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**BUILDING MATERIALS INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

JC/T 2170-2013

**Anti-reflective coated glass for photovoltaic modules
(English Translation)**

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1 Scope

This standard specifies the terms and definitions, materials, requirements, test methods, inspection rules, marking, packaging, transportation and storage of anti-reflective coated glass for photovoltaic modules (hereinafter referred to as anti-reflective coated glass).

This standard is applicable to single-side anti-reflective coated glass used for crystalline silicon photovoltaic modules, and may serve for reference for other anti-reflective coated glass for photovoltaic modules.

2 Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 1771-2007 Paints and Varnishes - Determination of Resistance to Neutral Salt Spray

GB/T 2828.1 Sampling Procedures for Inspection by Attribute - Part 1: Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-lot Inspection

GB/T 6739-2006 Paints and Varnishes - Determination of Film Hardness by Pencil Test

GB/T 8170 Rules of Rounding Off for Numerical Values & Expression and
Judgment of Limiting Values

GB/T 9056 Metal Ruler

GB/T 9266-2009 Determination of Scrub Resistance of Film of Architectural Paints and
Coatings

GB 15763.2-2005 Safety Glazing Materials in Building - Part 2: Tempered Glass

GB 15763.3-2009 Safety Glazing Materials in Building - Part 3: Laminated Glass

GB/T 22523 Feeler Gauge

GJB 150.12A-2009 Laboratory Environmental Test Methods for Military Material - Part
12: Sand and Dust Test

JB/T 2369 Reading Microscope

IEC 60068-2-78 Environmental Testing - Part 2-78: Tests - Test Cab: Damp Heat,
Steady State

IEC 61215-2005 Crystalline Silicon Terrestrial Photovoltaic (PV) Modules - Design
Qualification and Type Approval

5.12 Humidity and freezing resistance

Mean decrease of the effective solar transmittance after test shall not be greater than 1% and the film shall be free from obvious shedding, peeling and wrinkling.

5.13 Heat and humidity resistance

Mean decrease of the effective solar transmittance after test shall not be greater than 1% and the film shall be free from obvious shedding, peeling and wrinkling.

5.14 Ultraviolet resistance

Mean decrease of the effective solar transmittance after test shall not be greater than 1% and the film shall be free from obvious shedding, peeling and wrinkling.

5.15 Sand and dust resistance

Mean decrease of the effective solar transmittance after test shall not be greater than 1% and the film shall be free from obvious shedding, peeling and wrinkling.

5.16 Impact resistance

The specimen shall not be damaged after test.

5.17 Fragment state

The minimum quantity of fragments of each specimen within any area (50mmx50mm) shall not be less than 40, and a small amount of fragment strips with the length not exceeding 100mm are allowed to exist.

5.18 Shot-bag impact performance

The specimen must meet the requirements either a) or b);

- a) Where the glass is broken, the total mass of the 10 largest fragments of each specimen shall not exceed the mass of specimen with 65cm² in area, and the length of any glass fragment without through crack reserved in frame shall not exceed 120mm;
- b) Where the drop height of shot-bag is 1200mm, the specimen shall not be damaged.

5.19 Heat impact resistance

Anti-reflective coated glass shall be resistant to a temperature difference of 200°C without damage.

6.1.1 Dimension inspection

Dimensions shall be measured with a steel ruler or steel tape with the minimum scale of 1mm.

6.1.2 Permissible deviation of diagonal line

The length of two diagonal lines of glass shall be measured with steel tape and the deviation of diagonal line shall be calculated according to Formula (1).

Where,

δ - the deviation of diagonal line, mm;

l_1 and l_2 - the length of two diagonal lines, mm.

6.1.3 Permissible deviation of thickness and thickness difference

The external micrometer or instrument with precision of 0.01mm shall be adopted for the measurement at the midpoints of the four sides 15mm away from the glass sheet sides. The arithmetic mean value of measuring results is the thickness which is rounded off to two digits after the decimal point (in mm). The difference between thickness and nominal

thickness is calculated.

The thickness difference between the same glass is the difference between the maximum value and the minimum value of the four measurement values.

6.2 Appearance quality

Product is taken as specimen, place the specimen vertically at the position 600mm away from the screen in an environment not affected by external light. The screen is black and opaque, and it is equipped with several 40W fluorescent lamps which are arranged with a spacing of 300mm. The observer shall be 600mm away from the specimen, with included angle between sight and specimen of $0^{\circ}\sim 60^{\circ}$, observe it back and forth as shown in Figure 1.

Metal ruler with division value of 1mm complying with GB/T 9056 and reading microscope with division value of 0.01mm complying with JB/T 2369 are adopted for measuring length and width.

6.6.4 Test procedures

6.6.4.1

Push the sharp point of the pencil on the coating surface by at least 7mm according to the procedures of 9.1~9.5 in GB/T 6739-2006.

6.6.4.2

After 30s, wipe it up with nonwoven fabric dipped with absolute ethanol; after drying, inspect the specimen surface under 200x microscope, observe whether there is visible scratch on the specimen surface.

6.6.4.3

If there is no scratch, repeat the test in the area which is not tested, replace the pencil with relatively high hardness until a scratch with length at least 3mm appears.

If a scratch with length exceeding 3mm appears, decrease the pencil's hardness, repeat the test until the scratch with length exceeding 3mm no longer appears.

6.6.4.4

Conduct parallel determination twice. If the two determination results are inconsistent, repeat the test.

6.6.5 Result expression

If a scratch with length exceeding 3mm does not appear on anti-reflective coated glass, the hardness of the hardest pencil is taken as the pencil hardness of the specimen.