



SLOVENSKI STANDARD
oSIST prEN ISO 12543-4:2020
01-april-2020

**Steklo v gradbeništvu - Lepljeno steklo in lepljeno varnostno steklo - 4. del:
Metode preskušanja trajnosti (ISO/DIS 12543-4:2020)**

Glass in building - Laminated glass and laminated safety glass - Part 4: Test methods for durability (ISO/DIS 12543-4:2020)

Glas im Bauwesen - Verbundglas und Verbund-Sicherheitsglas - Teil 4: Verfahren zur Prüfung der Beständigkeit (ISO/DIS 12543-4:2020)

Verre dans la construction - Verre feuilleté et verre feuilleté de sécurité - Partie 4: Méthodes d'essai concernant la durabilité (ISO/DIS 12543-4:2020)

<https://standards.iteh.ai/catalog/standards/sist/1302434a-7665-4492-b2a5-43108f709d45/osist-pr-en-iso-12543-4-2020>

Ta slovenski standard je istoveten z: prEN ISO 12543-4

ICS:

81.040.20 Steklo v gradbeništvu Glass in building

oSIST prEN ISO 12543-4:2020 **en,fr,de**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN ISO 12543-4:2020](https://standards.iteh.ai/catalog/standards/sist/1302434a-7665-4492-b2a5-d3108f799d45/osist-pren-iso-12543-4-2020)

<https://standards.iteh.ai/catalog/standards/sist/1302434a-7665-4492-b2a5-d3108f799d45/osist-pren-iso-12543-4-2020>

DRAFT INTERNATIONAL STANDARD

ISO/DIS 12543-4

ISO/TC 160/SC 1

Secretariat: BSI

Voting begins on:
2020-01-20Voting terminates on:
2020-04-13

Glass in building — Laminated glass and laminated safety glass —

Part 4: Test methods for durability

*Verre dans la construction — Verre feuilleté et verre feuilleté de sécurité —
Partie 4: Méthodes d'essai concernant la durabilité*

ICS: 81.040.20

iTeh STANDARD PREVIEW
(standards.iteh.ai)

<https://standards.iteh.ai/catalog/standards/sist/1302434a-7665-4492-b2a5-d3108f799d45/osist-pren-iso-12543-4-2020>

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

This document is circulated as received from the committee secretariat.

ISO/CEN PARALLEL PROCESSING



Reference number
ISO/DIS 12543-4:2020(E)

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN ISO 12543-4:2020](https://standards.iteh.ai/catalog/standards/sist/1302434a-7665-4492-b2a5-d3108f799d45/osist-pren-iso-12543-4-2020)

<https://standards.iteh.ai/catalog/standards/sist/1302434a-7665-4492-b2a5-d3108f799d45/osist-pren-iso-12543-4-2020>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2020

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	iv
1 Scope.....	1
2 Normative references.....	1
3 Terms and definitions.....	1
4 Test specimens.....	1
5 High-temperature test.....	2
5.1 Principle.....	2
5.2 Size and number of test specimens.....	2
5.3 Procedures.....	2
5.3.1 General.....	2
5.3.2 Other characteristics of glass.....	2
5.3.3 Procedure B (long high temperature test).....	2
5.4 Expression of results.....	3
5.5 Test report.....	3
6 Humidity Test.....	3
6.1 Principle.....	3
6.2 Size and number of test specimens.....	3
6.3 Procedures.....	4
6.3.1 Test with condensation.....	4
6.3.2 Test without condensation.....	4
6.4 Expression of results.....	4
6.5 Test Report.....	4
7 Radiation Tests.....	5
7.1 Principle.....	5
7.2 Size and number of test specimens.....	5
7.3 Simulated solar radiation methods.....	5
7.3.1 Method A.....	5
7.3.2 Method C.....	6
7.4 Procedure.....	7
7.5 Expression of results.....	7
7.5.1 Laminated glass and laminated safety glass.....	7
7.5.2 Fire-resistant laminated glass and fire-resistant laminated safety glass.....	7
7.6 Test Report.....	7
Annex A (informative) Possible arrangement of the test apparatus for the radiation test described in 7.3.1.....	9
Annex B (normative) Retesting guidelines for durability testing of laminated glass.....	11
Bibliography.....	12

ISO/DIS 12543-4:2020(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

This third edition cancels and replaces the second edition (ISO 12543-4:2011), which has been technically revised.

The main changes compared to the previous edition are as follows:

- Editorial changes
-

A list of all parts in the ISO 12543 series can be found on the ISO website.

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 — Laminated glass and laminated safety glass —

Part 4: Test methods for durability

1 Scope

This part of ISO 12543 defines terms and describes component parts for laminated glass and laminated safety glass for use in building.

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 4892-2, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 9050, *Glass in building — Determination of light transmittance, solar direct transmittance, total solar energy transmittance, ultraviolet transmittance and related glazing factors*

ISO 12543-1, *Glass in building — Laminated glass and laminated safety glass — Part 1: Definitions and description of component parts*

ISO 12543-2, *Glass in building — Laminated glass and laminated safety glass — Part 2: Laminated safety glass*

ISO 12543-3, *Glass in building — Laminated glass and laminated safety glass — Part 3: Laminated glass*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12543-1 and ISO 12543-2 apply.

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

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

4 Test specimens

Test specimens should be representative of standard production. Test specimens shall either be specially manufactured to the test size or be cut from larger panes. Test specimens with cut edges shall contain at least one edge from the original pane from which it was cut.

The original edge should be marked.

If the final product has all its edges sealed/protected, the test specimen shall also have all its edges sealed/protected.

The method of supporting the test specimen shall not cover two edges of the test specimen. If the test specimen is cut from a larger pane at least one original edge shall not be covered.

ISO/DIS 12543-4:2020(E)

5 High-temperature test

5.1 Principle

The purpose of this test is to determine whether the laminated glass and laminated safety glass are able to withstand exposure to high temperatures over an extended period of time without their properties becoming substantially altered. The changes in properties are judged by the occurrence of bubbles, delamination and cloudiness (not discoloration).

5.2 Size and number of test specimens

The test specimens shall not be smaller than 300 mm × 100 mm. There shall be three test specimens.

5.3 Procedures

5.3.1 General

The high-temperature test may be carried out using either an oven or boiling water. The test temperature is 100 °C. The tolerances of the test temperature depend on the test method used and are as follows:

- a) Oven (100 ± 2) °C
- b) Boiling water 100 ($\begin{smallmatrix} +0 \\ -2 \end{smallmatrix}$) °C

To remove the risk of thermal breakage in the boiling water, test samples should be placed in water at 60 °C for 10 min before transferring to the water at 100 °C.

5.3.2 Other characteristics of glass

oSIST prEN ISO 12543-4:2020
<https://standards.iteh.ai/catalog/standards/sist/1302434a-7665-4492-b2a5-1310879044561100-pr-en-iso-12543-4-2020>

Heat the three test specimens to a temperature of 100 °C.

In an oven, the heating-up time is dependent on load and the type and thickness of the laminated glass being tested.

Generally speaking, for samples up to 10 mm thickness this should be assumed to be 30 minutes. For thick samples, i.e. thicker than 10 mm, a heating-up time of 3 minutes per millimetre glass thickness shall be assumed. The maximum shall be 2 hours. Alternatively, the heating-up time for samples thicker than 10 mm may be determined by calibration.

Maintain the test temperature for a period of 2 h.

Take the test specimens out and allow them to cool to room temperature by storing them vertically under natural convection and radiation. The assessment of the test samples may be carried out when the glass surface temperature is lower than 30 °C.

5.3.3 Procedure B (long high temperature test)

Heat the three test specimens to a temperature of 100 °C.

In an oven, the heating-up time is dependent on the load and the type and thickness of the laminated glass being tested. Generally speaking, for samples up to 10 mm thickness this should be assumed to be 30 minutes. For thick samples, i.e. thicker than 10 mm, a heating-up time of 3 minutes per millimetre glass thickness shall be assumed. The maximum shall be 2 hours. Alternatively, the heating-up time for samples thicker than 10 mm may be determined by calibration.

Maintain the test temperature for a period of 16 h.

Take the test specimens out and allow them to cool to room temperature by storing them vertically under natural convection and radiation. The assessment of the test samples may be carried out when the glass surface temperature is lower than 30 °C.

5.4 Expression of results

Inspect the samples at a distance between 300 mm and 500 mm in front of a white diffuse background.

Record the number and extent of the faults occurring in test specimen.

NOTE Bubbles, delamination, haze and cloudiness indicate faults, but discoloration does not.

Disregard all faults within 15 mm from an original edge and 20 mm from a cut edge. Individual bubbles in the immediate vicinity of inlaid wires are permissible.

Disregard a test specimen showing cracks, and perform the test on a new test specimen in its place.

5.5 Test report

The following information shall be given in the test report:

- a) reference to this part of ISO 12543, i.e. ISO 12543-4:2019;
- b) test procedure used: A (see 5.3.2) or B (see 5.3.3);
- c) type and structure of the laminated glass or laminated safety glass, with nominal thickness of the individual constituents, in millimetres;
- d) type of test specimens, including cut or special manufacture; type of edge; edge protection; dimensions;
- e) unsupported and supported edges by the test frame;
- f) for each test specimen, the number and size of the bubbles, delamination, haze or cloudiness occurring.

6 Humidity Test

6.1 Principle

The purpose of this test is to determine whether the laminated glass and laminated safety glass are able to withstand the effects of humidity in the atmosphere over an extended period of time without their properties becoming substantially altered. The effects of the humidity are judged by bubbles, delamination, haze or cloudiness.

6.2 Size and number of test specimens

The test specimens shall not be smaller than 300 mm × 100 mm. There shall be three test specimens.

ISO/DIS 12543-4:2020(E)

6.3 Procedures

6.3.1 Test with condensation

Keep the three test specimens vertically over water in a closed container for two weeks. Maintain the temperature of the air in the container at 50^{+5}_0 °C. Adequate spacing between the test specimens shall be provided.

NOTE These conditions give a relative humidity of about 100 % and lead to water condensing on the surface of the test specimen.

6.3.2 Test without condensation

Keep the three test specimens vertically for two weeks in a climate chamber and keep the temperature of the air in the container at 50^{+5}_0 °C and the relative humidity within the limits of (80 ± 5) %. Adequate spacing between the test specimens shall be provided.

6.4 Expression of results

Inspect the samples at a distance between 300 mm and 500 mm in front of a white diffuse background.

Record the number and extent of the faults occurring in the interlayer (bubbles, delamination, haze and cloudiness) for each test specimen. Disregard all faults within 15 mm from an original edge, 20 mm from a cut edge or 10 mm from any crack. Individual bubbles in the immediate vicinity of inlaid wires are permissible.

In the case of fire-resistant laminated glass and fire-resistant laminated safety glass, only delamination shall be considered as a fault.

NOTE The interlayers of fire-resistant laminated glass and fire-resistant laminated safety glass are designed to react at high temperatures. The exposure of test specimens of those glasses to the temperature reached in the humidity test over a long period of time may create bubbles, haze and cloudiness in the interlayer which do not affect the fire-resistant properties so that only delamination will be considered.

6.5 Test Report

The following information shall be given in the test report:

- a) reference to this part of ISO 12543, i.e. ISO 12543-4:2019;
- b) test procedure ([6.3.1](#) or [6.3.2](#));
- c) type and structure of the laminated glass or laminated safety glass, with nominal thickness of the individual constituents, in millimetres;
- d) type of test specimens, including cut or special manufacture; type of edge; edge protection; dimensions;
- e) unsupported and supported edges by the test frame;
- f) for each test specimen, the number and size of the bubbles, delamination, haze and cloudiness occurring;
- g) In the case of fire-resistant laminated safety glass and fire-resistant laminated glass, only delamination information shall be reported.