
**Glass in building — Basic soda lime
silicate glass products —**

**Part 3:
Polished wired glass**

Verre dans le bâtiment — Produits de base: Verre de silicate sodocalcique —

Partie 3: Verre armé poli





COPYRIGHT PROTECTED DOCUMENT

© ISO 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, 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
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Dimensional requirements	3
4.1 Thickness	3
4.1.1 General	3
4.1.2 Tolerance	3
4.2 Length, width and squareness	3
4.3 Wire mesh	3
4.3.1 Diameter of wires	3
4.3.2 Mesh dimension	3
5 Quality requirements	4
5.1 General	4
5.2 Methods of observation and measurement	4
5.2.1 Optical faults	4
5.2.2 Visual faults	4
5.2.3 Edge defects for final cut sizes	6
5.3 Acceptance levels	7
5.3.1 Optical faults	7
5.3.2 Visual faults	7
5.3.3 Edge defects for final cut sizes	9
6 Designation	9
Bibliography	10

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 on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 160, *Glass in building*, Subcommittee SC 1, *Product considerations*.

A list of all parts in the ISO 16293 series can be found on the ISO website.

Glass in building — Basic soda lime silicate glass products —

Part 3: Polished wired glass

1 Scope

This document specifies dimensional and minimum quality requirements (in respect of optical, visual and wire faults) for polished wired glass, as defined in ISO 16293-1, for use in building.

This document applies only to polished wired glass supplied in rectangular panes, in stock sizes and final cut sizes.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16293-1 and the following apply.

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

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

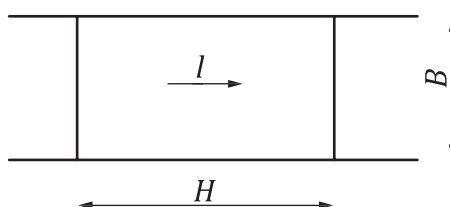
3.1 length

H

dimension of the straight edge of the glass parallel to the direction of draw of the glass ribbon

Note 1 to entry: See [Figure 1](#).

[SOURCE: ISO 11485-1:2011, 2.26, modified]



Key

- l* direction of draw
- H* length
- B* width

Figure 1 — Relationship between length, width and direction of draw

**3.2
width**

B
dimension of the edge of the glass perpendicular to the direction of the glass ribbon

Note 1 to entry: See [Figure 1](#).

**3.3
stock size**

glass sizes that are intended to be re-cut to obtain *final cut sizes* ([3.4](#))

**3.4
final cut size**

pane of glass that has been cut down to the dimensions being required either for installation or processing into a final product, e.g. insulating glass units, of those dimensions

**3.5
optical faults**

faults which lead to distortions in the appearance of objects observed through the glass

**3.6
visual faults**

faults which alter the visual quality of the glass

Note 1 to entry: Visual faults include spot faults, linear/extended faults and wire faults.

**3.7
spot fault**

fault which can be in or on the glass in the form of gaseous inclusion, solid inclusion, mark or deposit of small size

**3.8
spherical or quasi-spherical spot faults**

spot faults ([3.7](#)) whose larger dimension is less than or equal to twice the smaller dimension

**3.9
elongated spot faults**

spot faults ([3.6](#)) whose larger dimension is more than twice the smaller dimension

**3.10
linear/extended faults**

faults which can be on or in the glass, in the form of deposits, marks or scratches which occupy any extended long area

**3.11
wire faults**

deviation of the wire, penetration of the glass surface by the wire or break in the wire in body of the glass

**3.12
deviation of the wire**

deviation, *x*, *y* or *z*, of the wire in relation to a reference, e.g. line or straight edge (see [Figure 3](#))

**3.13
edge defect**

defect which can occur on the edge of a glass sheet in the form of entrant and emergent faults and/or bevels

4 Dimensional requirements

4.1 Thickness

4.1.1 General

The actual thickness shall be the average of four measurements taken to the nearest 0,01 mm, one taken at the centre of each side. Measurement shall be by means of an instrument of calliper micrometre type.

4.1.2 Tolerance

All four measurements, rounded to the nearest 0,1 mm shall not vary from the nominal thickness by more than the limits shown in [Table 1](#).

Table 1 — Thickness tolerance

Dimensions in millimetres

Nominal thickness	Limiting values	
	Minimum	Maximum
7	6,2	7,4
10	9,1	10,9

4.2 Length, width and squareness

The tolerances, t , on nominal dimensions length, H , and width, B , are ± 4 mm.

The limits of squareness are described by the difference between diagonals. Limits are given in [Table 2](#).

Table 2 — Limit on the difference between diagonals

Dimensions in millimetres

Nominal glass thickness	Limit on the difference between diagonals		
	Stock sizes and final cut sizes		
	Splits		
	$(H, B) \leq 1500$	$1500 < (H, B) \leq 3000$	$(H, B) > 3000$
7 and 10	3	4	5

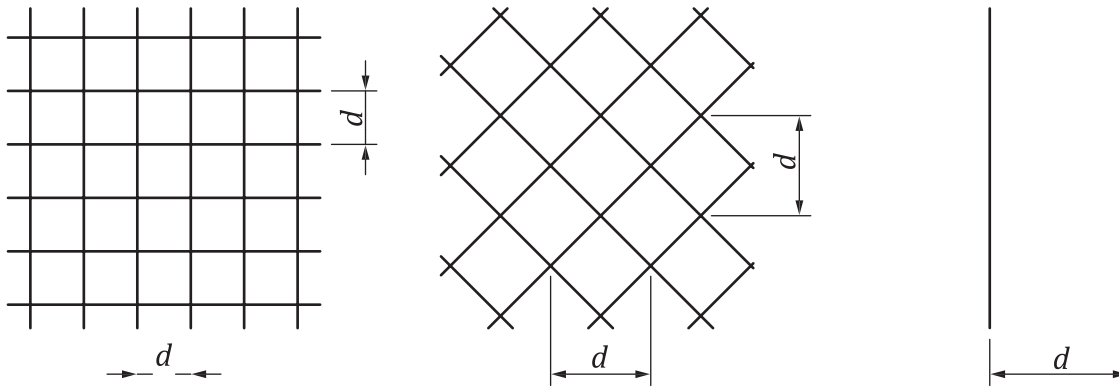
4.3 Wire mesh

4.3.1 Diameter of wires

Diameter of wires shall be 0,42 mm or more.

4.3.2 Mesh dimension

All intersections shall be welded. The mesh dimension, d , shall not exceed 16 mm for square, 32 mm for diamond. The spacing s for parallel strand shall be from 45 mm to 55 mm (see [Figure 2](#)).



Key

d mesh dimensions

Figure 2 — Mesh dimension

5 Quality requirements

5.1 General

One quality is considered in this document. This is determined by evaluation of the optical and visual faults.

Many spot faults are associated with the wire, due to the incorporation of the wire into the glass. Spot faults can, thus, be distinguished by their relationship with the wire:

- distance from the wire >2 mm;
- distance from the wire ≤2 mm, or in contact with the wire.

There are three different types of deviation of the wire considered, which may occur simultaneously. They are shown in [Figure 3](#) and are

- out of square,
- waviness, and
- bow.

5.2 Methods of observation and measurement

5.2.1 Optical faults

The glass pane to be examined is placed 1 m from a bank of strip lights. The observer stands 1 m away from the glass pane.

The strip lights are viewed through the glass and any disrobing distortions within the glass pane are noted.

5.2.2 Visual faults

5.2.2.1 Spot and linear/extended faults

The glass pane to be examined is illuminated in conditions approximating to diffuse daylight and is observed in front of a matt black screen (reflection coefficient between 0,2 and 0,4)

Place the pane of glass to be examined vertically in front of the screen and parallel to it. Arrange the point of observation 2 m from the glass, keeping the direction of observation normal to the glass surface.

View the pane of glass, and note the presence of visually disturbing faults.

a) Spot faults

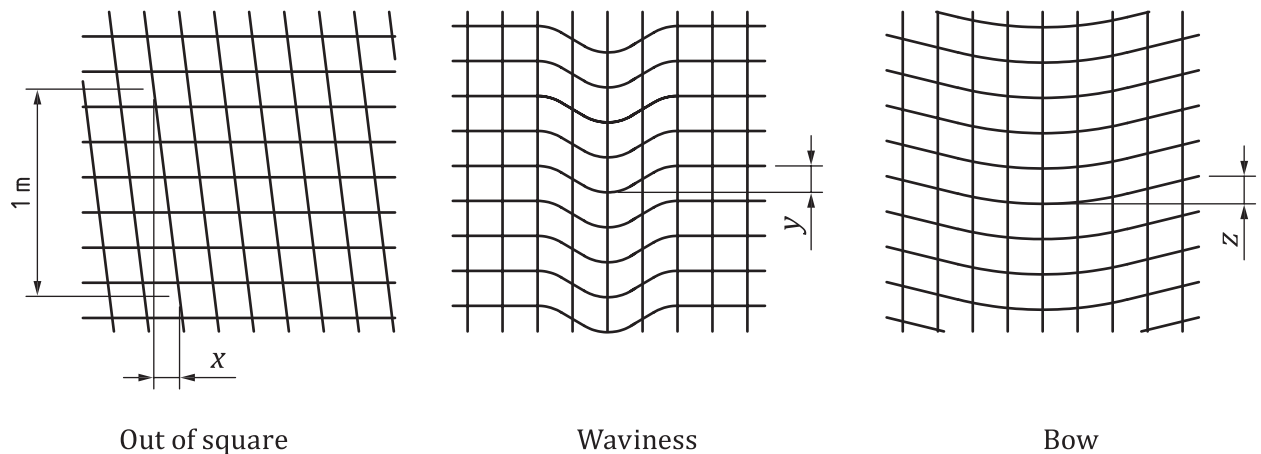
Measure the dimensions of these faults with a micrometre with graduations in tenths of a millimetre. Note the number, dimensions and concentration of the spot faults together with their relationship to the wire.

b) Linear/extended faults

Note the number of these faults.

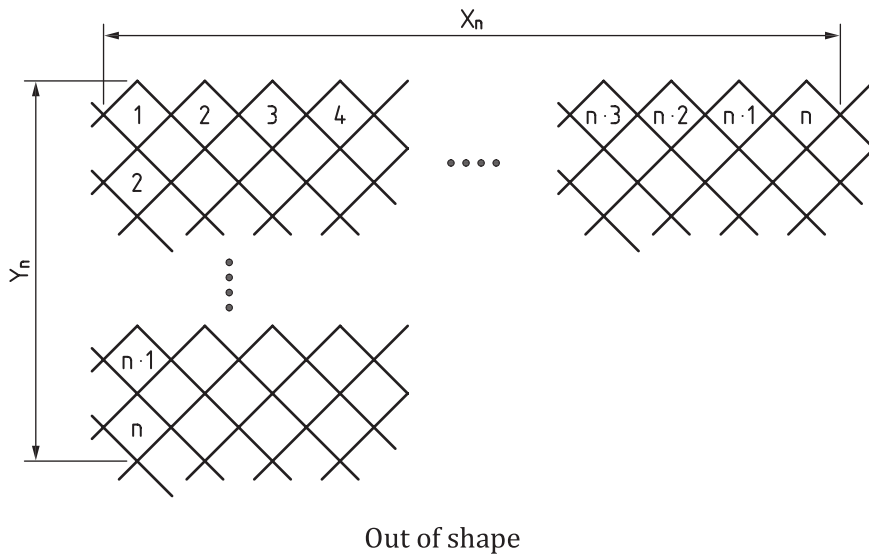
5.2.2.2 Wire faults

A reference, e.g. line or straight edge, is placed parallel to the direction of the wires. The deviation of the wire in relation to this reference edge is measured (see [Figures 3 to 5](#)).



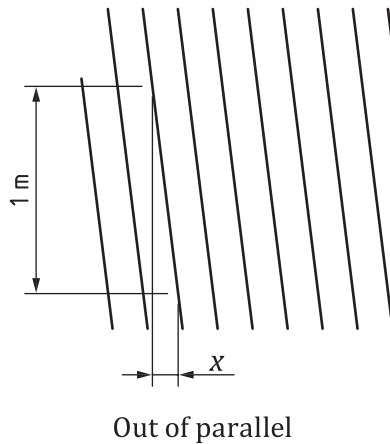
NOTE The scale of these drawings is exaggerated to be explicit.

Figure 3 — Representations of the types of wire deviations (square)



NOTE The scale of this drawing is exaggerated to be explicit.

Figure 4 — Representations of the types of wire deviations (diamond)



NOTE The scale of these drawings is exaggerated to be explicit.

Figure 5 — Representations of the types of wire deviations (parallel)

Any penetration of the glass surface by the wire is noted.

Any breaks in the wire are noted.

5.2.3 Edge defects for final cut sizes

5.2.3.1 Entrant and emergent faults

These faults are shown in [Figures 4](#) and [5](#). The dimensions h_1 , h_2 and p and the glass thickness, e , are measured.

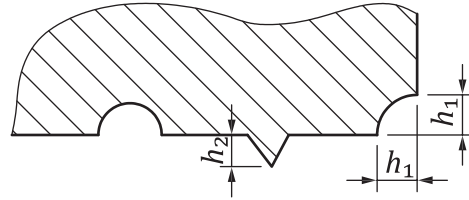


Figure 6 — Entrant and emergent faults (surface view)

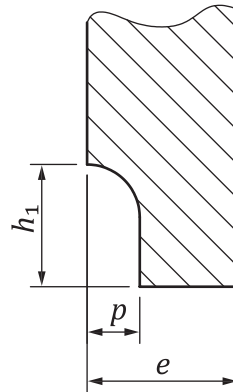


Figure 7 — Entrant faults (edge view)

5.2.3.2 Bevel

This fault is shown in [Figure 6](#). The dimension, d , and the glass thickness, e , are measured.



Figure 8 — Bevel (edge view)

5.3 Acceptance levels

5.3.1 Optical faults

The observer should not see any disturbing distortions within the glass pane.

5.3.2 Visual faults

5.3.2.1 Spot faults

The allowable numbers for type of spot faults are shown in [Tables 3](#) and [4](#).

Table 3 — Spherical and quasi-spherical spot faults

Distance from wire [mm]	Core size for large dimension [mm]	Maximum in any pane [piece(s)/m ²]
≤2,0	≤2,0	Any number
	>2,0 and ≤4,0	1
	>4,0	0
>2,0	≤1,5	Any number
	>1,5 and ≤4,0	1
	>4,0	0

Table 4 — Elongated spot fault

Width of fault [mm]	Length of fault [mm]	Maximum in any pane [piece(s)/m ²]
≤1,0	≤2,0	Any number
	>2,0 and ≤5,0	5
	>5,0 and ≤10,0	1
	>10,0 and ≤15,0	0,5
	>15,0	0
>1,0	≤5,0	1
	>5,0	0

5.3.2.2 Linear/extended faults

There shall be no visually observable defect in the observation conditions described in [5.2.2.1](#).

5.3.2.3 Wire faults

5.3.2.3.1 Square

The deviation, *x*, (see [Figure 3](#)) shall not exceed 16 mm per metre for the out of square.

The deviation, *y* and *z*, shall not exceed 16 mm for the waviness and bow, respectively.

NOTE The deformation of the wires of each square of the mesh is not considered.

No penetration of the surface is acceptable.

Breaks in the wire are not acceptable.

5.3.2.3.2 Diamond

The ratio, X_n/Y_n , (see [Figure 4](#)) shall not exceed 0,9 or 1,1 for the out of shape.

No penetration of the surface is acceptable.

Breaks in the wire are not acceptable.

5.3.2.3.3 Parallel

The deviation, *x*, (see [Figure 5](#)) shall not exceed 16 mm per metre for the out of parallel.

No penetration of the surface is acceptable.

Breaks in the wire are not acceptable.

5.3.3 Edge defects for final cut sizes

The limitations on entrant and emergent faults and bevel are given in [Table 6](#).

Table 6 — Limitations on edge defects

Edge defect	Limitations
Entrant fault	$h_1 < e$ mm $P < (0,8 \times e)$ mm
Emergent fault	$h_2 < e$ mm
Bevel	The ratio (d/e) shall be less than 0,8mm
The limitations only apply when there is no risk of breakage resulting from thermal stress. In applications where thermal stress breakage may apply, the manufacturers' recommendations on edge quality should be followed	

6 Designation

Polished wired glass in compliance with this document shall be designated respectively by the following:

- the type;
- a reference to this document, i.e. ISO 16293-3;
- the nominal thickness in mm;
- the nominal length, H , and width, B , in mm.

EXAMPLE Polished wired glass, intended for use in buildings, thickness 7 mm, length 2 438 mm, width 1 829 mm is designated as follows:

Polished wired glass – ISO 16293-3 – 7 mm, 2 438 mm × 1 829 mm

Bibliography

- [1] ISO 16293-1, *Glass in building — Basic soda lime silicate glass products — Part 1: Definitions and general physical and mechanical properties*

