements of standard, these items are qualified; if there is one disqualified test piece, this item is deemed as disqualified.

7.3.2.3 When all items of the thermal aging, chemical resistance, and artificial climate accelerated aging comply with the standard requirements, this item is deemed as qualified.

7.3.2.4 If the test results comply with the provisions of 5.3, this batch of products are qualified in material properties. If there is only one item in 5.3

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