



SLOVENSKI STANDARD

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Steklo v gradbeništvu – HS-preskus kaljenega natrijevega-kalcijevega-silikatnega varnostnega stekla – 1. del: Definicije in opis

Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 1: Definition and description

Glas im Bauwesen - Heißgelagertes thermisch vorgespanntes Kalknatron-Einscheibensicherheitsglas - Teil 1: Definition und Beschreibung

Verre dans la construction - Verre de silicate sodocalcique de sécurité trempé et traité Heat Soak - Partie 1: Définition et description

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EUROPEAN STANDARD
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EN 14179-1

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Glass in building - Heat soaked thermally toughened soda lime silicate safety glass - Part 1: Definition and description

Verre dans la construction - Verre de silicate sodo-calcique de sécurité trempé et traité Heat Soak - Partie 1: Définition et description

Glas im Bauwesen - Heißgelagertes thermisch vorgespanntes Kalknatron-Einscheibensicherheitsglas - Teil 1: Definition und Beschreibung

This European Standard was approved by CEN on 19 May 2005.

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EN 14179-1:2005 (E)**Foreword**

This European Standard (EN 14179-1:2005) has been prepared by Technical Committee CEN/TC 129 “Glass in building”, the secretariat of which is held by IBN/BIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2005, and conflicting national standards shall be withdrawn at the latest by December 2005.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This Part of the European Standard does not stand-alone, it is a part of one standard:

- EN 14179-1: Glass in building – Heat soaked thermally toughened soda lime silicate safety glass – Part 1: Definition and description;
- EN 14179-2: Glass in building – Heat soaked thermally toughened soda lime silicate safety glass – Part 2: Evaluation of conformity/Product standard.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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Introduction

Heat soaked thermally toughened soda lime silicate safety glass has a safer breakage behaviour when compared with annealed glass. It also has a known level of residual risk of spontaneous breakage arising from the possible presence of critical nickel sulphide (NiS) inclusions in the thermally toughened soda lime silicate glass.

NOTE 1 This case deals with extremely large quantities of glass. These quantities are dealt with on a statistical basis. Therefore it is impossible to select a quantity of heat soaked thermally toughened soda lime silicate safety glass, for a building, and claim that 'no break' by NiS inclusion can occur. The breakage of heat soaked thermally toughened soda lime silicate safety glass caused by other influences is excluded.[s11]

When used to offer protection under accidental human impact, heat soaked thermally toughened soda lime silicate safety glass also should be classified according to EN 12600 (all parts).

NOTE 2 CEN/TC 129/WG 8 is producing standards for the determination of the design strength of glass and is preparing a design method.

The European Committee for Standardization (CEN) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent concerning Heat Soak Tests. CEN takes no position concerning the evidence, validity and scope of this patent right. The holder of this patent right has assured CEN that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with CEN. Information may be obtained from:

SAINT-GOBAIN GLASS FRANCE [SIST EN 14179-1:2005](https://standards.iteh.ai/catalog/standards/sist/30b6c94d-9450-485b-afa4-256be2d8a555/sist-en-14179-1-2005)

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. CEN shall not be held responsible for identifying any or all such patent rights.

EN 14179-1:2005 (E)**1 Scope**

This European Standard specifies the heat soak process system together with tolerances flatness, edgework, fragmentation and physical and mechanical characteristics of monolithic flat heat soaked thermally toughened soda lime silicate safety glass for use in buildings.

Information on curved heat soak thermally toughened soda lime silicate safety glass is given in Annex B, but this product does not form part of this European Standard.

Other requirements, not specified in this European Standard, can apply to heat soaked thermally toughened soda lime silicate safety glass which is incorporated into assemblies, e.g. laminated glass or insulating units, or undergo an additional treatment, e.g. coating. The additional requirements are specified in the appropriate product standard. Heat soak thermally toughened soda lime silicate safety glass, in this case, does not lose its mechanical or thermal characteristics.

2 Normative references

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

EN 572-1, *Glass in building — Basic soda lime silicate glass products — Part 1: Definitions and general physical and mechanical properties*

EN 572-2, *Glass in building — Basic soda lime silicate glass products — Part 2: Float glass*

EN 572-4, *Glass in building — Basic soda lime silicate glass products — Part 4: Drawn sheet 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*

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

3.1**heat soaked thermally toughened soda lime silicate safety glass**

glass within which a permanent surface compressive stress has been induced in order to give it greatly increased resistance to mechanical and thermal stress and prescribed fragmentation characteristics and which has a known level of residual risk of spontaneous breakage due to the presence of critical nickel sulphide (NiS) inclusions

3.2**level of residual risk**

risk of spontaneous breakage of heat soaked thermally toughened soda lime silicate safety glass, on a statistical basis, due to the presence of critical nickel sulphide inclusions, is no more than one breakage per 400 tonnes of heat soaked thermally toughened soda lime silicate safety glass

3.3**flat heat soaked thermally toughened soda lime silicate safety glass**

heat soaked thermally toughened soda lime silicate safety glass that has not been deliberately given a specific profile during manufacture

3.4**heat soaked enamelled thermally toughened soda lime silicate safety glass**

heat soaked thermally toughened soda lime silicate safety glass which has a ceramic frit fired into the surface during the toughening process. After toughening the ceramic frit becomes an integral part of the glass

NOTE In the UK, this glass is also known as heat soaked opaque thermally toughened soda lime silicate safety glass.

3.5**horizontal toughening**

process in which the glass is supported on horizontal rollers

3.6**vertical toughening**

process in which the glass is suspended by tongs

4 Glass products

Heat soaked thermally toughened soda lime silicate safety glass shall be made from a monolithic soda lime silicate glass product generally corresponding to one of the following standards:

- soda lime silicate glass according to EN 572-1;
 - float glass according to EN 572-2;
 - drawn sheet glass according to EN 572-4,
 - patterned glass according to EN 572-5;
 - coated glass according to EN 1096-1.
- iTech STANDARD PREVIEW
(standards.itech.ai)
- SIST EN 14179-1:2005
<https://standards.itech.ai/catalog/standards/sist/30b6c94d-9450-485b-afa4-256be2d8a555/sist-en-14179-1-2005>

5 Manufacturing processes**5.1 General**

Heat soaked thermally toughened soda lime silicate safety glass is manufactured as follows:

Basic soda lime silicate glass products (see Clause 4) are cut to size, shaped and edgeworked (see Clause 9).

The prepared glass panes are then thermally toughened (see 5.2).

The thermally toughened panes are then subjected to the heat soak process cycle.

After manufacture the heat soaked thermally toughened soda lime silicate glass shall comply with the fragmentation test (see Clause 10) and mechanical strength requirement (see 11.4).

5.2 Toughening process

The cut, shaped and edgeworked glasses are toughened. The horizontal or vertical toughened glass shall comply with the flatness criteria (see 8.3).

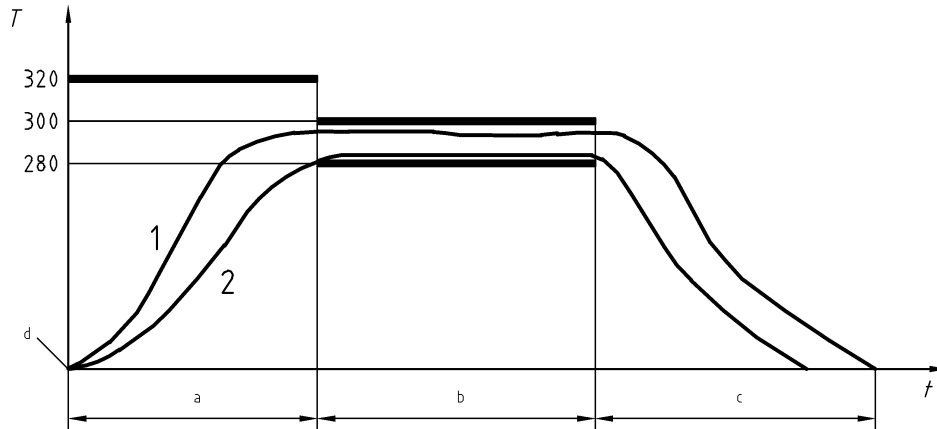
The thermally toughened soda lime silicate glass shall have a level of fragmentation that will ensure that after the glass has been through the heat soak process, and subsequently tested to the fragmentation test (see Clause 10), it shall comply with 10.5.

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5.3 Heat soak process cycle

5.3.1 General

The heat soak process cycle consists of a heating phase, a holding phase and a cooling phase (see Figure 1).

**Key**

T	glass temperature at any point, °C	d	ambient temperature
t	time, h	a	heating phase
1	first glass to reach 280 °C	b	holding phase
2	last glass to reach 280 °C	c	cooling phase

Figure 1 — Heat soak process cycle

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5.3.2 Heating phase <https://standards.iteh.ai/catalog/standards/sist/30b6c94d-9450-485b-afa4-256be2d8a555/sist-en-14179-1-2005>

The heating phase commences with all the glasses at ambient temperature and concludes when the surface temperature of the last glass reaches 280 °C. The time to reach this temperature is defined in the calibration process. This time will be dependent on the size of the oven, the amount of glass to be treated, the separation between glasses and the heating system capacity.

NOTE 1 The glass separation and rate of heating should be controlled to minimise the risk of glass breakage as a result of thermal stress.

To facilitate economic heating, the air temperature within the oven may exceed 320 °C. However, the glass surface temperature shall not be allowed to exceed 320 °C. The period of glass surface temperature in excess of 300 °C shall be minimised.

NOTE 2 When the temperature of the glass exceeds 300 °C, care should be taken to ensure that the properties of the heat soaked thermally toughened soda lime silicate safety glass are not significantly altered i.e. they continue to meet Clause 10.

5.3.3 Holding phase

The holding phase commences when the surface temperature of all the glasses has reached a temperature of 280 °C. The duration of the holding phase is 2 h.

Precise oven control is necessary in order to ensure that the glass surface temperature shall be maintained in the range of 290 °C ± 10 °C during the holding phase.

5.3.4 Cooling phase

The cooling phase commences when the last glass to reach 280 °C has completed its holding phase, i.e. been held for two hours at 290 °C ± 10 °C. During this phase the glass temperature shall be brought down to ambient temperature.

The cooling phase can be concluded when the air temperature in the oven reaches 70 °C.

NOTE The rate of cooling should be controlled to minimise the risk of glass breakage as a result of thermal stress.

6 Heat soak process system

6.1 General

The heat soak process system consists of:

- oven (see 6.2);
- glass support (see 6.3);
- separation system (see 6.4).

The oven shall be calibrated, see 6.5 and Annex A, and this determines the method of operation of the heat soak process system during manufacture of heat soaked thermally toughened soda lime silicate safety glass.

6.2 Oven

The oven shall be heated by convection and shall allow an unhindered air circulation around each glass pane. In the event of glass breakage the airflow shall not be hindered. The airflow in the oven shall be led parallel to the glass surfaces.

NOTE The openings for the air ingress/egress should be designed to ensure that fragments of broken glass do not cause blockages.

6.3 Glass support

Glasses may be supported vertically or horizontally. The glasses shall not be fixed or clamped, they have to be supported to allow free movement.

NOTE Vertically means true vertical or up to 15° either side of true vertical.

The distance between glasses affects the airflow, heat exchange and the heating time. Glass to glass contact shall not be allowed.

6.4 Glass separation

The glasses shall be separated in a manner that does not hinder the airflow. The separators shall also not hinder the airflow e.g. see Figure 2.

Dimensions in millimetres

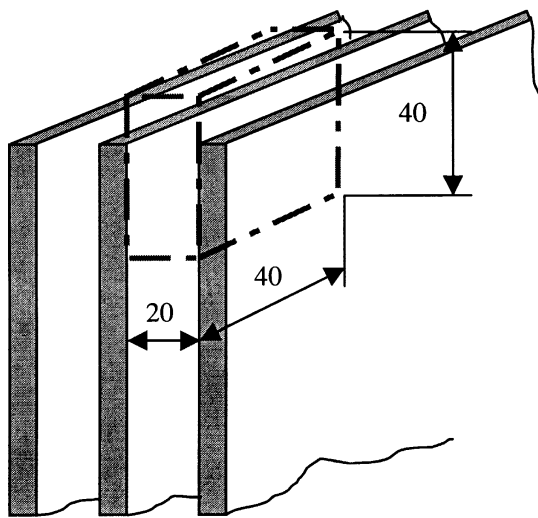


Figure 2 — Example of a vertical glass support

The minimum separation of the glasses shall be determined during the calibration of the oven, see 6.5 and Annex A.

NOTE 1 Generally, a minimum separation of 20 mm is recommended (see Figure 3).

NOTE 2 If glasses of very different size are put on the same stillage, they will require greater separation in order to prevent glass breakage when the furnace is opened after the heat soak process. The same applies to glasses with holes, notches and cut-outs.

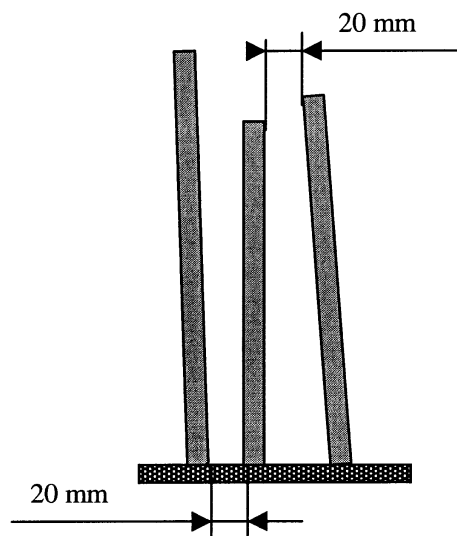


Figure 3 — Recommend separation between glass

The positioning of the separators, material of the manufacture and their shape shall be specified during the calibration test of the oven and shall be reproduced during the manufacturing process.

6.5 Calibration

The heat soak system, e.g. oven, glass separation, separators, etc., shall be calibrated, see Annex A.

The calibration shall determine the heating phase of the process, glass separation distance, the positioning, material and shape of separators, the type and positioning of stillage(s) and define the operating conditions for use during manufacture.

7 Fracture characteristics

In the event of breakage, heat soaked thermally toughened soda lime silicate safety glass fractures into numerous small pieces, the edges of which are generally blunt.

NOTE Fragmentation in service does not always correspond to that described in Clause 10, due to restraint from fixing or reprocessing (e.g. laminating), or due to the cause of fracture.

8 Dimensions and tolerances

8.1 Nominal thickness and thickness tolerances

The nominal thicknesses and thickness tolerances are those given in the relevant product standard (see Clause 4), some of which are reproduced in Table 1.