ISO/TS 21486:~~2021~~2022(E)

ISO/TC 160/SC 1/WG 9

BSI

Glass in building — Retesting requirements for laminated solar photovoltaic glass for use in buildings

First edition

Date: ~~2021-12-15~~

2022-02

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 160, *Glass in building*, Subcommittee SC 1, *Product considerations*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Glass in building — Retesting guideline for laminated solar photovoltaic glass for use in buildings

1 Scope

This document specifies requirements for retesting laminated solar photovoltaic (PV) glass for use in buildings.

This document applies to laminated solar PV glass.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 12543-5, *Glass in building — Laminated glass and laminated safety glass — Part 5: Dimensions and edge finishing*

ISO/TS 18178:2018, *Glass in building — Laminated solar photovoltaic glass for use in buildings*

~~ISO 12543-5, *Glass in building — Laminated glass and laminated safety glass — Part 5: Dimensions and edge finishing*~~

ISO 29584, *Glass in building — Pendulum impact testing and classification of safety glass*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain ~~terminological~~terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Retesting criteria

4.1 Glass modifications

For glass modification, retesting shall be performed in accordance with Table 1.

Table 1 — Parameters, changes and retesting items for glass

Parameters	Changes	Retesting item
Thickness	Decrease: >20 %	1) Appearance 2) Dimensions and edge finishing 3) High-temperature test

		4) Hot-spot endurance test 5) Ball drop test 6) Impact test
	a) Increase, or b) Decrease: ≤20 %	Does not require retesting
Varieties	Toughened glass change to non-toughened glass	1) Impact test 2) ball drop test
	Enamelled glass change to non-enamelled glass or coated glass	1) Radiation test 2) High-temperature test 3) Thermal cycling test (200 cycles) 4) Damp heat test 5) Humidity freeze test
	Ordinary glass change to lower iron glass or patterned glass[a]	1) Radiation test 2) High-temperature test 3) Thermal cycling test (200 cycles) 4) Damp heat test 5) Humidity freeze test
	a) Non-toughened glass change to toughened glass, or b) Non-enamelled glass change to enamelled glass, or c) Lower iron glass or patterned glass change to ordinary glass	Does not require retesting

[a] The light transmission of the glass is higher than the uncertainty of the measured glass value.

4.2 Solar cell modifications

4.2.1 Crystalline silicon solar cells

For modifications to crystalline silicon solar cells, retesting shall be performed in accordance with Table 2.

Table 2 — Parameters, changes and retesting items for crystalline silicon solar cells

Parameters	Changes	Retesting items
Thickness	Decrease: ≥10 %	1) Appearance 2) Hot-spot endurance test 3) Impact test
	a) Increase, or b) Decrease: <10 %	Does not require retesting
Size	Increase: ≥10 %	1) Appearance 2) Thermal cycling test (200 cycles) 3) Hot-spot endurance test 4) Impact test
	a) Decrease, or b) Increase: <10 %	Does not require retesting
Cell surface	Treatment	1) Appearance

		2) Hot-spot endurance test 3) Damp heat test 4) High-temperature test
Density[a]	Increase: ≥20 % and <50 %	1) Appearance 2) Hot-spot endurance test
	Decrease or increase: <20 %	Does not require retesting
	Increase: ≥50 %	All testing items[b]
Cell type	Changes between monocrystalline silicon and polycrystalline silicon	All testing items[b]

[a] Percentage of solar cells per unit area.

[b] Under this condition, the module shall be considered as a new product and subjected to all the testing items in accordance with ISO/TS 18178.

4.2.2 Thin-film solar cells

For modifications to thin-film solar cells, retesting shall be performed in accordance with Table 3.

Table 3 — Parameters, changes and retesting items for thin-film solar cells

Parameters	Changes	Retesting items
Substrate material	Thickness decrease	1) Appearance 2) Ball drop test 3) Impact test 4) Damp heat test 5) High-temperature test 6) Humidity freeze test
	Thickness increase	Does not require retesting
	Material type	All testing items[a]
Thin-film material	Material type	All testing items[a]

[a] Under this condition, the module shall be considered as a new product and subjected to all the testing items in accordance with ISO/TS 18178.

4.3 Interlayer modifications

For interlayer modifications, retesting shall be performed in accordance with Table 4.

Table 4 — Parameters, changes and retesting items for interlayer

Parameters	Changes	Retesting items
Thickness	Decrease: ≥0,38 mm	1) Appearance 2) High temperature test 3) Damp heat test 4) Radiation test 5) Thermal cycling test (200 cycles) 6) Humidity freeze test 7) Insulation test 8) Wet leakage current test 9) Ball drop test

		10) Impact test
	a) Increase, or b) Decrease ~~<~~: ≤0,38 mm	Does not require retesting
Material	The chemical composition of the interlayer changes such as polyofefin elastomer (POE) and polyvinyl butyral (PVB) and vice versa.	All testing items[a]
[a] Under this condition, the module shall be considered as a new product and subjected to all the testing items in accordance with ISO/TS 18178.		

4.4 Interconnector modifications

For interconnector modification, retesting shall be performed in accordance with Table 5.