

INFORMATION ABOUT PRODUCT

Tolerances and acceptable defects for toughened, heat soaked toughened, heat strengthened glasses and for laminated glass – according to relevant European standards

- **TOUGHENED, HEAT SOAKED TOUGHENED, HEAT STRENGTHENED GLASS**

Tab. 1 – Dimensional (width/length)

Longest Dimension	Tolerance			
	Nominal thickness ≤ 8mm		Nominal thickness > 8mm	
	Dimensional (width/length)	Diagonals	Dimensional (width/length)	Diagonals
≤ 2000mm	± 2.0	≤ 4	± 3.0	≤ 6
> 2000mm ≤ 3000mm	± 3.0	≤ 6	± 4.0	≤ 8
> 3000mm	± 4.0	≤ 8	± 5.0	≤ 10

Tab. 2 – Overall bow, roller wave, edge lift

Product	Maximum allowable value for distortion		Edge lift	
	Overall bow mm / m	Roller wave mm	Thickness 4-5 mm	Thickness 6-19 mm
All glasses	3,0	0,3	0,4	0,3

Tab. 3 – Spot and linear defects^a

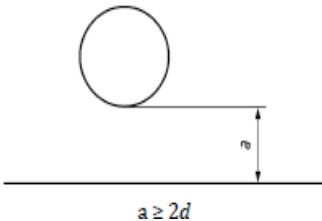
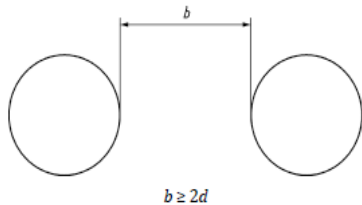
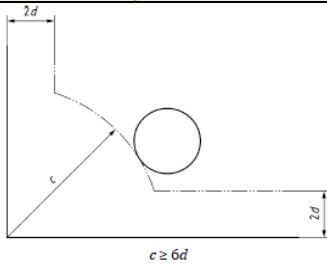
Features	Edge zone	Main zone
Hair line	Allowed, but not concentrated	Allowed, but not concentrated
Scratches	< 25mm / 4 per metre	One ≤ 12mm
Point defects (pin holes)		
<0,5mm	Allowed	Allowed
<1,0mm	Allowed not in clusters	Allowed not in clusters
<2,0mm	Allowed 1 per metre	2 per m ² / maximum 4
>2,0mm	Not allowed	Not allowed

a - does not refer to European standard

Tab. 4 – Tolerances on hole diameters

Nominal hole diameter, \emptyset , [mm]	Tolerances [mm]
$4 \leq \emptyset \leq 20$	$\pm 1,0$
$20 < \emptyset \leq 100$	$\pm 2,0$
$100 < \emptyset$	Consult the manufacturer

Tab. 5 – Limitations for position of holes

Between the hole and the glass edge	Between two holes	Between hole and corner of pane
 <p>$a \geq 2d$</p>	 <p>$b \geq 2d$</p>	 <p>$c \geq 6d$</p>

- **LAMINATED GLASS**

Thickness – sum of the thicknesses of the glass panes and interlayers

Interlayers: for the total thickness $\leq 2\text{mm}$ the additional limit deviation is $\pm 0,1 \text{ mm}$, otherwise it is $\pm 0,2 \text{ mm}$

Panes: - limit deviations for float: 3-6 mm is $\pm 0,2 \text{ mm}$, for float: 8-12 is $\pm 0,3 \text{ mm}$

Tab. 6 – Limit deviations on width L and length H

Nominal dimension L or H	Nominal thickness of laminated glass $\leq 8 \text{ mm}$	Nominal thickness of laminated glass $> 8 \text{ mm}$	
		Each glass pane $< 10 \text{ mm}$ nominal thickness	At least one glass pane $\geq 10 \text{ mm}$ nominal thickness
≤ 2000	+3,0 -2,0	+3,5 -2,0	+5,0 -3,5
≤ 3000	+4,5 -2,5	+5,0 -3,0	+6,0 -4,0
> 3000	+5,0 -3,0	+6,0 -4,0	+7,0 -5,0

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REGON 006911139 NIP 123-00-06-857 Sąd Rejonowy w Kielcach X Wydział Gospodarczy Krajowego

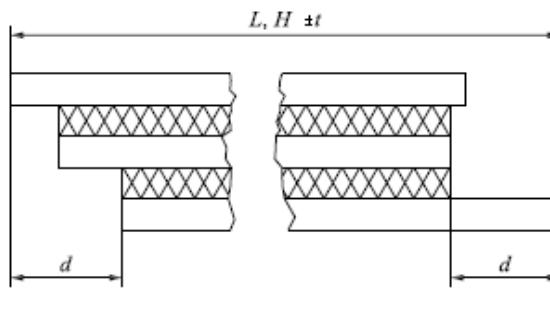
Rejestru Sądowego KRS 0000012897 Kapitał zakładowy: 506 500 PLN

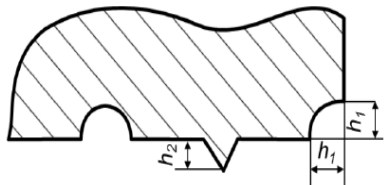
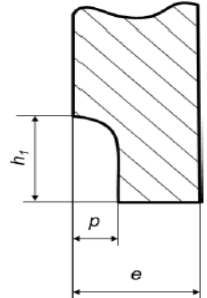
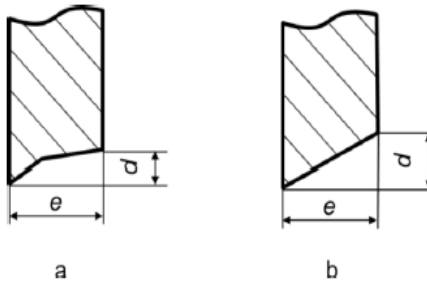
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Tab. 7 – Maximum displacement

Nominal dimension L or H	Maximum permissible displacement d
$L, H \leq 1000$	2,0
$1000 < L, H \leq 2000$	3,0
$2000 < L, H \leq 4000$	4,0
$L, H > 4000$	6,0


Tab. 8 – Edge defects

Entrant end emergent faults – surface view	Entrant faults – edge view	Bevel – edge view
		
Edge defect	Limitations	
Entrant fault	$h_1 < (e-1)$ mm $p < (e/4)$ mm	
Emergent fault	h_2 – shall not exceed the positive tolerance t depending on glass production type and the pane shall remain within the rectangle resulting from nominal dimensions, i.e. H and B with positive tolerance	
Bevel	The ratio (d/e) shall be less than 0.25	

Tab. 9 – Permissible spot defects in the vision area - spot defects

Size of defect d [mm]		0,5 < d ≤ 1,0	1,0 < d ≤ 3,0			
Size of pane A [m ²]		For all sizes	A ≤ 1	1 < A ≤ 2	2 < A ≤ 8	A > 8
Number of density of permissible defects	2 panes	No limitation, however no accumulation of defects	1	2	1/m ²	1,2/m ²
	3 panes		2	3	1,5/m ²	1,8/m ²
	4 panes		3	4	2/m ²	2,4/m ²
	≥ 5 panes		4	5	2,5/m ²	3m ²

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Tab. 10 – Number of permissible defects in the vision area – linear defects

Area of pane [m ²]	Number of permissible defects >30 mm in length ^a
≤5	Not allowed
5 to 8	1
>8	2
A linear defects less than 30 mm in length are allowed	

Note 1: Above tolerances do not refer fire resistant glasses

Note 2: If one of the component of the laminated glass is a toughened or heat-strengthened glass an additional tolerance for them shall be taken into account

Note 3: Marking of the laminated, toughened, heat-strengthened and heat soaked glass is a standard

Note 4: Defects should be evaluated from a distance at least 2 m with the glass in vertical position and under diffuse daylighting conditions

List of product standards:

EN 12150-1 Glass in building – Thermally toughened soda lime silicate safety glass – Part 1: Definition and description

EN 14179-1 Heat Soaked thermally toughened soda lime silicate safety glass – Part1: Definition and description

EN 1863-1 Glass in building – Heat strengthened soda lime silicate glass – Part 1: Definition and description

EN 12543-5 Glass in building – Laminated glass and laminated safety glass – Part 5: Dimensions and edge finishing

EN 12543-6 Glass in building – Laminated glass and laminated safety glass – Part 6: Appearance

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