SLOVENSKI STANDARD
SIST EN 14179-1:2016

01-oktober-2016

Nadomešča:
SIST EN 14179-1:2005

Steklo v gradbeništvu - HS-preskus kaljenega natrij-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 sodo-calcique de sécurité trempé et traité Heat Soak - Partie 1: Définition et description

Ta slovenski standard je istoveten z: **EN 14179-1:2016**

ICS:

81.040.20	Steklo v gradbeništvu	Glass in building

SIST EN 14179-1:2016 **en,fr,de**

EUROPEAN STANDARD

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English Version

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

European foreword

This document (EN 14179-1:2016) has been prepared by Technical Committee CEN/TC 129 “Glass in building”, the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by January 2017, and conflicting national standards shall be withdrawn at the latest by January 2017.

This document supersedes EN 14179-1:2005.

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

EN 14179, *Glass in building — Heat soaked thermally toughened soda lime silicate safety glass*, is composed of the following parts:

— *Part 1: Definition and description*;

— *Part 2: Evaluation of conformity / Product standard*.

This European Standard differs from EN 14179-1:2005 as follows:

a) some figures have been revised and some new figures have been added;

b) new terms and definitions have been included in Clause 3, e.g. air cushion process (3.7), edge lift (3.10) and roller wave distortion (3.14) further nominal thicknesses have been included in Table 1;

c) the glass temperature during the holding time of the heat soak process cycle has been reduced,

d) subclause 8.2.3 “Tolerances and squareness” has been completely revised; the squareness of rectangular glass panes is now expressed by the difference between its diagonals;

e) Clauses 8 and 9 have been completely revised (including the air cushion manufacturing process);

f) the informative Annex “Curved heat soaked thermally toughened soda lime silicate safety glass” has been deleted;

g) a new informative Annex dealing with an alternative method for the measurement of roller wave distortion has been added.

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

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 heat soaked 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 not considered in this European Standard.

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.

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 ensured 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;

Les Miroirs – 92096 La Défense Cedex,

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CEN and CENELEC maintain online lists of patents relevant to their standards. Users are encouraged to consult the lists for the most up to date information concerning patents (ftp://ftp.cencenelec.eu/EN/IPR/Patents/IPRdeclaration.pdf).

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.

Curved heat soaked thermally toughened soda lime silicate safety glass is not 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 soaked thermally toughened soda lime silicate safety glass, in this case, does not lose its bending strength characteristics and its resistance to temperature differentials.

Surface finished glasses (e.g. sandblasted, acid etched) after toughening are not covered by this European Standard.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 572-8, *Glass in building - Basic soda lime silicate glass products - Part 8: Supplied and final cut sizes*

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)*

3 Terms and definitions

For the purposes of this document, 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, additionally to the basic mechanical strength, has been induced by a controlled heating and cooling process 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

Note 1 to entry: The mechanical properties, i.e. thermal durability and mechanical strength, and safety properties, i.e. fragmentation characteristics, are generated by the level of surface compression. These properties are not size dependent.

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 t 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
curved heat soaked thermally toughened soda lime silicate safety glass
heat soaked thermally toughened soda lime silicate safety glass which has been deliberately given a specific profile during manufacture

Note 1 to entry: This product is excluded from the scope.

3.5
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

Note 1 to entry: After toughening, the ceramic frit becomes an integral part of the glass.

Note 2 to entry: In the UK, this glass is also known as opaque heat soaked thermally toughened soda lime silicate safety glass.

Note 3 to entry: The application of the ceramic frit may be by a continuous process or discontinuous application, e.g. screen printing. The enamelled surface could be partially or wholly.

3.6
horizontal process
process in which the glass is supported on horizontal rollers

3.7
air cushion process
process in which the glass is supported by an air cushion with or without additional rollers

Note 1 to entry: In this process, the glass will be between horizontal and 45° of horizontal.

3.8
vertical process
process in which the glass is suspended by tongs

3.9
edge deformation
deformation of the edge cause by the tong marks for vertically toughened glass

3.10
edge lift
distortion produced in horizontal toughened glass, at the leading and trailing edge of the plate

3.11
perimeter deformation
distortion around the edge of toughened glass manufactured by air cushion process

3.12
local distortion
local deformation of vertically toughened glass underneath the tong marks

3.13
overall bow
deformation of the whole pane of toughened glass caused by the heating and cooling process

3.14
roller wave distortion
distortion produced in horizontally toughened glass as a result of the glass during toughening process being in contact with the rollers

3.15
wave distortion
distortion produced in toughened glass manufactured by air cushion process as a result of the glass toughening process

4 Glass products

Heat soaked thermally toughened soda lime silicate safety glass shall be made from a monolithic 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;

— supplied and final cut sizes according to EN 572-8;

— coated glass according to EN 1096-1.

Glass of nominal thicknesses other than those covered in the above standards is possible.

5 Manufacturing processes

5.1 General

Heat soaked thermally toughened soda time 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

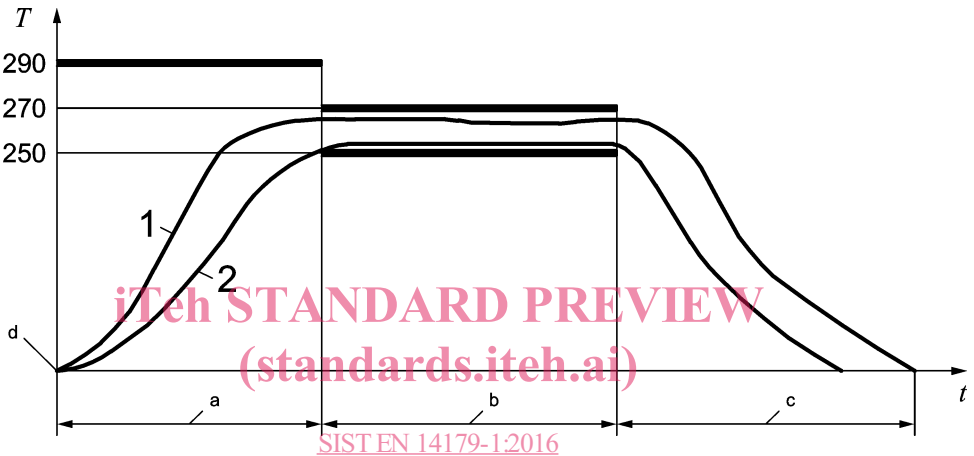
The cut, shaped and edgeworked glasses are toughened. The glasses toughened by the horizontal or air cushion or vertical process shall comply with the flatness criteria (see 8.3).

The thermally toughened soda lime silicate safety 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.

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 250 °C	b	holding phase
2	last glass to reach 250 °C	c	cooling phase

Figure 1 — Heat soak process cycle

5.3.2 Heating phase

The heating phase commences with all the glasses at ambient temperature and concludes when the surface temperature of the last glass reaches 250 °C. The maximum heating rate is 3° C per minute. 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 minimize the risk of glass breakage as a result of thermal stress.

To facilitate economic heating, the air temperature within the oven may exceed 290 °C. However, the glass surface temperature shall not be allowed to exceed 290 °C. The period of glass surface temperature in excess of 270 °C shall be minimized.

NOTE 2 Care should be taken to ensure the maximum temperature of the glass does not exceed 270° C as there is a possibility of the nickel sulphide inclusion reconverting.

5.3.3 Holding phase

The holding phase commences when the surface temperature of all the glasses has reached a temperature of 250 °C. The minimum duration of the holding phase is 2 hours.

Precise oven control is necessary in order to ensure that the glass surface temperature shall be maintained in the range of 260 °C ± 10 °C during the holding phase.

5.3.4 Cooling phase

The cooling phase commences when the last glass to reach 250 °C has completed its holding phase, i.e. been held for minimum 2 hours at 260 °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.

The rate of cooling should be controlled to minimize 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.

The openings in the oven 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

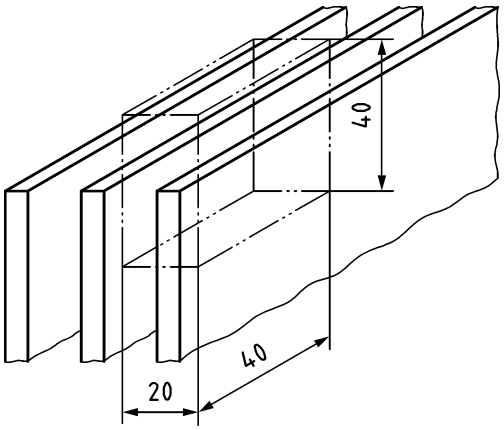


Figure 2 — Example of a vertical glass separator

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

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

NOTE 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 — Recommended 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.