INTERNATIONAL STANDARD

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Second edition
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Ships and marine technology — Thermally toughened safety glass panes for windows and side scuttles

Navires et technologie maritime — Verres de sécurité trempés thermiquement pour fenêtres et hublots

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 21005 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 8, *Ship design*.

This second edition cancels and replaces the first edition (ISO 21005:2004), which has been technically revised.

Ships and marine technology — Thermally toughened safety glass panes for windows and side scuttles

1 Scope

This International Standard specifies materials and finish, dimensions for interchangeability, tolerances, parallelism and flatness, testing, marking and designation of thermally toughened safety glass panes for windows complying with ISO 3903 and side scuttles complying with ISO 1751.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 614, *Ships and marine technology — Toughened safety glass panes for rectangular windows and side scuttles — Punch method of non-destructive strength testing*[1)]

ISO 1751, *Ships and marine technology — Ships' side scuttles*[2)]

ISO 3903, *Shipbuilding and marine structures — Ships' ordinary rectangular windows*[3)]

ISO 6345, *Shipbuilding and marine structures — Windows and side scuttles — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 6345 and the following apply.

3.1
batch of glass panes
quantity of glass panes of the same nominal size and nominal thickness, produced in the same process under consistent controlled conditions

4 Material

Thermally toughened safety glass shall be manufactured of plate glass, either float or polished.

5 Finish

The finished glass pane shall meet the strength requirement of ISO 614. If the finishing method used on the glass pane lowers its strength below the strength required by ISO 614 for the untreated plate, either the finishing method needs to be changed or a thicker glass pane shall be used.

1) To be published. Revision of ISO 614:1989.

2) To be published. Revision of ISO 1751:1993.

3) To be published. Revision of ISO 3903:1993.

6 Dimensions and tolerances

6.1 Dimensions, thicknesses and nominal sizes

6.1.1 Ordinary rectangular windows

The thicknesses of glass panes for windows complying with the requirements of ISO 3903 are shown in Figure 1 and given in Table 1.

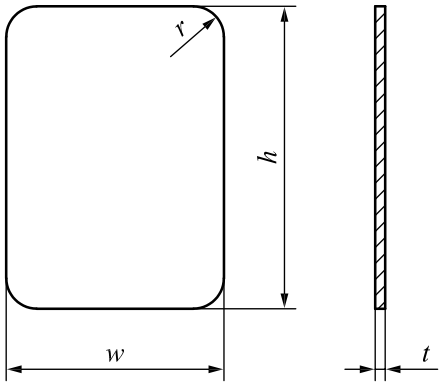


Figure 1 — Dimensions of glass pane

Table 1 — Dimensions of glass panes for ordinary rectangular windows

Dimensions in millimetres

Nominal size $w_1 \times h_1$	Width w		Height h		Radius r	Thickness[a] t				
						8 ± 0,3	10 ± 0,3	12 ± 0,3	15 ± 0,5	19 ± 1
	min.	max.	min.	max.						
300 × 425	314	318	439	443	58	F	F	—	—	—
355 × 500	369	373	514	518	58	F	F	—	—	—
400 × 560	414	418	574	578	58	F	F	E	—	—
450 × 630	464	468	644	648	108	F	F	E	—	—
500 × 710	514	518	724	728	108	—	F	F	E	—
560 × 800	574	578	814	818	108	—	F	F	E	—
900 × 630	916	920	646	650	109	—	—	F	F	E
1 000 × 710	1 016	1 020	726	730	109	—	—	F	F	E
1 100 × 800	1 116	1 120	816	812	109	—	—	—	F	—

[a] Type E for Heavy-type window, Type F for Light-type window in accordance with ISO 3903.

6.1.2 Side scuttles

The diameters, d, and the thicknesses, t, of thermally toughened safety glass panes for side scuttles complying with the requirements of ISO 1751 are shown in Figure 2 and given in Table 2.

The nominal sizes given in Table 2 are the clear light diameters of the side scuttles.

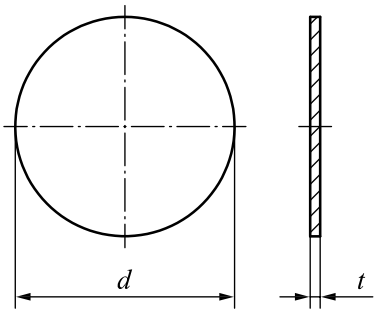


Figure 2 — Dimensions of glass panes for side scuttles

Table 2 — Dimensions of glass panes for side scuttles

Dimensions in millimetres

Nominal size	Diameter		Thickness[a]					
d_1	d		t					
			8	10	12	15	19	25
	min.	max.	± 0,3	± 0,3	± 0,3	± 0,5	± 1	± 1
200	213	215	B,C	A	—	—	—	—
250	263	265	B,C	B	A	—	—	—
300	316	319	C	B	B	A	—	—
350	366	369	C	C	B	A	—	—
400	416	419	C	C	B	B	A	—
450	466	469	—	C	C	B	B	A

[a] Type A for Heavy-type side scuttle, Type B for Medium-type side scuttle and Type C for Light-type side scuttle in accordance with ISO 1751.

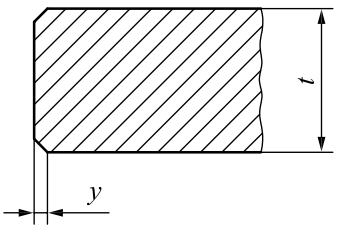
6.1.3 Other dimensions

Dimensions other than those listed in 6.1.1 and 6.1.2 may be agreed on between the parties concerned.

The thickness shall be calculated in accordance with Annex A.

6.2 Edges

All edge work shall be smooth ground and carried out before toughening the glass. See Figure 3.



Key

t thickness

1 mm < y < 2 mm

Figure 3 — Glass edges

7 Parallelism

The deviation from parallelism between the two surfaces of a clear glass pane shall not exceed the value given in Figure 4.

Dimensions in millimetres

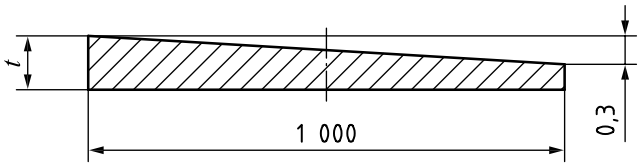


Figure 4 — Parallelism

8 Flatness

The tolerance on flatness in glass panes shall not exceed that shown in Figure 5.

Dimensions in millimetres

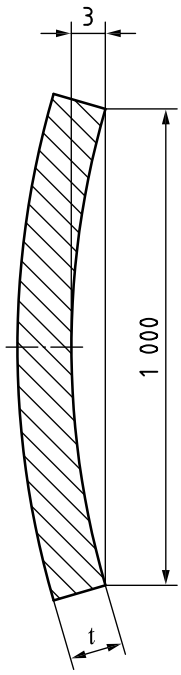


Figure 5 — Flatness

9 Testing

The glass panes shall be tested in accordance with ISO 614.

9.1 Sampling of glass panes

Each batch of glass panes shall be tested separately.

Where a batch consists of four glass panes or less, each of the glass panes shall be tested.

Where a batch consists of more than four glass panes, the test shall be carried out on a random sample of four glass panes, or on 2 % of the batch, whichever figure is the greater.

9.2 Acceptance conditions

The following acceptance conditions are specified.

a) The tested glass panes shall remain unbroken and shall show no signs of damage.

b) If each sample glass pane tested remains unbroken, the whole batch shall be accepted.

c) If one sample glass pane breaks during the test, a complete re-test shall be carried out on a further sample taken from the same batch.

d) If

— more than one glass pane breaks in the first test, or

— a further glass pane breaks in the re-test,

the batch shall be rejected.

9.3 Marking

Each glass pane shall be marked as indicated in ISO 614.

Annex A
(normative)

Calculation of required glass thickness

Where one or both dimensions (w_1 or h_1) of a window or side scuttle (d_1) are different from those given in Table 1 or Table 2, the required glass thickness, shall be determined using the following equation:

for rectangular windows: $$t = \frac{b}{200}\sqrt{\alpha \times \beta \times p}$$

for side scuttles: $$t = \frac{d_1}{400}\sqrt{\alpha \times p}$$

where

d_1 is the nominal size, in millimetres (mm);

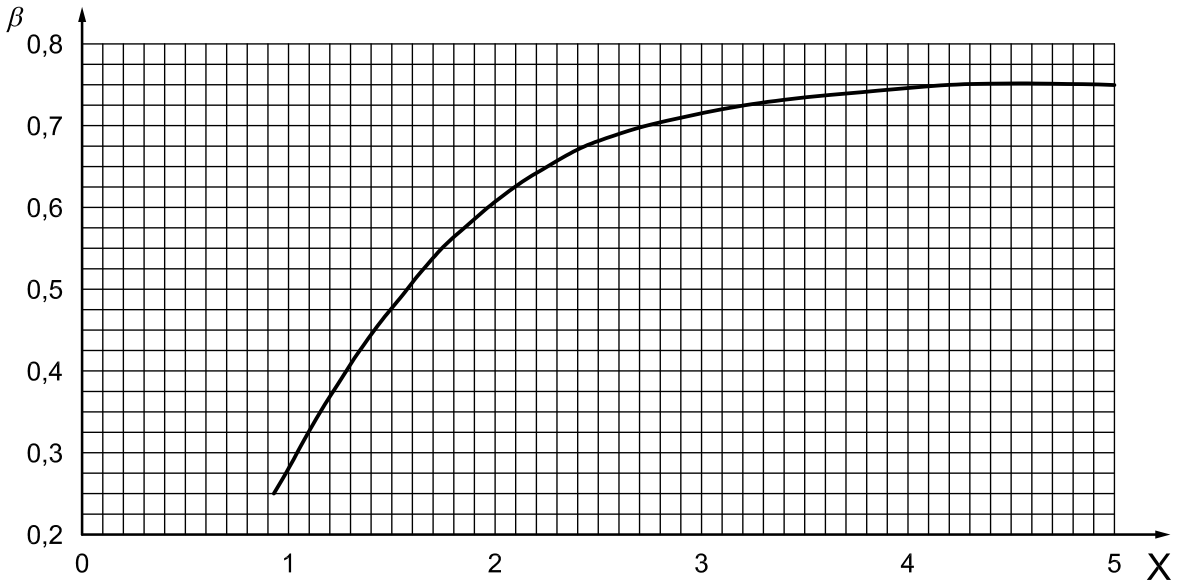
t is the thickness of the glass pane, in millimetres (mm);

α = 1,2 (factor for glass edge cover);

β is the factor obtained from the graph in Figure A.1;

b is the dimension of w_1 or h_1, whichever is less, in millimetres (mm);

p is the pressure, in kilopascals (kPa).



Key

X is the window size ratio = $\left(\frac{\text{large dimension}}{\text{small dimension}}\right)$ in millimetres (mm).

Figure A.1 — Curve for determination of factor β based on window size ratio

ICS 47.020.05

Price based on 6 pages