INTERNATIONAL STANDARD

ISO 16293-4

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Glass in building — Basic soda lime silicate glass products —

Part 4: Wired patterned glass

Verre dans la construction — Produits de base: verre de silicate sodo-calcique —

Partie 4: Verre armé

Reference number
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International Organization for Standardization

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Foreword

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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:

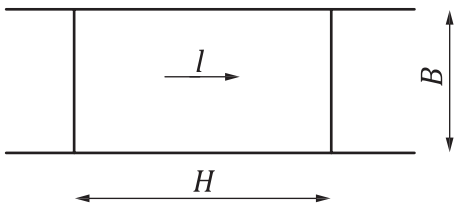
— IEC Electropedia: available at http://www.electropedia.org/

— 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^2.

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 ± 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	±0,6
7	±0,7
8	±0,8
9	±0,9
10	±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	Tolerance, t			
	Stock sizes	Final cut sizes		
		$(H, B) \leq 1\,500$	$1\,500 < (H, B) \leq 3\,000$	$(H, B) > 3\,000$
6, 6,8,	±5	±2	±3	±4
7, 8, 9, 10	±5	±3	±4	±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		
		$(H, B) \leq 1\,500$	$1500 < (H, B) \leq 3\,000$	$(H, B) > 3\,000$
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 ≥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

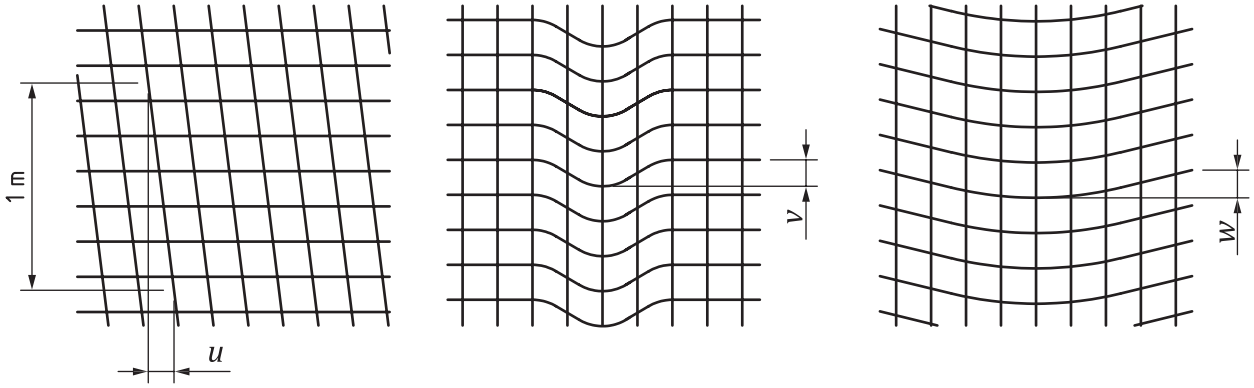
Measure the dimensions of these faults with a micrometre with graduations in tenths of a millimetre. Note the number, dimensions and concentration of the spot faults.

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.



Out of square Waviness Bow

NOTE 1 The scale of these drawings is exaggerated to be explicit.

NOTE 2 Deviation measurement is not possible for all kinds of patterns.

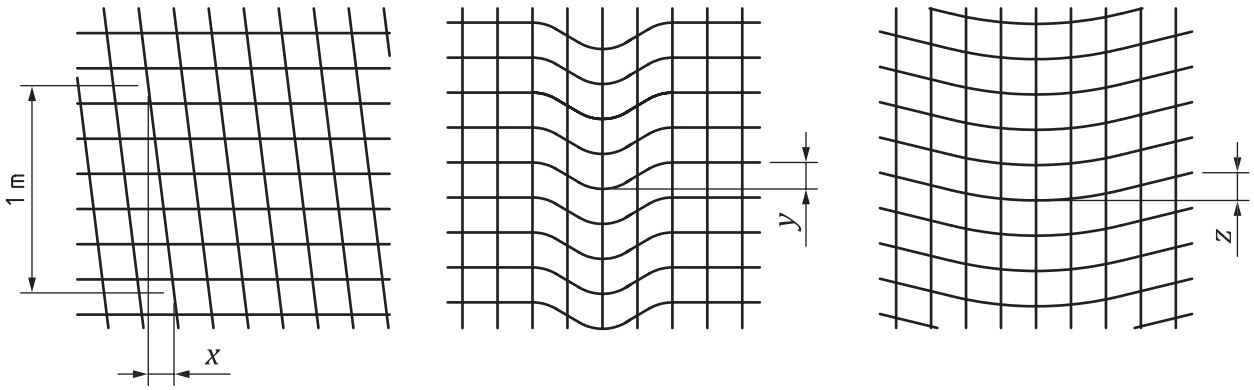
Figure 2 — Representations of the type of pattern faults

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.



Out of square Waviness Bow

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.

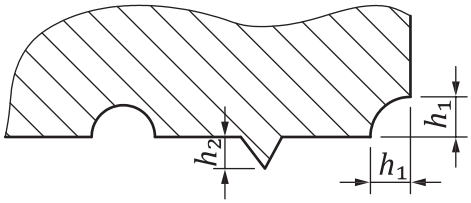


Figure 4 — Entrant and emergent faults (surface view)

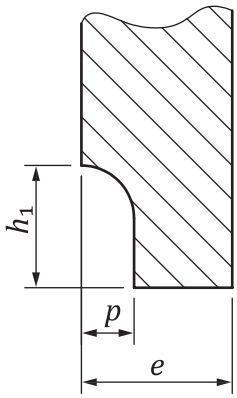


Figure 5 — Entrant faults (edge view)

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^2]
≤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^2]
≤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^2 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.

A break in the wire is acceptable only if it does not affect vision in a disturbing manner under the conditions of observation described in 5.2.1.1.

5.3.5 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 0,8
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

Wired patterned glass in compliance with this standard shall be designated respectively by:

— the type;

— a reference to this document, i.e. ISO 16293-4;

— the nominal thickness in mm;

— the nominal length, H, and width, B, in mm.

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

Patterned wired glass – ISO 16293-4 – 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*

ICS 81.040.20

Price based on 9 pages