SEMI PV63-0215
SPECIFICATION FOR ULTRA-THIN GLASSES USED FOR PHOTOVOLTAIC MODULES

This Standard was technically approved by the Photovoltaic Global Technical Committee. This edition was approved for publication by the global Audits and Reviews Subcommittee on November 11, 2014. Available at www.semiviews.org and www.semi.org in February 2015.

1 Purpose

1.1 The purpose of this Standard is to standardize requirements for ultra-thin glasses for photovoltaic modules.

2 Scope

2.1 This Specification covers requirements, test methods, sampling, and judgment rules for ultra-thin glass for photovoltaic modules.

2.2 This Specification applies to ultra-thin glass with heat-treated technology, including float and tempered (or heat strengthened) ultra-thin glass, patterned and tempered (or heat strengthened) ultra-thin glass.

2.3 This Specification applies to the glass used for double-glass photovoltaic module, and normal module with glass and polymer back sheet.

NOTICE: SEMI Standards and Safety Guidelines do not purport to address all safety issues associated with their use. It is the responsibility of the users of the Documents to establish appropriate safety and health practices, and determine the applicability of regulatory or other limitations prior to use.

3 Limitations

3.1 None.

4 Referenced Standards and Documents

4.1 *SEMI Standards and Safety Guidelines*

SEMI PV47 — Specification for Anti-Reflective-Coated Glass, Used in Crystalline Silicon Photovoltaic Modules

4.2 *ASTM Standard*[1]

ASTM C1279 — Non-Destructive Photoelastic Measurement of Edge and Surface Stresses in Annealed, Heat-strengthened, and Fully Tempered Flat Glass

4.3 *EN Standards*[2]

EN 572-2 — Glass in Building. Basic Soda Lime Silicate Glass Products – Part 2: Float Glass

EN 572-5 — Glass in Building. Basic Soda Lime Silicate Glass Products – Part 5: Patterned Glass

EN 1096-1 — Glass in Building. Coated Glass – Part 1: Definitions and Classification

EN 1288-3 — Glass in Building. Determination of the Bending Strength of Glass – Part 3: Test with Specimen Supported at Two Points (Four Point bending)

EN 1863-1 — Glass in Building. Heat Strengthened Soda Lime Silicate Glass – Part 1: Definition and Description

[1] ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, USA; Telephone: +1.610.832.9585, Fax: +1.610.832.9555, http://www.astm.org

[2] European Committee for Standardization, Avenue Marnix 17, B-1000 Brussels; Telephone: +32.2.550.08.11, Fax: +32.2.550.08.19, http://www.cen.eu

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4.4 *ISO Standard*[3]

ISO 2859-1 — Sampling Procedures for Inspection by Attributes – Part 1: Sampling Schemes Indexed by Acceptance Quality Limit (AQL) for Lot-by-lot Inspection

NOTICE: Unless otherwise indicated, all documents cited shall be the latest published versions.

5 Terminology

5.1 Refer to the SEMI Standards Compilation of Terms (COTs) for a list of the current Abbreviations, Acronyms, Definitions, and Symbols.

5.2 *Abbreviations and AcronymsAQL* — acceptance quality level

5.2.2 *T* — thickness of ultra-thin glass

5.3 *Definitions*

5.3.1 *ultra-thin glass used for photovoltaic module* — glass with thickness of 2 to 3 mm (containing 2 mm) used for photovoltaic module, as shown in Figure 1.

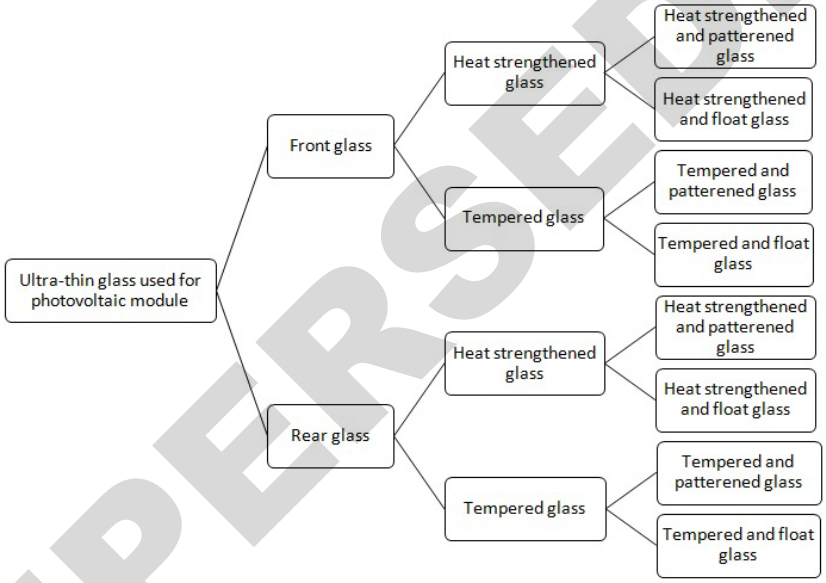


Figure 1
Ultra-thin Glass Used for Photovoltaic Module

5.3.2 *ultra-thin heat-treated glass* — ultra-thin glass with the heat-treated technology, the mechanical strength and heat shock resistance of the glass can be improved.

5.3.3 *ultra-thin front glass* — front glass used for the photovoltaic module, which is ultra-white glass, including patterned and float glass, coated and uncoated glass.

5.3.4 *ultra-thin rear glass* — ultra-thin glass only used for the back of double-glass module, which is usually normal float and uncoated glass, and it can also be ultra-white glass.

[3] International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland; Telephone: +41.22.749.01.11, Fax: +41.22.733.34.30, http://www.iso.org

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6 Test Methods

6.1 *Test Condition*

6.1.1 Tests shall be carried in the conditions as follows:

1. Temperature: 20°C ± 5°C;
2. Pressure: 8.60×10^4 Pa to 1.06×10^5 Pa;
3. Relative humidity: 40% to 80%.

6.2 *Appearance*

6.2.1 Appearance test of uncoated glass shall be carried according to EN 572-2 and EN 572-5. Appearance test of coated glass shall be carried according to EN 1096-1.

6.3 *Size Tolerance*

6.3.1 Length and width are tested by steel tape with minimum scale of 1 mm. Thickness is tested on the middle spots which are 15 mm away from the glass edge by outside micrometer with 0.01 mm accuracy or the equipment with the same accuracy. Thickness difference of the glass is the gap difference between maximum and minimum value.

6.4 *Hole*

6.4.1 Test the size of holes on the glass with appliance such as vernier caliper, whose minimum scale is 0.02 mm. Test the relative position of the holes with steel ruler or steel tape measure, whose minimum scale is 1 mm.

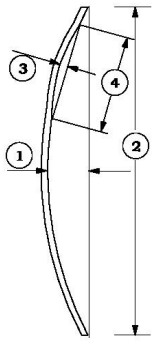
6.5 *Edge Processed*

6.5.1 Visually inspect the glass at 600 mm away from the front of glass under fine natural light and scattering light.

6.6 *Bow Degree*

6.6.1 The glass shall be placed in a vertical position and supported on its longer side by two load bearing blocks at the quarter points. Put an edge ruler or metal wire close to the two sides or diagonal of the glass. And test the gap between straight line and the glass by feeler. The degree of bow is then expressed as the deformation, divided by the measured length of the edge of the glass, or diagonal.

6.6.2 Local bow shall be measured over a limited length of 300 mm by using an edge ruler or a metal line. As shown in Figure 2 (metal line) and Figure 3 (edge ruler), degree of local bow is represented by the height of the trough or crest by using a feeler. The measurement shall be carried out at room temperature.



#1 (1) Deformation of the bow; (2) Glass side or diagonal length; (3) local bow; (4) 300 mm length.

Figure 2
Test by Metal Line

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