

---

---

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

Part 4:  
**Wired patterned glass**

*Verre dans la construction — Produits de base: verre de silicate sodocalcique —*

*Partie 4: Verre armé*

STANDARDSISO.COM : Click to view the full PDF of ISO 16293-4:2016



STANDARDSISO.COM : Click to view the full PDF of ISO 16293-4:2016



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2016, 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
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Dimensional requirements</b> .....	<b>3</b>
4.1 Thickness .....	3
4.1.1 General .....	3
4.1.2 Tolerances .....	3
4.2 Length, width and squareness .....	3
4.3 Wire mesh .....	4
<b>5 Quality requirements</b> .....	<b>4</b>
5.1 General .....	4
5.2 Methods of observation and measurement .....	4
5.2.1 Visual faults .....	4
5.2.2 Edge defects for final cut sizes .....	5
5.3 Acceptance levels .....	6
5.3.1 Spot faults .....	6
5.3.2 Linear/extended faults .....	7
5.3.3 Pattern faults .....	7
5.3.4 Wire faults .....	7
5.3.5 Edge defects for final cut sizes .....	8
<b>6 Designation</b> .....	<b>8</b>
<b>Bibliography</b> .....	<b>9</b>

STANDARDSISO.COM : Click to view the full PDF of ISO 16293-4:2016

## 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](http://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](http://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 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](http://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 4: Wired patterned glass

### 1 Scope

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

This document applies only to wired patterned glass supplied in rectangular panes, in stock sizes and in 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>

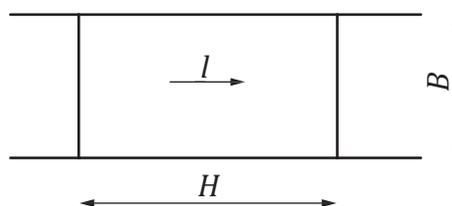
#### 3.1 length

*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

Note 1 to entry: The minimum final cut size shall have dimensions *H* or *B* not less than 100 mm and a minimum surface area of not less than 0,05m<sup>2</sup>.

**3.5**  
**visual fault**

fault which alters the visual quality of the glass

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

**3.6**  
**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

**3.7**  
**linear/extended fault**

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

**3.8**  
**pattern fault**

*deviation of the pattern* ([3.9](#)) relative to a reference, e.g. line or straight edge

**3.9**  
**deviation of the pattern**

deviation, *u*, *v* or *w*, of the pattern

**3.10**  
**wire fault**

*deviation of the wire* ([3.11](#)), penetration of the glass surface by the wire or break in the wire in the body of the glass

**3.11**  
**deviation of the wire**

deviation, *x*, *y*, *z* of the wire relative to a reference, e.g. line or straight edge

**3.12**  
**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, each one taken at the thickest and closest point to the centre of each side. Measurement shall be by means of an instrument of the plate gauge type with a diameter of 50 mm  $\pm$  5 mm.

NOTE The mechanical resistance of wired patterned glass is a function of the pattern as well as the thickness

#### 4.1.2 Tolerances

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

**Table 1 — Tolerance on nominal thickness**

Dimensions in millimetres

Nominal thickness	Tolerances
6, 6,8	$\pm 0,6$
7	$\pm 0,7$
8	$\pm 0,8$
9	$\pm 0,9$
10	$\pm 0,9$

### 4.2 Length, width and squareness

The tolerances,  $t$ , on nominal dimensions length,  $H$ , and width,  $B$  of stock sizes and final cut size are shown in [Table 2](#).

**Table 2 — Tolerance for stock and final cut sizes**

Dimensions in millimetres

Thickness	Stock sizes	Tolerance, $t$		
		Final cut sizes		
		$(H, B) \leq 1\,500$	$1\,500 < (H, B) \leq 3\,000$	$(H, B) > 3\,000$
6, 6,8,	$\pm 5$	$\pm 2$	$\pm 3$	$\pm 4$
7, 8, 9, 10	$\pm 5$	$\pm 3$	$\pm 4$	$\pm 5$

The limits of squareness are described by deviation between diagonals. Limits are given in [Table 3](#).

**Table 3 — Limit on the difference between diagonals**

Dimensions in millimetres

Nominal thickness	Size	Limit on the difference between diagonals		
		$(H, B) \leq 1\,500$	$1\,500 < (H, B) \leq 3\,000$	$(H, B) > 3\,000$
6, 6,8, 7, 8, 9, 10	Stock sizes	3	4	5
	Final cut sizes	3	4	5

### 4.3 Wire mesh

This is either a square steel mesh of approximate dimensions 12,5 mm or 25,0 mm, or a diamond mesh of approximate dimensions 19 mm.

The mesh is welded at all intersections and manufactured from wire of diameter  $\geq 0,42$  mm.

## 5 Quality requirements

### 5.1 General

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

There are three different types of pattern faults considered which may occur simultaneously. They are shown in [Figure 2](#) and are:

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

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 Visual faults

##### 5.2.1.1 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 grey screen.

Place the pane of glass to be examined vertically 3 m in front of and parallel to the screen. Arrange the point of observation 1,5 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

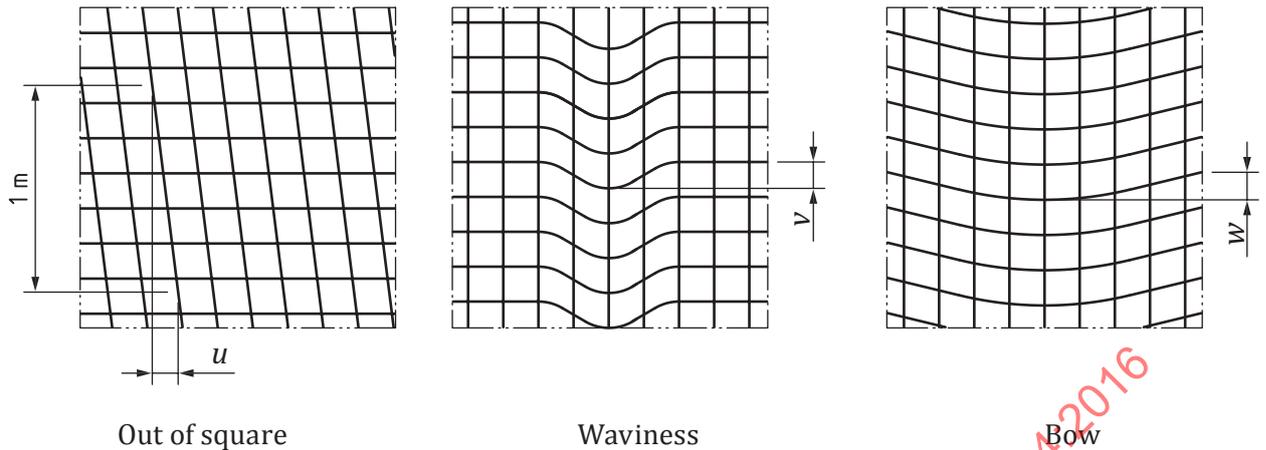
Measure the dimensions of these faults with a micrometre with graduations in tenths of a millimetre. Note the number, dimensions and concentration of the spot faults.

##### b) Linear/extended faults

Note the number of these faults.

##### 5.2.1.2 Pattern faults

A reference, e.g. line or straight edge, is placed on the glass as shown in [Figure 2](#). The deviations,  $u$ ,  $v$  or  $w$  of the pattern in relation to this reference are measured.



NOTE 1 The scale of these drawings is exaggerated to be explicit.  
 NOTE 2 Deviation measurement is not possible for all kinds of patterns.

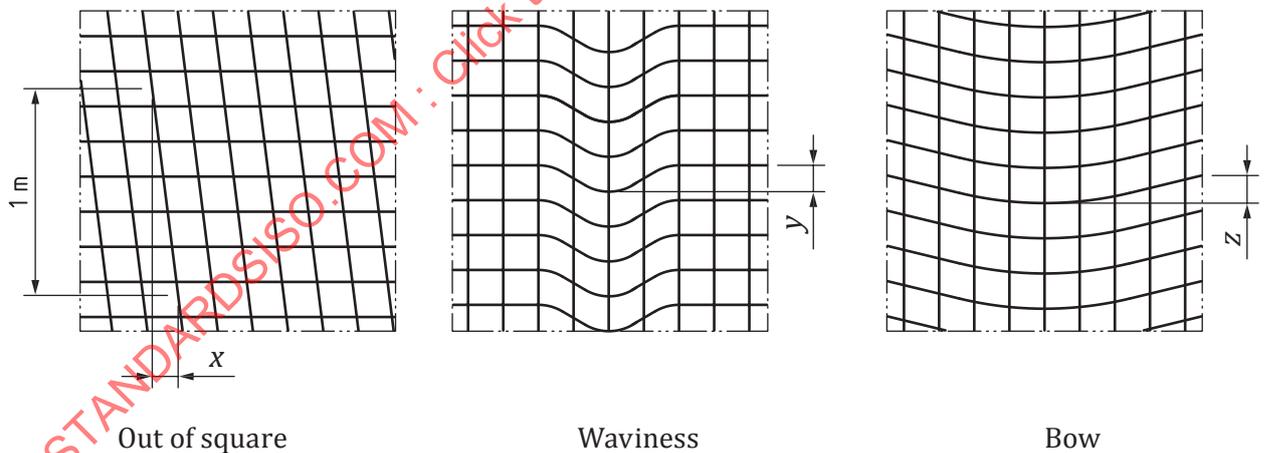
**Figure 2 — Representations of the type of pattern faults**

**5.2.1.3 Wire faults**

A reference, e.g. line or straight edge, is placed parallel to the direction of the wires. The deviations,  $x$ ,  $y$ , or  $z$ , of the wire in relation to this reference are measured (see [Figure 3](#)).

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

Any breaks in the wire are noted.



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

**Figure 3 — Representations of the types of wire faults**

**5.2.2 Edge defects for final cut sizes**

**5.2.2.1 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.

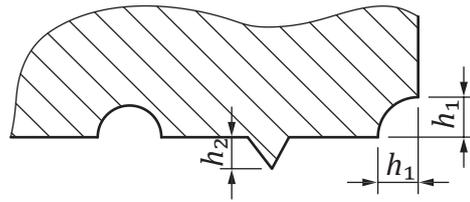


Figure 4 — Entrant and emergent faults (surface view)

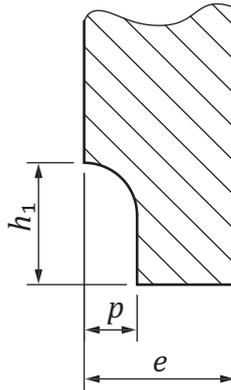


Figure 5 — Entrant faults (edge view)

### 5.2.2.2 Bevel

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



Figure 6 — Bevel (edge view)

## 5.3 Acceptance levels

### 5.3.1 Spot faults

#### 5.3.1.1 Stock sizes

The allowable number for each size of spot faults for stock sizes are shown in [Table 4](#).

**Table 4 — Spot fault**

Width of fault [mm]	Length of fault [mm]	Maximum in any pane [per m <sup>2</sup> ]
≤2,0	≤8,0	Any number
	>8,0 and ≤50,0	Sum of length ≤200 mm
	>50,0	0
>2,0	≤4,0	Any number
	>4,0 and ≤10,0	12
	>10,0 and ≤20,0	6
	20,0<	0

### 5.3.1.2 Final cut sizes

The allowable numbers for each size of spot faults for final cut sizes are shown in [Table 5](#).

**Table 5 — Spot fault**

Width of fault [mm]	Length of fault [mm]	Maximum in any pane [per m <sup>2</sup> ]
≤2,0	≤8,0	Any number
	>8,0 and ≤50,0	Sum of length ≤200 mm
	>50,0	0
>2,0	≤4,0	Any number
	>4,0 and ≤10,0	12
	>10,0 and ≤20,0	6
	20,0<	0

### 5.3.2 Linear/extended faults

#### 5.3.2.1 Stock sizes

The allowable number of faults is an average of 0,05 faults in 20 m<sup>2</sup> of glass related to at least 20 tonnes.

#### 5.3.2.2 Final cut sizes

When examined by the method in [5.2](#) no linear/extended faults are allowed.

#### 5.3.3 Pattern faults

The deviation,  $u$ , (see [Figure 2](#)) shall not exceed 12 mm per metre for the out of square.

The deviations,  $v$  and  $w$ , (see [Figure 2](#)) shall not exceed 12 mm for the waviness and bow respectively.

#### 5.3.4 Wire faults

The deviation,  $x$ , (see [Figure 3](#)) shall not exceed 15 mm per metre.

The deviations,  $y$  and  $z$ , (see [Figure 3](#)) shall not exceed 15 mm for the waviness and bow, respectively.

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

No penetration of the surface is acceptable.