INTERNATIONAL STANDARD

ISO 3903

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Ships and marine technology — Ships' ordinary rectangular windows

Navires et technologie maritime — Fenêtres rectangulaires de type courant pour navires

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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.

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 3903 was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 8, *Ship design*.

This third edition cancels and replaces the second edition (ISO 3903:1993), which has been technically revised.

Ships and marine technology — Ships' ordinary rectangular windows

1 Scope

This International Standard specifies the classification of rectangular windows for ships (series, types and models), and gives the dimensions for interchangeability and construction, materials, tests, marking and designation of these rectangular windows.

NOTE 1 This International Standard is based on the experience of ships' window and glass manufacturers, shipbuilders and authorities who apply to ships the Regulations of the *International Convention for the Safety of Life at Sea, 1974 (SOLAS 1974)*, as amended, and of the *International Convention of Load Lines, 1966, as amended*.

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 261, *ISO general purpose metric screw threads — General plan*

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

ISO 1207, *Slotted cheese head screws — Product grade A*

ISO 1580, *Slotted pan head screws — Product grade A*

ISO 2009, *Slotted countersunk flat head screws — Product grade A*

ISO 2010, *Slotted raised countersunk head screws — Product grade A*

ISO 3434, *Shipbuilding and marine structures — Heated glass panes for ships' rectangular windows*

ISO 3902, *Shipbuilding and marine structures — Gaskets for rectangular windows and side scuttles*

ISO 5779, *Shipbuilding — Ordinary rectangular windows — Positioning*

ISO 5797, *Shipbuilding and marine structures — Windows and side scuttles for fire-resistant constructions*

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

ISO 7045, *Pan head screws with type H or type Z cross recess — Product grade A*

ISO 7046-2, *Countersunk flat head screws (common head style) with type H or type Z cross recess — Product grade A — Part 2: Steel screws of property class 8.8, stainless steel screws and non-ferrous metal screws*

ISO 7047, *Raised countersunk head screws (common head style) with type H or type Z cross recess — Product grade A*

ISO 21005, *Ships and marine technology — Thermally toughened safety glass panes for windows and side scuttles*

3 Terms and definitions

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

4 Classification

Rectangular windows shall be classified by series, types, models and nominal sizes in accordance with 4.1 to 4.4 respectively.

NOTE 1 A survey of standardized rectangular windows is given in 4.5 and Table 3.

Further classification characteristics are the material classes; see 6.1 and Table 12.

4.1 Series

4.1.1 Regular series (N)

Rectangular windows of the regular series shall contain a toughened safety glass pane that meets the requirements of ISO 21005.

4.1.2 Fire-resistant series (P)

Rectangular windows of the fire-resistant series shall be provided for installation in “A” or “B” class divisions, containing a glass pane that meets the requirements of ISO 5797.

Modifications to the construction and installation of the glassholder and main frame, as well as additional testing and marking, shall be in accordance with ISO 5797.

4.1.3 Heated series (H)

Rectangular windows of the heated series shall contain a heated glass pane in accordance with ISO 3434.

NOTE Modifications of the construction of glassholder or main frame are to be observed; see 5.1.2.

4.2 Types

Ships’ ordinary rectangular windows may be of two types:

— Type E: Heavy-type rectangular window;

— Type F: Light-type rectangular window.

4.3 Models

Models shall be designated in accordance with the following principal characteristics:

— opening or non-opening model;

— opening direction of glassholder;

— type of fastening.

The various combinations of these, which are in accordance with the definitions in ISO 6345, are given in Table 1.

4.4 Nominal sizes

The nominal size is defined by the clear light dimension for width w_1 and height h_1 of the rectangular window, in millimetres, and is identified by a code number; see Table 2.

4.5 Survey of types, models and sizes

A survey is given in Table 3 for all rectangular windows standardized in this International Standard. It applies to window series N (regular), P (fire-resistant) and H (heated).

The illustrations given in Table 3 do not define the construction; they are simplified examples for information only.

Table 1 — Principal characteristics of models

Opening or non-opening	Opening direction			Fastening		Model designation code
				bolted (B)	welded (W)	
opening	inwards (I)	side-hinged	left-hand (L)	B	—	ILB
				—	W	ILW
			right-hand (R)	B	—	IRB
				—	W	IRW
		top-hinged (T)		B	—	ITB
				—	W	ITW
	outwards (O)	side-hinged	left-hand (L)	B	—	OLB
				—	W	OLW
			right-hand (R)	B	—	ORB
				—	W	ORW
		top-hinged (T)		B	—	OTB
				—	W	OTW
non-opening (NO)	—			B	—	NOB
				—	W	NOW

Table 2 — Nominal size

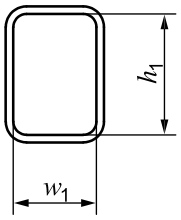
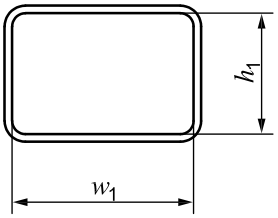
Code no.	Nominal size $w_1 \times h_1$ mm × mm	Illustration
1	300 × 425	
2	355 × 500	
3	400 × 560	
4	450 × 630	
5	500 × 710	
6	560 × 800	
7	900 × 630	
8	1 000 × 710	
9	1 100 × 800	

Table 3 — Survey of rectangular windows

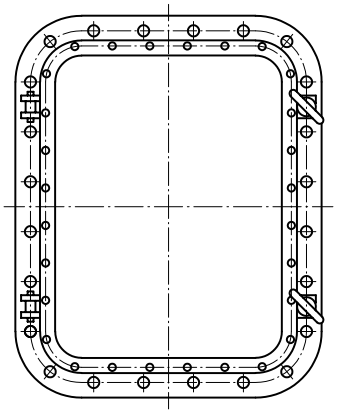
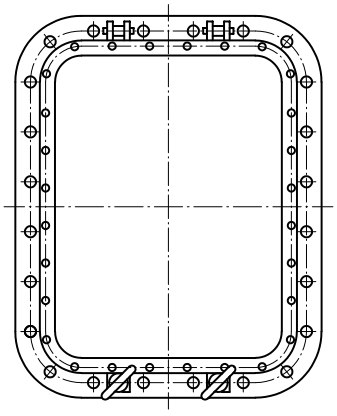
Type (see 4.2)	Model (see 4.3) bolted	Model (see 4.3) welded	Nominal size by code no. (see 4.4)	Illustration (bolted windows are shown)
Inwards opening side-hinged windows				
E	ILB	—	1 to 6	
	—	ILW		
	IRB	—		
	—	IRW		
F	ILB	—		
	—	ILW		
	IRB	—		
	—	IRW		
Inwards opening top-hinged windows				
E	ITB	—	4 to 8	
	—	ITW		
F	ITB	—	4 to 9	
	—	ITW		
Outwards opening side-hinged windows				

Table 3 *(continued)*

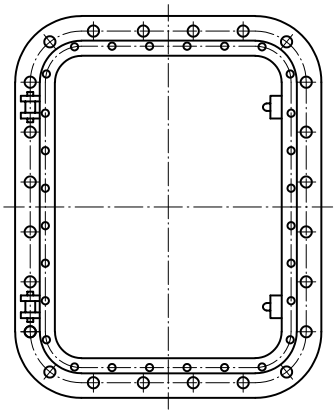
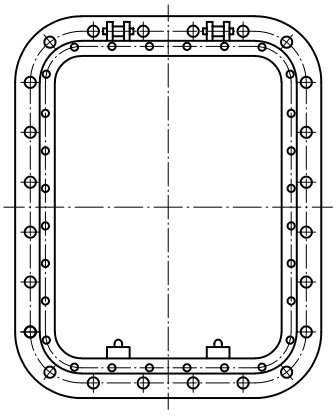
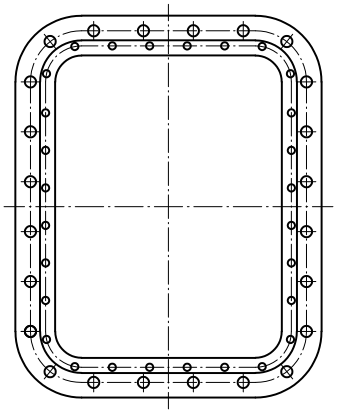
Type (see 4.2)	**Model** (see 4.3)		**Nominal size by code no.** (see 4.4)	**Illustration** (bolted windows are shown)
	bolted	**welded**		
E	OLB	—	1 to 6	
	—	OLW		
	ORB	—		
	—	ORW		
F	OLB	—		
	—	OLW		
	ORB	—		
	—	ORW		
Outwards opening top-hinged windows				
E	OTB	—	4 to 8	
	—	OTW		
F	OTB	—	4 to 9	
	—	OTW		
Non-opening windows				

Table 3 *(continued)*

Type (see 4.2)	Model (see 4.3)		Nominal size by code no. (see 4.4)	Illustration (bolted windows are shown)
	bolted	welded		
E	NOB	—	1 to 8	
F	—	NOW	1 to 9	

5 Technical requirements

5.1 General

Rectangular windows of all series, types, models and nominal sizes shall be manufactured to the requirements (dimensions, materials, etc.) given in this International Standard. They shall be capable of meeting the test requirements specified in Clause 7.

5.1.1 Rectangular windows for fire-resistant constructions

In addition, for rectangular windows for fire-resistant construction, the glassholder and the main frame shall be made of a material that keeps its mechanical characteristics at the temperatures given in ISO 5797.

They shall be designed so that temperature gradients do not develop stresses in the glass which could result in rupture.

5.1.2 Heated rectangular windows

For heated rectangular windows, deviations in the design of glassholder or main frame based on the thickness of the heated glass pane, see ISO 3434, and the electrical connection shall be taken into consideration.

5.2 Dimensions

5.2.1 Main dimensions

The main dimensions of rectangular windows shall be as given in Figure 1 and Tables 4 and 5. The correlation between nominal sizes and types and models shall be as given in Table 3.

NOTE 1 Figure 1 does not define the construction of any series, type or model of rectangular windows; it is given for the indication of standardized dimensions only. The illustration shows an inwards opening side-hinged rectangular window.

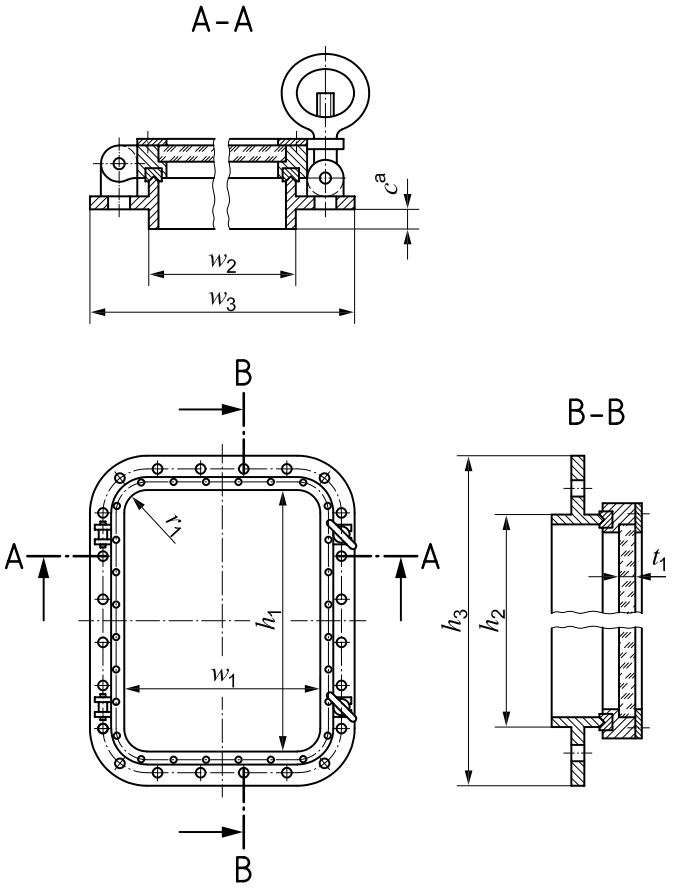
5.2.2 Corner radii

The basic radius is the corner radius r_1 of the clear light size; see Table 4.

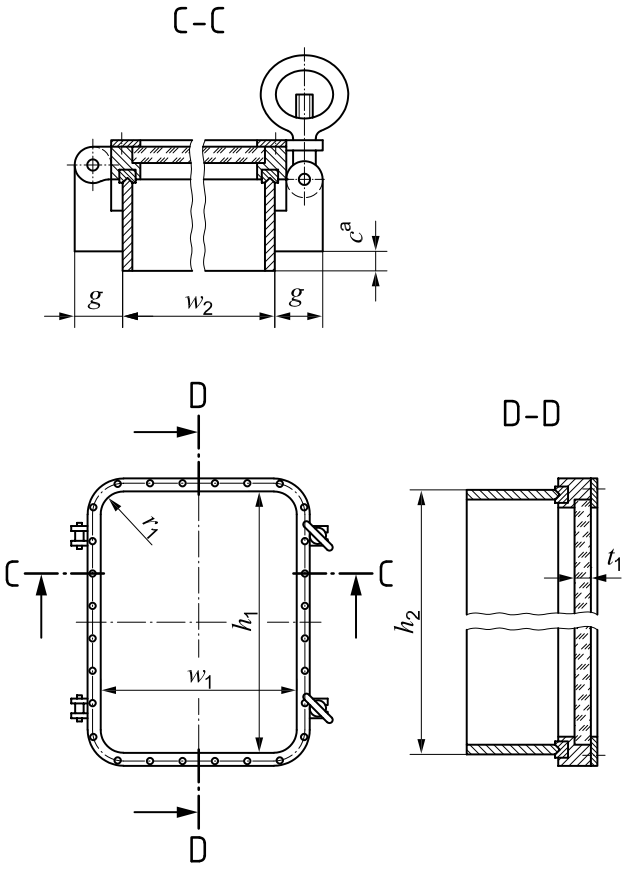
The values of the other radii shall be as follows:

— spigot outside corner radius and welding-in main frame outside corner radius: $r_2 = r_1 + 24$ mm;

— flange outside corner radius: $r_3 = r_1 + 65$ mm max.



a) Bolted model



b) Welded model

[a] For the spigot height (dimension c), see 5.2.3 and Table 5.

Figure 1 — Main dimensions of rectangular window

Table 4 — Main dimensions and number of fasteners

Nominal size code no.	$w_1 \times h_1$ mm	w_2 mm ± 2	h_2 mm ± 2	w_3 mm max.	h_3 mm max.	g mm max.	r_1 [a] mm	Minimum number of fasteners [b]
1	300 × 425	348	473	430	555	41	50	4
2	355 × 500	403	548	485	630	41	50	4
3	400 × 560	448	608	530	690	41	50	4
4	450 × 630	498	678	580	760	41	100	4
5	500 × 710	548	758	630	840	41	100	6
6	560 × 800	608	848	690	930	41	100	6
7	900 × 630	948	678	1 030	760	41	100	6
8	1 000 × 710	1 048	758	1 130	840	41	100	8
9	1 100 × 800	1 148	848	1 230	930	41	100	8

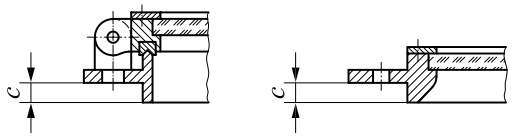
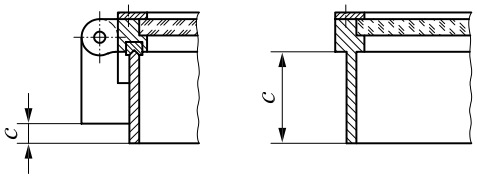
[a] For corner radii r_2 and r_3, see 5.2.2.

[b] The number of fasteners includes only closing devices and hinges with round holes; see 5.6.

5.2.3 Height of spigot

The recommended nominal heights of the main frame spigot, which should be preferred for all types, models and nominal sizes of rectangular windows, are given in Table 5.

Table 5 — Height of spigot (dimension c)

Model		Manufacturing height mm	Actual height mm
Bolted		16	The actual required delivery height of the spigot may be agreed when ordering the rectangular window.
Welded		30	

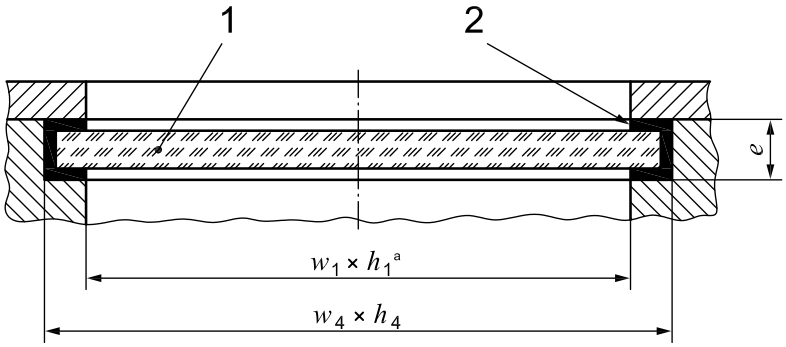
5.2.4 Glass recess

The dimensions of the glass recess (w_4, h_4, r_4 and e) in the glassholder of opening rectangular windows and in the main frame of non-opening rectangular windows shall be as given in Figure 2 and Table 6.

The minimum glass thicknesses for rectangular windows series N (regular) are given in ISO 21005.

The minimum glass thicknesses for side rectangular windows series P (fire-resistant) are given in ISO 5797.

The minimum glass thicknesses for side rectangular windows series H (heated) are given in ISO 3434.



Key

1 glass pane
2 glazing material
[a] Nominal size.

Figure 2 — Glass recess

Table 6 — Glass recess

Nominal size code no.	$w_1 \times h_1$ mm	w_4 mm min.	h_1 mm min.	r_4 mm	e mm
1	300 × 425	321	446	60	The dimension is left to the manufacturer's discretion. It depends on the thickness of the glass pane and on the glazing material used.
2	355 × 500	376	521	60	
3	400 × 560	421	581	60	
4	450 × 630	471	651	110	
5	500 × 710	521	731	110	
6	560 × 800	581	821	110	
7	900 × 630	921	651	110	
8	1 000 × 710	1 021	731	110	
9	1 100 × 800	1 121	821	110	

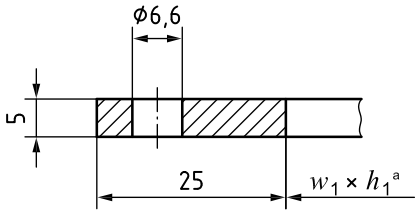
5.3 Glass retaining frame

The use of a glass retaining frame for fixing the glass pane in the glassholder or in the main frame is optional.

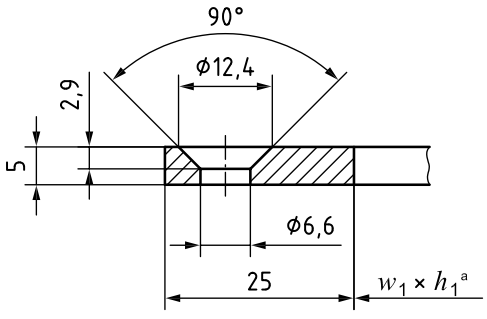
5.3.1 Dimensions

If a glass retaining frame is used, the minimum dimensions shall be as given in Figure 3.

Dimensions in millimetres



a) For use with cylindrical head screws



b) For use with countersunk head screws

a Nominal size.

Figure 3 — Glass retaining frame

5.3.2 Screws for glass retaining frames

To fasten the glass retaining frame, slotted or cross recessed screws in accordance with ISO 1207, ISO 1580, ISO 2009, ISO 2010, ISO 7045, ISO 7046-2 or ISO 7047 shall be used, at the window manufacturer's discretion. Such screws shall have the following characteristics:

— thread: M 6;

— length: 16 mm;

— material: marine corrosion-resistant copper alloy (for windows of copper alloy); stainless steel (for windows of aluminium alloy or steel).

5.3.3 Glazing screw pitch

The screw pitch shall be as follows:

— for Type E windows: 75 mm max.;

— for Type F windows: 100 mm max.

5.4 Glass panes

5.4.1 Panes for regular rectangular windows (series N)

Thermally toughened safety glass panes, clear or surface treated, in accordance with ISO 21005 shall be used. Appropriate codes are given in Table 7.

Correlation of glass thickness with types and nominal sizes shall be as given in 5.2.4, with the peculiarity for surface-treated glass panes given in 5.5.3.

5.4.2 Panes for rectangular windows for fire-resistant constructions (series P)

Glass panes in accordance with ISO 5797 shall be used. Depending on the application conditions, the shipbuilder shall decide for which fire-resistance class the rectangular window is suitable, see footnote 1.

Glass panes are standardized for rectangular windows for fire-resistant constructions; see ISO 5797.

5.4.3 Panes for heated rectangular windows (series H)

Glass panes in accordance with ISO 3434 (Type A or Type B) shall be used. Depending on the application conditions (electrical supply, power loading and kind of overheating protection device), the shipbuilder shall decide what kind of glass pane is to be fitted to the rectangular window by the window manufacturer.

Applicable heated glass panes are listed in Table 8.

Table 7 — Finish of glass pane

Kind of finish	Code
clear	Y1
surface treated	Y2

Table 8 — Codes for rectangular windows with heated glass pane

Electrical supply (current rating system)			Overheating protection device[a]	Minimum power loading[b] W/dm^2		
Supply	Voltage V	Frequency Hz		7	12	17
				Code		
d.c.	24	—	G	7G 01	12G 01	17G 01
			S	7S 01	12S 01	17S 01
	110	—	G	7G 02	12G 02	17G 02
			S	7S 02	12S 02	17S 02
	220	—	G	7G 03	12G 03	17G 03
			S	7S 03	12S 03	17S 03
a.c. single-phase	115	50	G	7G 11	12G 11	17G 11
			S	7S 11	12S 11	17S 11
		60	G	7G 12	12G 12	17G 12
			S	7S 12	12S 12	17S 12
	230	50	G	7G 13	12G 13	17G 13
			S	7S 13	12S 13	17S 13
		60	G	7G 14	12G 14	17G 14
			S	7S 14	12S 14	17S 14
a.c. three-phase	115	50	G	7G 31	12G 31	17G 31
			S	7S 31	12S 31	17S 31
		60	G	7G 32	12G 32	17G 32
			S	7S 32	12S 32	17S 32
	230	50	G	7G 33	12G 33	17G 33
			S	7S 33	12S 33	17S 33
		60	G	7G 34	12G 34	17G 34
			S	7S 34	12S 34	17S 34
	230/400	50	G	7G 35	12G 35	17G 35
			S	7S 35	12S 35	17S 35
		60	G	7G 36	12G 36	17G 36
			S	7S 36	12S 36	17S 36
	440	50	G	7G 37	12G 37	17G 37
			S	7S 37	12S 37	17S 37
		60	G	7G 38	12G 38	17G 38
			S	7S 38	12S 38	17S 38

[a] G means group regulation, S mean single regulation; see ISO 3434.

[b] If a higher power loading is required for navigation in polar regions, the window manufacturer or the heated glass pane manufacturer shall be consulted.

5.5 Glazing

5.5.1 Glazing material

An appropriate glazing material, resistant to sea water and ultraviolet light, shall be used.

5.5.2 Mounting of glass pane

When glazing, it is essential that the glass pane is centralized in the glassholder or in the main frame so that there is the same clearance all round.

The necessity of using special packings for the mounting of special glass panes for rectangular windows for fire-resistant constructions (series P) or heated windows (series H) depends on the construction of the glassholder, and on the composition and edge protection (if any) of these glass panes.

5.5.3 Peculiarity for surface-treated glass panes

Mounting position A

In general, obscured glass panes are positioned with the obscured surface outwards. For this positioning, the glass thicknesses given in 5.2.4 apply. Note, however, that the glass pane becomes transparent when wet.

Mounting position B

When, in special cases, a surface-treated toughened safety glass pane is positioned with the obscured surface facing inwards, a greater glass thickness than that specified in 5.2.4 shall be used. These greater thicknesses shall be as given in Table 9.

Table 9 — Thickness of surface-treated glass panes when obscured surface is facing inwards

Dimensions in millimetres

Nominal size		Glass thickness for type of rectangular window	
code no.	$w_1 \times h_1$	E	F
1	300 × 425	15	12
2	355 × 500	15	12
3	400 × 560	19	12
4	450 × 630	19	12
5	500 × 710	—	15
6	560 × 800	—	15
7	900 × 630	—	19
8	1 000 × 710	—	19
9	1 100 × 800	—	—

5.6 Fasteners (closing devices and hinges)

5.6.1 Number of fasteners

a) The minimum number of fasteners comprising closing devices and hinges with round holes for glassholders of Type E and Type F opening rectangular windows shall be as given in Table 4.

b) The total number of the fasteners and their construction shall be such that the window meets the strength and watertightness requirements in Clause 7.

NOTE If the hole for the hinge of the glassholder is oval, the hinge is not regarded as a fastener.

5.6.2 Closing device

a) At least two closing devices (or example screw-in bolts or swing bolts with nuts) shall be provided.

b) In the case of outwards-opening windows, an appropriate screw-locking device shall be provided to ensure that, when open, the closing device does not strike the glass pane.

c) If a closing device is composed of a swing bolt, swing bolt nut and swing bolt hinge pin, these component parts shall have main dimensions as given in Table 10.

5.6.3 Hinges

The number of hinges (at least two) depends on the kind of window (type, model, size and construction). For all kinds of opening rectangular windows, it is recommended to use hinge pins with a diameter in accordance with Table 10.

Table 10 — Diameter of bolts and pins

Dimensions in millimetres

Thread of swing bolt and nut (in accordance with ISO 261)	Diameter of hinge pin for	
	swing bolt	glassholder
M 20	12	12

5.7 Gaskets for glassholder and glass retaining frame

To ensure watertightness between the glassholder and main frame, gaskets shall be used.

5.7.1 Type of gasket

The gaskets shall be of Type A, B or C in accordance with ISO 3902, at the manufacturer's discretion.

5.7.2 Fixing of gaskets

The gaskets shall be secured in the grooves of the glassholder by means of a suitable adhesive.

5.8 Fixing device

All sidewards opening rectangular windows shall be provided with a fitted fixing device (for example a hook). This fixing device is a part of the window to be delivered.

6 Materials

6.1 Main frame, glassholder and glass retaining frame

The main components of a rectangular window (main frame, glassholder and glass retaining frame) shall be manufactured from the materials given in Table 12. These materials shall be marine corrosion-resistant and shall have the minimum mechanical properties given in Table 12.

The values for the minimum tensile strength and minimum elongation given in Table 13 are valid for the types of window indicated. However, the material used should comply with any relevant national standard.

The material class code numbers given in Table 12, which are for indicating the material in the designation of the rectangular windows, are combinations of the material code numbers, given in Table 11, for the main frame, the glassholder and glass retaining frame, in that order.

Table 11 — Material code numbers

Material code no.	Material
1	Copper material (for example brass, gun metal)
2	Ferrous material (for example mild steel, cast steel, iron)
3	Aluminium material (cast or wrought alloy)
0	No components (for example glassholders for non-opening windows)

Table 12 — Material classes

Type of rectangular window	Method of fastening window	Material class code no.	Material		
			main frame	glassholder	glass retaining frame
opening	bolted	111	brass[a]		
		333	aluminium alloy [a]		
	welded	211	mild steel	brass[a]	
		221	mild steel		brass[a]
		222	mild steel		
		233	mild steel	aluminium alloy[a]	
		333	aluminium alloy (only wrought or extruded)	aluminium alloy[a]	
non-opening	bolted	101	brass[a]	—	brass[a]
		303	aluminium alloy[a]	—	aluminium alloy[a]
	welded	201	mild steel	—	brass[a]
		202	mild steel	—	mild steel
		203	mild steel	—	aluminium alloy[a]
		303	aluminium alloy (only wrought or extruded)	—	aluminium alloy[a]

[a] The use of cast or wrought alloy is optional.

Table 13 — Tensile strength and elongation for main components

Type of window	Minimum tensile strength N/mm^2	Minimum elongation %
E	180	10
F	140	3

6.2 Closing device and hinge pin

Bolts, pins and nuts of the closing device and hinge pins for the glassholder shall be manufactured from materials having the following properties:

a) resistant to corrosion;

b) no effect on the corrosion resistance of other parts;

c) minimum mechanical properties as given in Table 14.

Table 14 — Tensile strength and elongation for closing devices

Type of window	Hinge pin screw-in bolt, or swing bolt and swing bolt pin		Nut	
	minimum tensile strength	minimum elongation	minimum tensile strength	minimum elongation
	N/mm^2	%	N/mm^2	%
E	350	15	250	14
F	250	14	180	8

The values for the minimum tensile strength and minimum elongation given in Table 14 are valid for the types of windows indicated. However, the material used should comply with any relevant national standard.

For aluminium alloy windows, the bolts (screw-in bolt or swing bolt) of the closing device and the hinge pin of the glassholder shall be made of non-corrodible steel, stainless steel or such alloys as are not likely to cause corrosion of windows or pins.

7 Testing

7.1 Watertightness test

Maximum allowable pressures for rectangular windows with standardized dimensions are given in Annex A.

7.1.1 Board test

To ensure that the rectangular windows and packing are watertight when fitted, a hose test shall be carried out by the shipbuilder to the satisfaction of the owner's or surveyor's representative.

The test shall consist of hosing the rectangular windows by means of at least 12,5 mm nominal size hose held not more than 1,5 m from the window and with a water pressure of a least 250 kPa.

7.1.2 Shop test

An equivalent hydraulic test shall be carried out by the manufacturer before despatch by means of batch tests (approximately 10 % of the delivery batch, with a minimum of one window), at a test pressure of 25 kPa.

7.2 Mechanical strength test

7.2.1 A prototype window shall be subjected to a mechanical strength test by a suitable test method, applying a load equivalent to the following pressures:

— Type E windows: 75 kPa;

— Type F windows: 35 kPa.

7.2.2 The manufacturer shall, at the request of the purchaser, provide guarantees that the metallic materials used in the construction of the window conform with the strength requirements as given in Tables 13 and 14.

7.2.3 Mechanical testing of the materials shall be carried out in accordance with the mechanical test requirements of any relevant national standards.

7.3 Fire-resistance test

Windows for fire-resistant constructions (series P) shall have been subjected to prototype testing for fire resistance; see ISO 5797.

7.4 Test for heated windows

Heated windows shall have been subjected to the electrical testing described in ISO 3434.

8 Marking

Windows conforming to this International Standard shall be marked as indicated in 8.1 to 8.2.2.

8.1 Regular rectangular windows (series N)

8.1.1 Marking of body

a) The main frame or some other metallic main component part shall be marked with the letter for the Type (E or F).

b) Further marking indications are optional, for example:

— nominal size;

— material class;

— manufacturer's name or trade-mark;

— number of this International Standard[1)].

8.1.2 Marking of glass pane

The glass pane shall be marked in accordance with ISO 614.

8.2 Rectangular windows for fire-resistant constructions (series P)

8.2.1 Marking of body

The indications given in 8.1.1 apply. In addition, fire-resistant windows shall be marked on the inside of the glassholder with the following indications:

— fire-resistance class (B-0 or B-15; see 5.4.2);

— number of the test report.

8.2.2 Marking of glass pane

The fire-resistant glass pane shall be marked in accordance with ISO 5797.

8.3 Heated rectangular windows (series H)

8.3.1 Marking of body

The indications given in 8.1.1 apply.

8.3.2 Marking of glass plane

The glass pane shall be marked in accordance with ISO 3434.

1) Admissible only in connection with the manufacturer's name or trade-mark.

9 Designation

For ordering and reference purposes, rectangular windows conforming to this International Standard shall be designated in accordance with 9.1 to 9.2.3.

9.1 Elements for designation

The following basic elements and additional elements for the different series of windows (depending on the type of window glass pane) shall be used, in the order given:

a) basic elements:

   1) denomination (abbreviated): window;

   2) number of this International Standard: ISO 3903;

   3) series (code letter), as specified in 4.1;

   4) type (code letter), as specified in 4.2;

   5) nominal size, as specified in Table 2;

   6) height of spigot, as specified in 5.2.3;

   7) model (code), as specified in Table 1;

   8) material class of window (code number), as specified in Table 12;

b) additional elements for designation of regular windows with safety glass panes (series N):

   — finish of glass pane (code), as specified in 5.4.1.

c) additional elements for designation of windows for fire-resistant constructions (series P):

   — fire-resistance class of windows, as specified in 5.4.2.

d) additional elements for designation of windows with heated glass panes:

   — electrical requirements for testing (code), as specified in 5.4.3 and Table 8.

9.2 Examples

9.2.1 Example for regular rectangular windows (N)

A rectangular window in accordance with this International Standard of regular series (N), heavy type E, nominal size 450 mm × 630 mm (window no. 4), height of spigot $c = 16$ mm, side-hinged inwards left-hand opening bolted model (ILB), material class 111, with glass pane of plate glass and glass finish clear (Y1) is designated as follows:

Window ISO 3903-N-E4 × 16-ILB-111-Y1

9.2.2 Example for rectangular windows for fire-resistant constructions (P)

A rectangular window in accordance with this International Standard of fire-resistance series (P), heavy type E, nominal size 450 mm × 630 mm (window no. 4), with height of spigot $c = 16$ mm, side-hinged inwards left-hand opening bolted model (ILB), material class 111, for fire-resistance class B-15 is designated as follows:

Window ISO 3903-P-E4 × 16-ILB-111-B15

9.2.3 Example for heated rectangular windows (H)

A heated rectangular window in accordance with this International Standard of heated series (H), heavy type E, nominal size 450 mm × 630 mm (window no. 4), height of spigot c = 16 mm, side-hinged inwards left-hand opening bolted model (ILB), made of material according to class 111, fitted out with a heated glass pane for power loading 12 W/dm^2 with overheating protection device with group regulation and powered by a single-phase 220 V 60 Hz a.c. supply (code 12G 14) is designated as follows:

Window ISO 3903-H-E4 × 16-ILB-111-12G14

10 Positioning

Rectangular windows shall be positioned in accordance with ISO 5779.

11 Installation

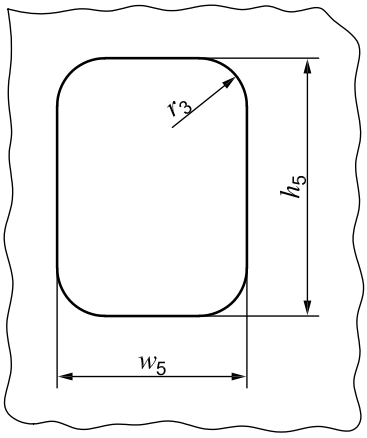
For installation the relevant national rules and regulations apply, if any.

The dimension of the pre-cut hole in the shell plate should be as given in Table 15.

For windows which are designed for welding-in, the pre-cut hole should be smaller than that indicated in Table 15, in order to keep the gap between the cut and the main frame as small as possible.

Table 15 — Pre-cut hole

Dimensions in millimetres

Nominal size		w_5	h_5	r_5	Illustration
code no.	$w_1 \times h_1$	$^{+2}_{0}$	$^{+2}_{0}$	$^{+1}_{0}$	
1	300 × 425	352	477	76	
2	355 × 500	407	552	76	
3	400 × 560	452	612	76	
4	450 × 630	502	682	126	
5	500 × 710	552	762	126	
6	560 × 800	612	852	126	
7	900 × 630	952	682	126	
8	1 000 × 710	1 052	762	126	
9	1 100 × 800	1 152	852	126	

Annex A
(normative)

Maximum allowable pressure for rectangular windows with standardized dimensions

The maximum allowable pressure p to which rectangular windows in accordance with this International Standard of regular series N (glazed with toughened safety glass panes in accordance with ISO 21005), fire-resistant series P (glazed with glass panes according to ISO 5797), and heated series H (glazed with glass panes in accordance with ISO 3434) may be subjected is given in Table A.1.

Table A.1 — Maximum allowable pressure

Rectangular window				Maximum allowable pressure
Type	Code no.	Nominal size	Glass thickness[a]	
		mm × mm	mm × mm	kPa
E Heavy	1	300 × 425	10	99
	2	355 × 500	10	71
	3	400 × 560	12	80
	4	450 × 630	12	63
	5	500 × 710	15	80
	6	560 × 800	15	64
	7	900 × 630	19	81
	8	1 000 × 710	19	64
F Light	1	300 × 425	8	63
	2	355 × 500	8	45
	3	400 × 560	8	36
	4	450 × 630	8	28
	5	500 × 710	10	36
	6	560 × 800	10	28
	7	900 × 630	12	32
	8	1 000 × 710	12	25
	9	1 100 × 800	15	31

[a] The glass thickness applies to glass panes of regular windows (series N) and to the main glass pane of windows for fire-resistant constructions (series P) or heated windows (series H). In special cases, a greater glass thickness shall be used for obscured glass panes, see 5.5.3.

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