Tc 8

INTERNATIONAL STANDARD ISO 3903

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Shipbuilding — Ships' ordinary rectangular windows

Construction navale — 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 institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3903 was developed by Technical Committee ISO/TC 8, *Shipbuilding,* and was circulated to the member bodies in October 1975.

It has been approved by the member bodies of the following countries :

Australia	Italy	Romania
Belgium	Japan	Spain
Bulgaria	Korea, Dem. P. Rep. of	Sweden
Czechoslovakia	Korea, Rep. of	Turkey
Finland	Mexico	United Kingdom
France	Netherlands	Yugoslavia
Germany	Norway	

The member bodies of the following countries expressed disapproval of the document on technical grounds :

India
Poland
U.S.S.R.

Printed in Switzerland

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Shipbuilding — Ships' ordinary rectangular windows

0 INTRODUCTION

This International Standard is based on the experience of window and glass manufacturers, shipbuilders and authorities who apply to ships the Regulations of the International Convention for the Safety of Life at Sea, 1960[1] and of the International Convention on Load Lines, 1966.

1 SCOPE AND FIELD OF APPLICATION

This International Standard gives definitions and lays down a classification (types and models), the dimensions for interchangeability and construction, materials, testing and designation of ships' ordinary rectangular windows.

2 REFERENCES

ISO 614, *Shipbuilding — Toughened safety glass panes for ships' side scuttles and rectangular windows — Punch method of non-destructive strength testing.*

ISO 3254, *Shipbuilding — Toughened safety glass panes for ships' rectangular windows.*

ISO 3434, *Shipbuilding — Heated glass panes for ships' windows.*

ISO 3902, *Shipbuilding — Gaskets for ships' side scuttles and rectangular windows.*

ISO 5779, *Shipbuilding — Ships' rectangular windows — Positioning.*[2]

ISO 5797, *Shipbuilding — Fire-resistant glass panes for ships' side scuttles and rectangular windows.*[3]

ISO 5896, *Shipbuilding — Ships' rectangular windows — Installation.*[3]

3 DEFINITIONS

For the purpose of this International Standard, the following definitions apply.

3.1 ships' ordinary rectangular window : An opening hinged window or non-opening window made of metallic material having an undivided glass pane with dimensions and of materials according to ISO 3254, which is used in ships in accordance with the relevant regulations. (See clause 11.)

NOTE — All other kinds of rectangular windows, for example non-opening very light type with main frame of Z-shaped profile, sliding windows, wide-vision windows, fanlight windows, bottom-hinged windows and other special types, do not belong, in the sense of this International Standard, to the type "ships' ordinary rectangular window".

3.1.1 left-hand model (L) : An opening model with hinges of the glassholder on the left side when viewed from the side towards which it opens. (See figure 1.)

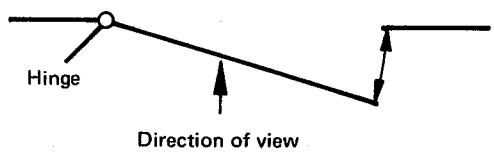


FIGURE 1 — **Left-hand window**

3.1.2 right-hand model (R) : An opening model with hinges of the glassholder on the right side when viewed from the side towards which it opens. (See figure 2.)

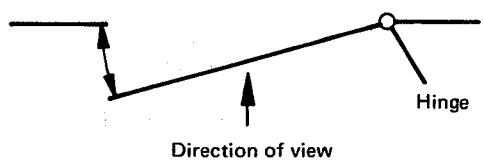


FIGURE 2 — **Right-hand window**

3.1.3 top hinged model (T) : An opening model with hinges of the glassholder on the top.

1) To be replaced by the Regulations of the International Convention for the Safety of Life at Sea, 1974, when they are brought into force.

2) At present at the stage of draft.

3) In preparation.

3.2 Components

The denomination of the main components of rectangular windows is given in table 1. (See figures 3 and 4.)

NOTE — Figures 3 and 4 do not define the construction of the windows; they are only examples.

3.2.1 *Opening window*

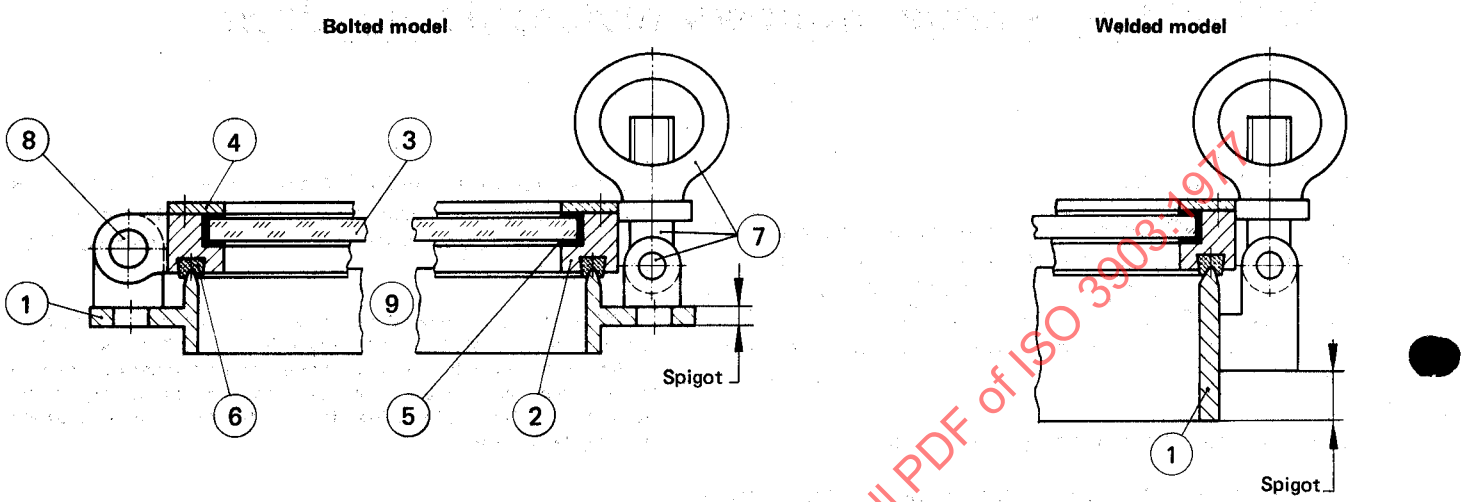


FIGURE 3 — **Opening window**

3.2.2 *Non-opening window*

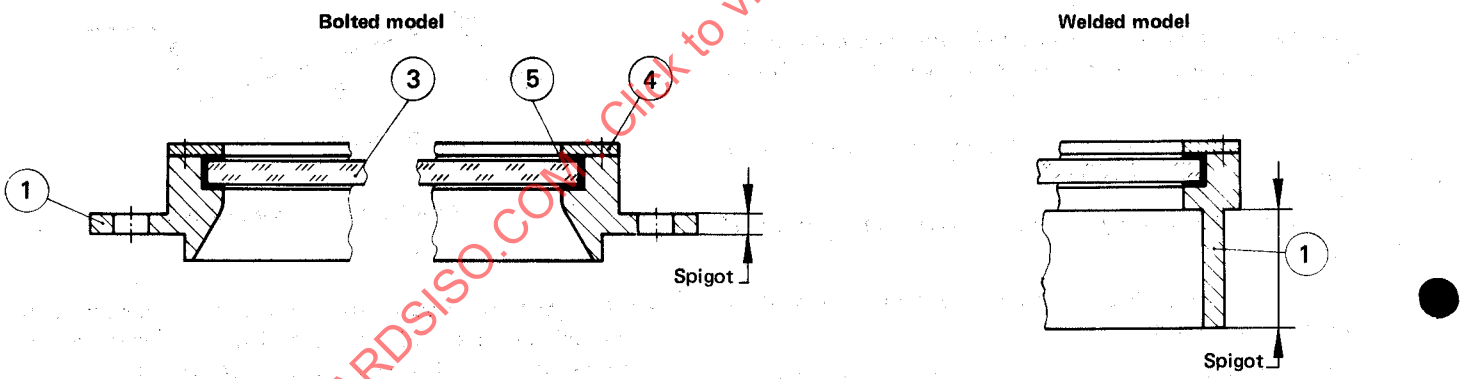


FIGURE 4 — **Non-opening window**

TABLE 1 — **Components**

Component No.	Denomination of main components
1	Main frame
2	Glassholder
3	Glass pane
4	Glass retaining frame
5	Glazing material
6	Gasket (for glassholder)
7	Closing device (for example swingbolt with nut and pin)
8	Hinge pin
9	Fixing device (see 6.6)

4 CLASSIFICATION

Windows shall be classified by types, models and nominal sizes in accordance with 4.1, 4.2 and 4.3 respectively.

Further classification characteristics are the material classes. (See 7.1.)

NOTE — For a survey of the standardized windows, see 5.1 to 5.4.

4.1 Types

— Type E : heavy-type window;

— Type F : light-type window.

NOTE — The differentiation between the types E and F is derived from the thickness of the glass pane (tables 4 to 11) and the tensile strength and elongation of the material for the main components (tables 16 and 17).

4.2 Models

Models are designated according to their principal characteristics as given in table 2.

4.3 Nominal sizes

The nominal sizes are the clear light dimensions for width w_1 and height h_1 of the window and are identified by number. (See table 3.)

5 MAIN DIMENSIONS

The main dimensions of a window shall be as given in the tables 4 to 11.

Figures 5 to 12 in 5.1 to 5.4 do not define the construction; they are only intended to indicate the standardized dimensions given in the tables.

TABLE 2 — **Principal characteristics of models**

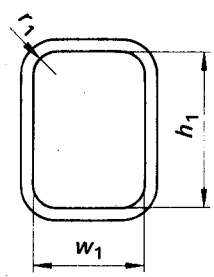
Opening or non-opening	**Opening direction**	**Further attributes**		**Fastening**	
				bolted (B)	welded (W)
				Code for designation of model	
Opening	inwards	side hinged	left-hand (L)	ILB	ILW
			right-hand (R)	IRB	IRW
		Top hinged (T)		ITB	ITW
	outwards	side hinged	left-hand (L)	OLB	OLW
			right-hand (R)	ORB	ORW
Non-opening	—			NOB	NOW

TABLE 3 — **Nominal sizes**

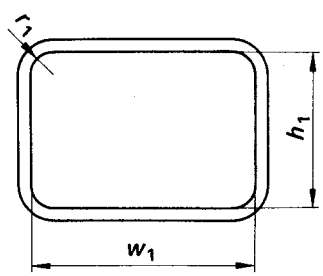
Dimensions in millimetres

Window No.	nominal size $w_1 \times h_1$ Type E	nominal size $w_1 \times h_1$ Type F	r_1
1	300 × 425		50
2	355 × 500		50
3	400 × 560		50
4	450 × 630		100
5	500 × 710		100
6	560 × 800		100
7	900 × 630		100
8	1 000 × 710		100
9	—	1 100 × 800	100

Window No. 1 to 6



Window No. 7 to 9



5.1 Inwards opening side-hinged windows

5.1.1 *Bolted models*

Model ILB — Left-hand opening

Model IRB — Right-hand opening

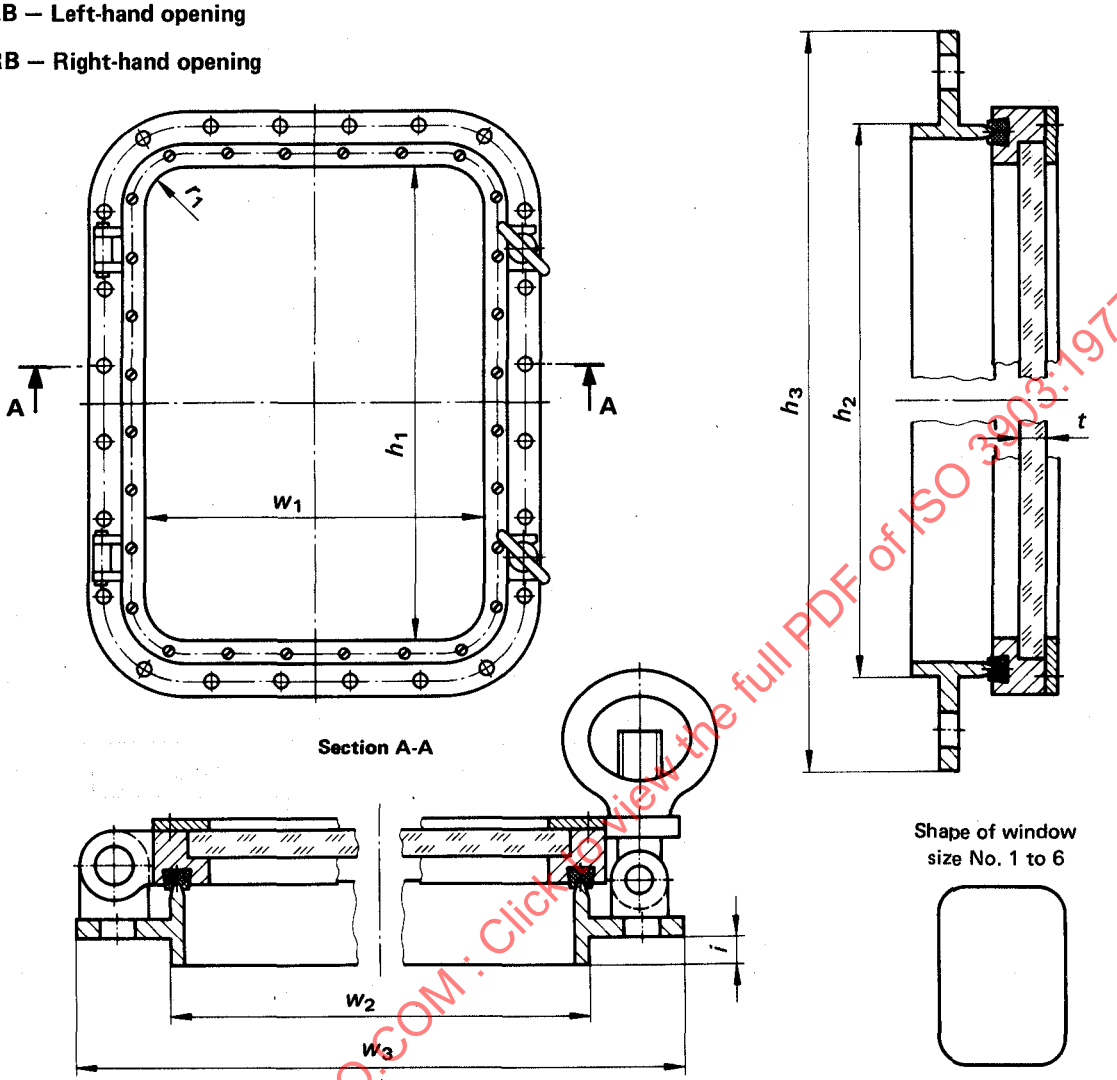


FIGURE 5 — **Window of models ILB and IRB**

TABLE 4 — **Models ILB and IRB**

Dimensions in millimetres

Window		**Main frame**					**Glass thickness** t[2]		**Minimum total number of fasteners**[3]
No.	Nominal size	Spigot		Flange			type		
types E and F	$w_1 \times h_1$	w_2	h_2	w_3 max.	h_3 max.	r_1[1]	E	F	
1	300 × 425	348	473	430	555	50	10	8	4
2	355 × 500	403	548	485	630	50	10	8	4
3	400 × 560	448	608	530	690	50	12	8	4
4	450 × 630	498	678	580	760	100	12	8	4
5	500 × 710	548	758	630	840	100	15	10	6
6	560 × 800	608	848	690	930	100	15	10	6

1) See also 5.5.

2) In special cases a greater glass thickness shall be used for obscured glass panes. (See table 13.)

3) The minimum total number of fasteners comprises closing devices and hinges with round holes for the glassholder. (See 6.4.)

5.1.2 *Welded models*

Model ILW — Left-hand opening

Model IRW — Right-hand opening

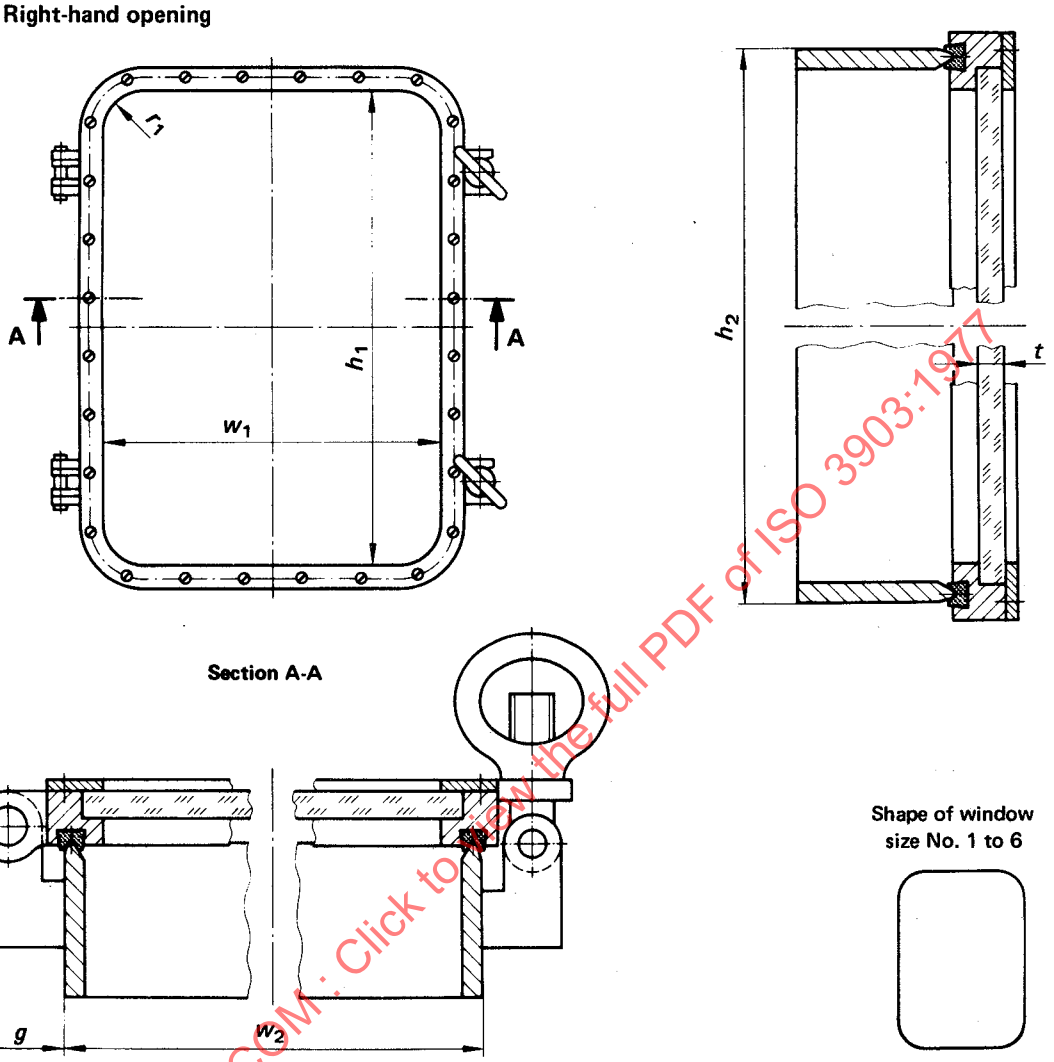


FIGURE 6 — **Window of models ILW and IRW**

TABLE 5 — **Models ILW and IRW**

Dimensions in millimetres

Window		Main frame				Glass thickness t[2]		Minimum total number of fasteners[3]
No.	Nominal size					type		
types E and F	$w_1 \times h_1$	w_2	h_2	g max.	r_1[1]	E	F	
1	300 × 425	348	473	41	50	10	8	4
2	355 × 500	403	548	41	50	10	8	4
3	400 × 560	448	608	41	50	12	8	4
4	450 × 630	498	678	41	100	12	8	4
5	500 × 710	548	758	41	100	15	10	6
6	560 × 800	608	848	41	100	15	10	6

1) See also 5.5.

2) In special cases a greater glass thickness shall be used for obscured glass panes. (See table 13.)

3) The minimum total number of fasteners comprises closing devices and hinges with round holes for the glassholder. (See 6.4.)

5.2 Inwards opening top-hinged windows

5.2.1 *Model ITB — Bolted window*

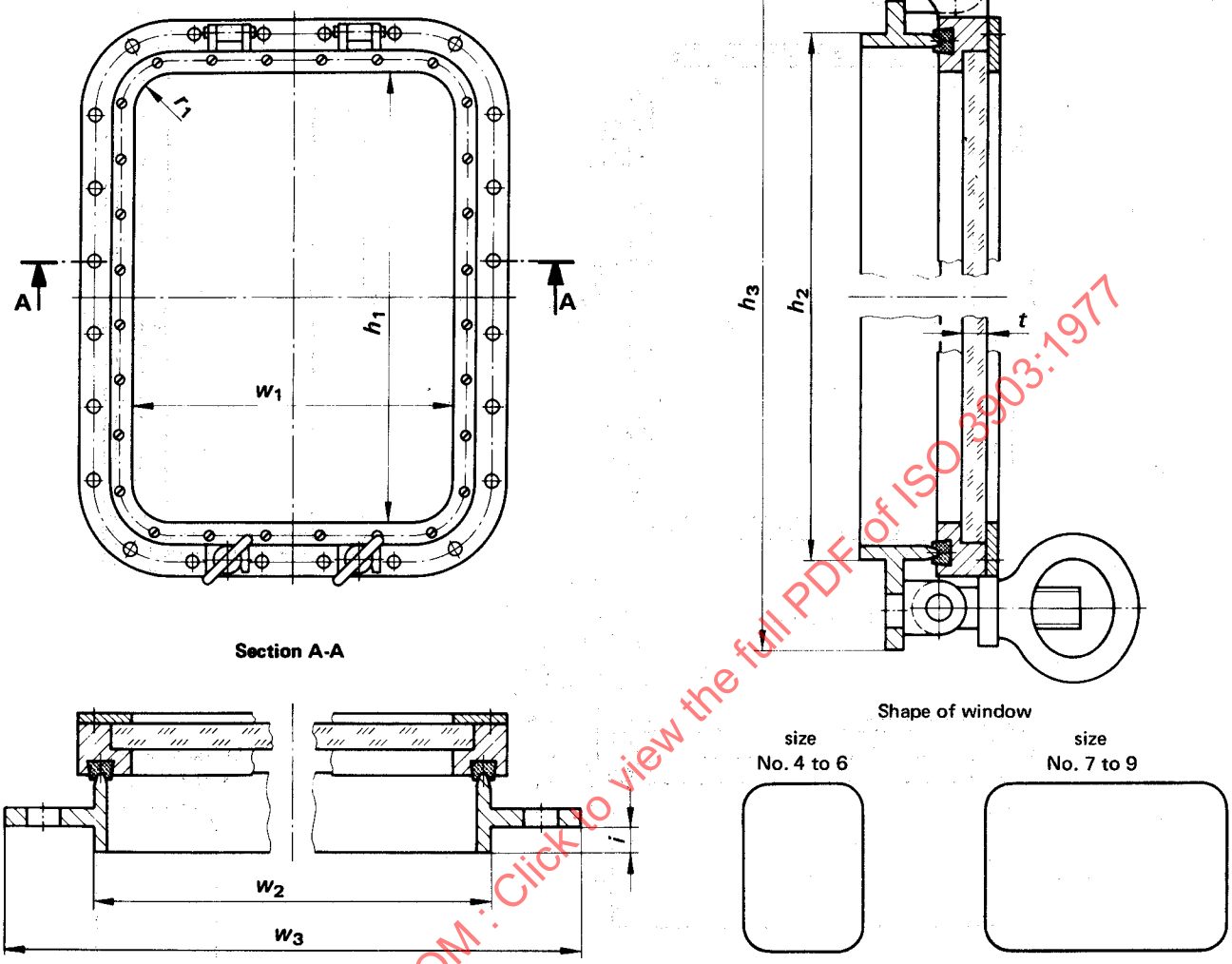


FIGURE 7 — **Window of model ITB**

TABLE 6 — **Model ITB**

Dimensions in millimetres

Window			Main frame					Glass thickness t[2]		Minimum total number of fasteners[3]
No.		Nominal size	Spigot		Flange		r_1[1]	type		
type		$w_1 \times h_1$	w_2	h_2	w_3 max.	h_3 max.		E	F	
E	F									
4		450 × 630	498	678	580	760	100	12	8	4
5		500 × 710	548	758	630	840	100	15	10	6
6		560 × 800	608	848	690	930	100	15	10	6
7		900 × 630	948	678	1 030	760	100	19	12	6
8		1 000 × 710	1 048	758	1 130	840	100	19	12	8
–	9	1 100 × 800	1 148	848	1 230	930	100	–	15	8

1) See also 5.5.

2) In special cases a greater glass thickness shall be used for obscured glass panes. (See table 13.)

3) The minimum total number of fasteners comprises closing devices and hinges with round holes for the glassholder. (See 6.4.)

5.2.2 *Model ITW — Welded window*

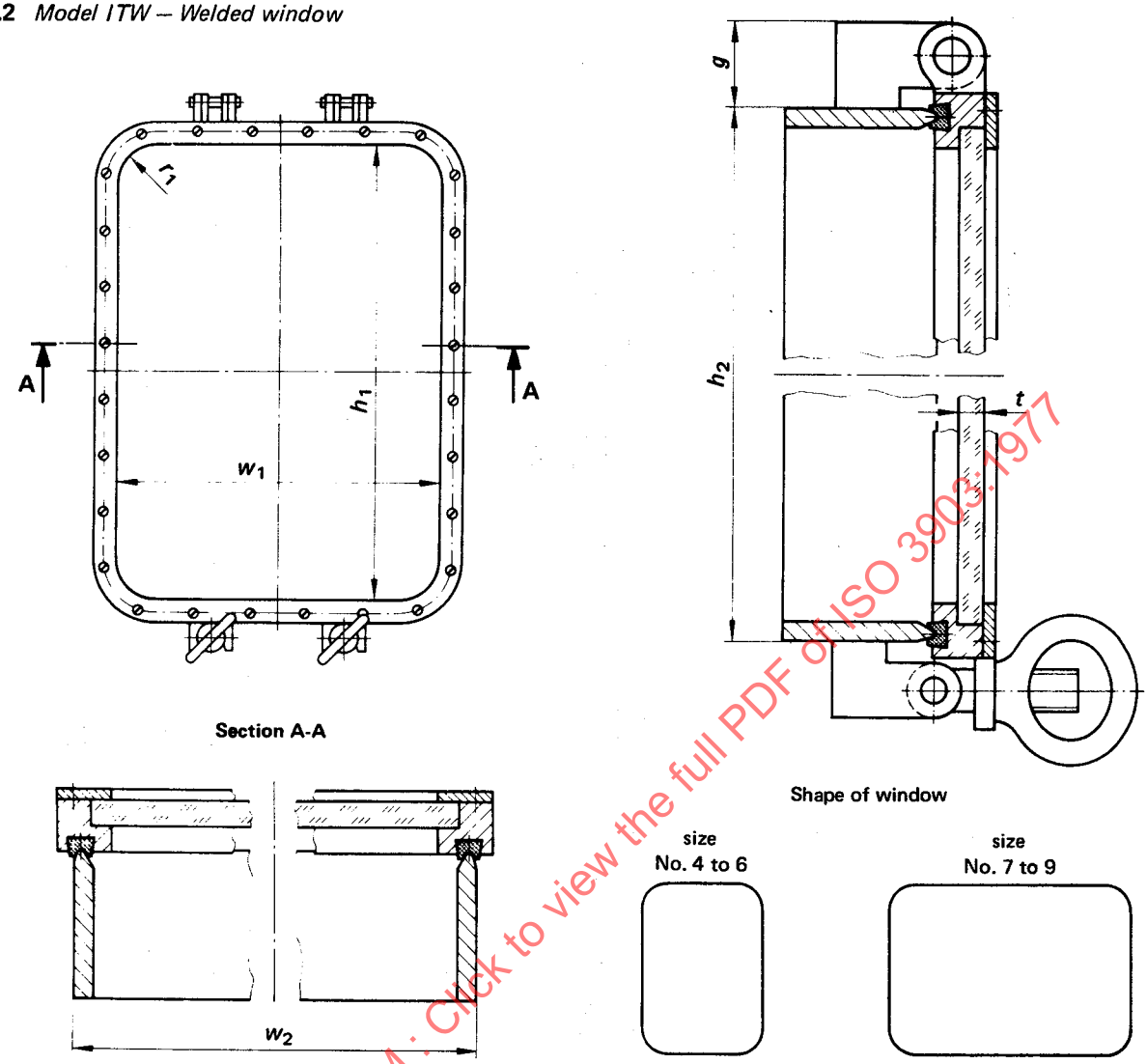


FIGURE 8 — **Window of model ITW**

TABLE 7 — **Model ITW**

Dimensions in millimetres

Window			Main frame				Glass thickness t[2]		Minimum total number of fasteners[3]
No.		Nominal size					type		
type		$w_1 \times h_1$	w_2	h_2	g max.	r_1[1]	E	F	
E	F								
4		450 × 630	498	678	41	100	12	8	4
5		500 × 710	548	758	41	100	15	10	6
6		560 × 800	608	848	41	100	15	10	6
7		900 × 630	948	678	41	100	19	12	6
8		1 000 × 710	1 048	758	41	100	19	12	8
—	9	1 100 × 800	1 148	848	41	100	—	15	8

1) See also 5.5.

2) In special cases a greater glass thickness shall be used for obscured glass panes. (See table 13.)

3) The minimum total number of fasteners comprises closing devices and hinges with round holes for the glassholder. (See 6.4.)

5.3 Outwards opening side-hinged windows

5.3.1 *Bolted models*

Model OLB — Left-hand opening

Model ORB — Right-hand opening

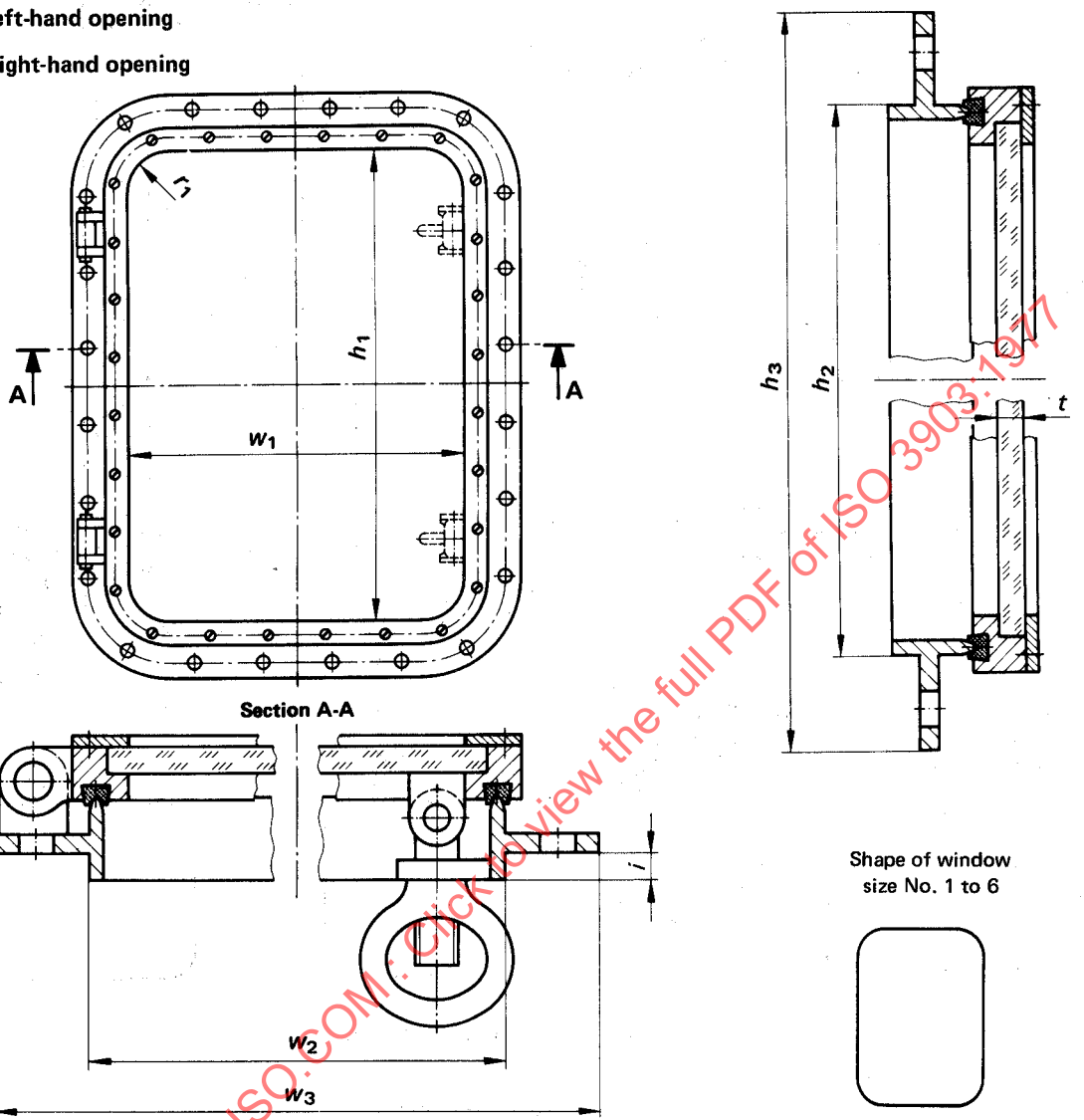


FIGURE 9 — **Window of models OLB and ORB**

TABLE 8 — **Models OLB and ORB**

Dimensions in millimetres

Window		Main frame				r_1 [1]	Glass thickness t [2]		Minimum total number of fasteners [3]
No.	Nominal size	Spigot		Flange			type		
types E and F	$w_1 \times h_1$	w_2	h_2	w_3 max.	h_3 max.	r_1 [1]	E	F	
1	300 × 425	348	473	430	555	50	10	8	4
2	355 × 500	403	548	485	630	50	10	8	4
3	400 × 560	448	608	530	690	50	12	8	4
4	450 × 630	498	678	580	760	100	12	8	4
5	500 × 710	548	758	630	840	100	15	10	6
6	560 × 800	608	848	690	930	100	15	10	6

1) See also 5.5.

2) In special cases a greater glass thickness shall be used for obscured glass panes. (See table 13.)

3) The minimum total number of fasteners comprises closing devices and hinges with round holes for the glassholder. (See 6.4.)

5.3.2 *Welded models*

Model OLW — Left-hand opening

Model ORW — Right-hand opening

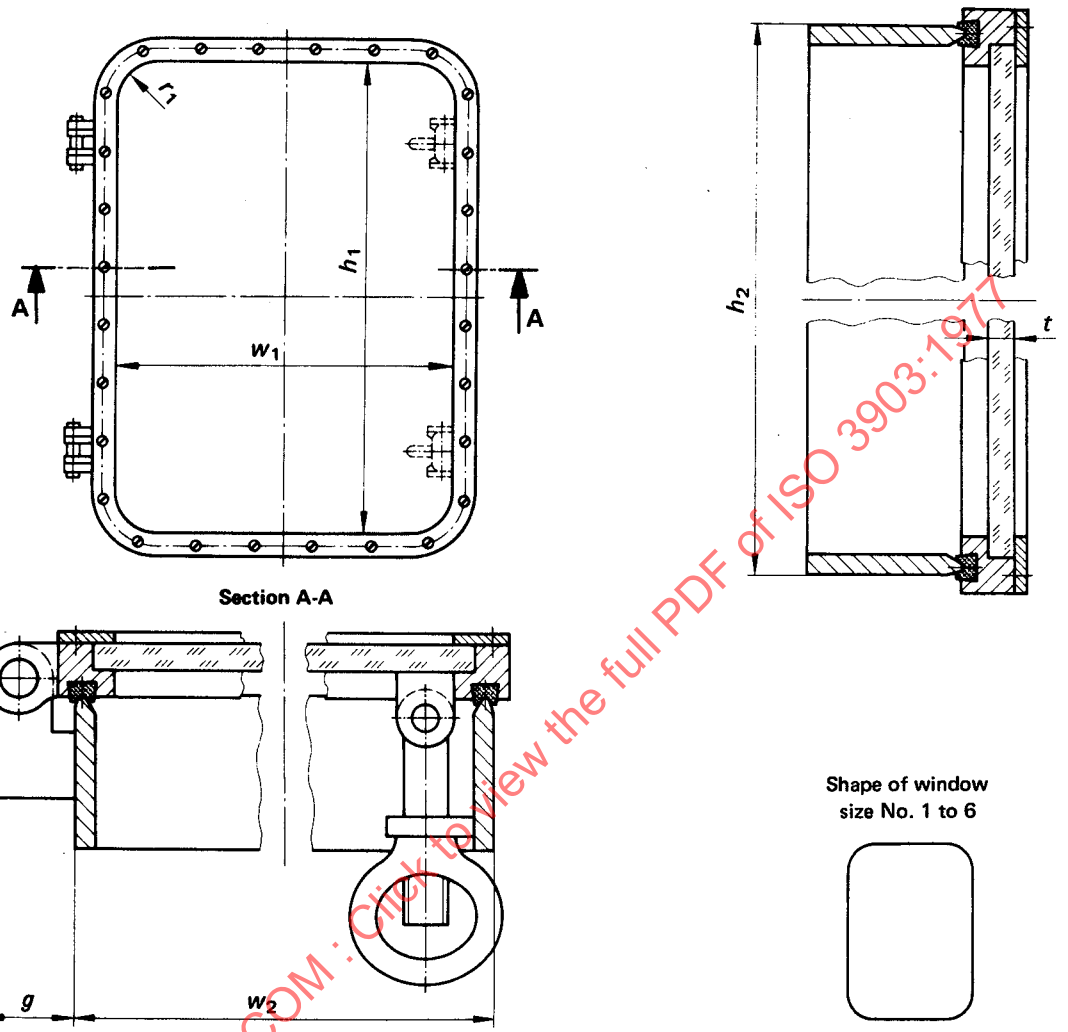


FIGURE 10 — **Window of models OLW and ORW**

TABLE 9 — **Models OLW and ORW**

Dimensions in millimetres

Window		Main frame				Glass thickness t [2]		Minimum total number of fasteners [3]
No.	Nominal size					type		
types E and F	$w_1 \times h_1$	w_2	h_2	g max.	r_1 [1]	E	F	
1	300 × 425	348	473	41	50	10	8	4
2	355 × 500	403	548	41	50	10	8	4
3	400 × 560	448	608	41	50	12	8	4
4	450 × 630	498	678	41	100	12	8	4
5	500 × 710	548	758	41	100	15	10	6
6	560 × 800	608	848	41	100	15	10	6

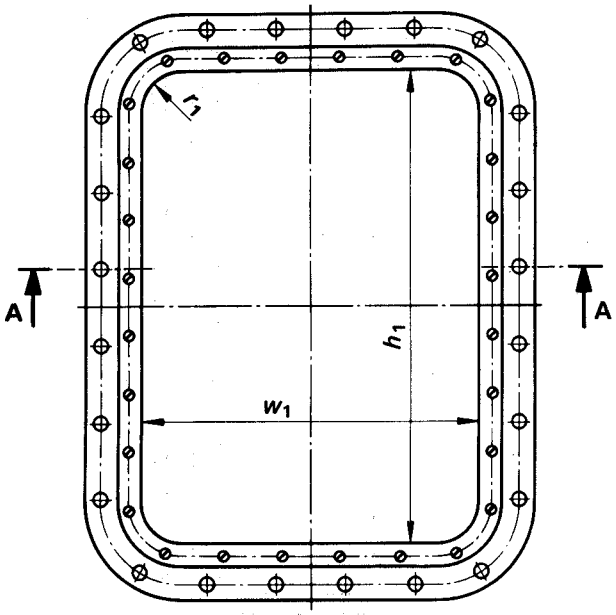
1) See also 5.5.

2) In special cases a greater glass thickness shall be used for obscured glass panes. (See table 13.)

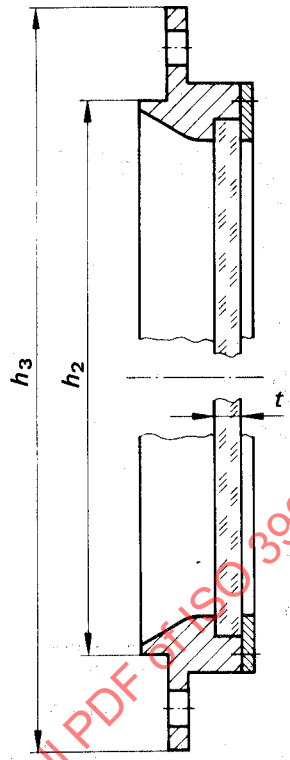
3) The minimum total number of fasteners comprises closing devices and hinges with round holes for the glassholder. (See 6.4.)

5.4 Non-opening windows

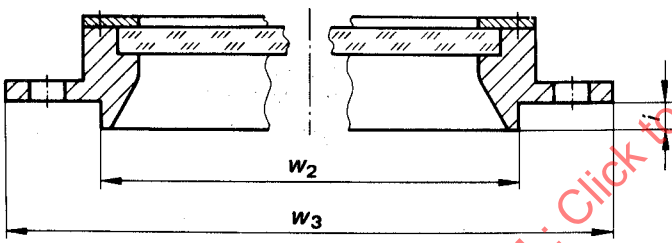
5.4.1 *Model NOB — Bolted window*

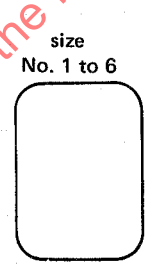


Section A-A



Shape of window





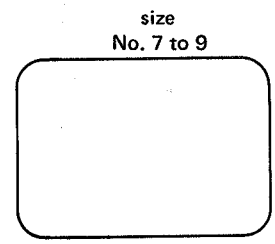


FIGURE 11 — **Window of model NOB**

TABLE 10 — **Model NOB**

Dimensions in millimetres

Window			Main frame					Glass thickness t [2]	
No.		Nominal size	Spigot		Flange			type	
type E	type F	$w_1 \times h_1$	w_2	h_2	w_3 max.	h_3 max.	r_1 [1]	E	F
1		300 × 425	348	473	430	555	50	10	8
2		355 × 500	403	548	485	630	50	10	8
3		400 × 560	448	608	530	690	50	12	8
4		450 × 630	498	678	580	760	100	12	8
5		500 × 710	548	758	630	840	100	15	10
6		560 × 800	608	848	690	930	100	15	10
7		900 × 630	948	678	1 030	760	100	19	12
8		1 000 × 710	1 048	758	1 130	840	100	19	12
–	9	1 100 × 800	1 148	848	1 230	930	100	–	15

1) See also 5.5.

2) In special cases a greater glass thickness shall be used for obscured glass panes. (See table 13.)

5.4.2 *Model NOW – Welded window*

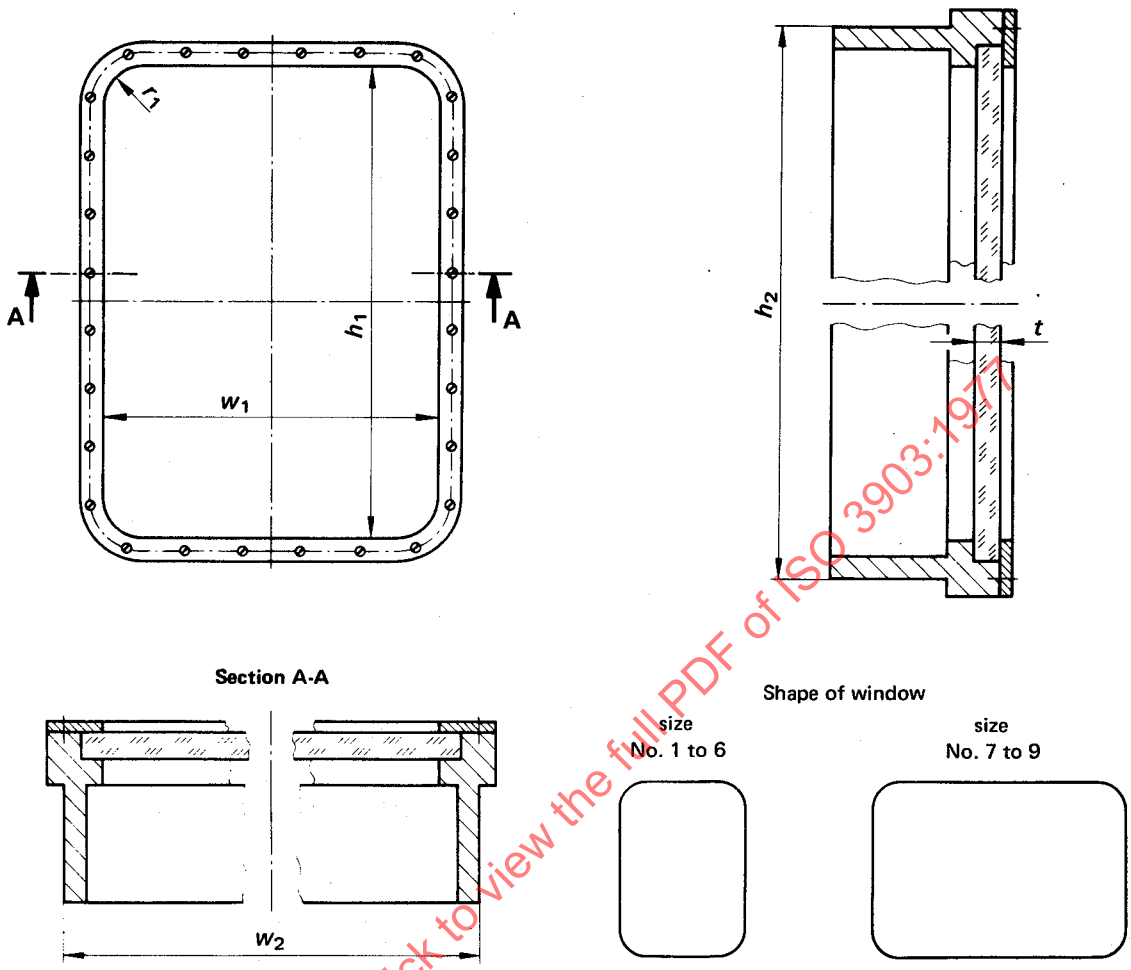


FIGURE 12 – **Window of model NOW**

TABLE 11 – **Model NOW**

Dimensions in millimetres

Window			Main frame			Glass thickness t [2]	
No.		Nominal size				type	
type		$w_1 \times h_1$	w_2	h_2	r_1 [1]	E	F
E	F						
1		300 × 425	348	473	50	10	8
2		355 × 500	403	548	50	10	8
3		400 × 560	448	608	50	12	8
4		450 × 630	498	678	100	12	8
5		500 × 710	548	758	100	15	10
6		560 × 800	608	848	100	15	10
7		900 × 630	948	678	100	19	12
8		1 100 × 710	1 048	758	100	19	12
–	9	1 100 × 800	1 148	848	100	–	15

1) See also 5.5.

2) In special cases a greater glass thickness shall be used for obscured glass panes. (See table 13.)

5.5 Corner radii

Basic radius is the corner radius r_1 of the clear light size.

The dimensioning 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 : $r_3 = r_1 +$ maximum 65 mm.

6 DESIGN AND CONSTRUCTION

6.1 General

The rectangular windows shall be manufactured to the main dimensions given in clause 5 as well as to the additional requirements given in 6.2 to 6.7 and from the materials specified in clause 7.

The completed rectangular windows, main frames, glass-holders and all other components shall be capable of meeting the test requirements specified in clause 8.

6.2 Glazing

6.2.1 *Glass recess*

The dimensions of the glass recess (w_4, h_4, r_4) in the glass-holder of opening windows and in the main frame of non-opening windows shall be as given in table 12.

6.2.2 *Glass retaining frame*

If a glass retaining frame is used for fixing the glass pane in the glassholder of opening windows or in the main frame of non-opening windows, the minimum dimensions shall be as given in figure 13.

Dimensions in millimetres

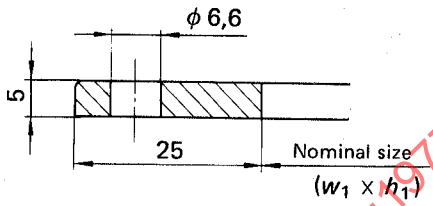


FIGURE 13 – **Glass retaining frame, minimum dimensions**

The dimensions of the glazing screw shall be as follows :

Glazing screw diameter : 6 mm (M6 thread)

Glazing screw pitch : type E : max. 75mm
type F : max. 100 mm

6.2.3 *Glazing material*

An appropriate glazing material resistant to sea water and ultraviolet light shall be used. (See figure in table 12.)

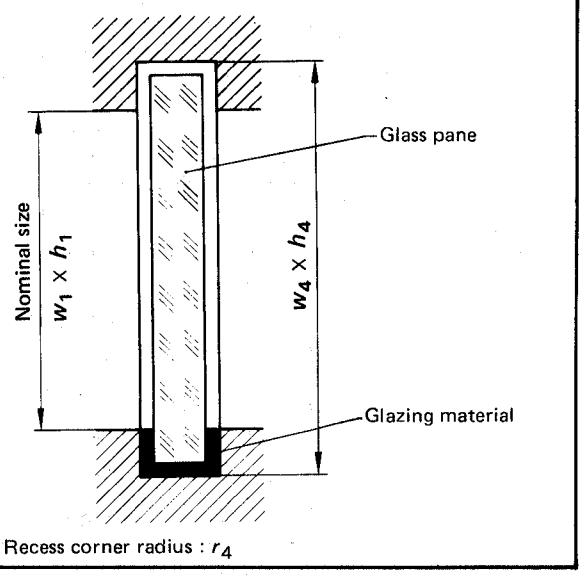
6.2.4 *Mounting*

When glazing, it is essential that the glass pane is centralized in the glassholder of opening windows or in the main frame of non-opening windows so that there is the same clearance all round. (See figure in table 12.)

TABLE 12 – **Glass recess**

Dimensions in millimetres

Window			Glass recess		
No.		Nominal size			
type					
E	F	$w_1 \times h_1$	w_4	h_4	r_4
1		300 × 425	321	446	60
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



NOTE – For main frames of welded non-opening windows (see 5.4.2) the dimensions h_4 and w_4 may be increased by 3 mm and the corner radius r_4 by 1,5 mm.

6.3 Glass panes

Toughened safety glass panes according to ISO 3254 shall be used. For fire resistant glass panes see ISO 5797. For heated glasses see ISO 3434.

When an obscured toughened safety glass pane is fixed with the obscured surface facing inwards, a greater thickness than that specified in tables 4 to 11 shall be used. (See table 13.) These thicknesses have to be especially arranged when ordering the window.

NOTES

1 When an obscured toughened safety glass pane is fixed with the obscured surface facing outwards, the glass becomes transparent when wet.

2 For windows in observation rooms, public rooms and wheelhouses, the admissible deviation from parallelism of the two surfaces of a clear glass pane shall not exceed 0,2 mm/1 000 mm. This tolerance is, at present, only ensured concerning glass panes of plate glass (Y). (See ISO 3254.)

TABLE 13 — **Thickness of obscured glass panes when the obscured surface is facing inwards**

Dimensions in millimetres

Window		Thickness t of glass pane	
No.	Nominal size $w_1 \times h_1$	for window type	
		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	—	—

6.4 Fasteners (closing devices and hinges)

6.4.1 *General*

The minimum number of fasteners comprising closing devices and hinges for glassholders of type E and type F opening rectangular windows shall be as given in tables 4 to 9.

The total number of the fasteners and their construction shall be such that the window meets the strength and watertightness requirements according to clause 8.

6.4.2 *Hinges*

The hinges shall be provided with round holes. The number of hinges (at least two) depends on the kind of window (type, model, size and construction).

6.4.3 *Closing devices*

At least two closing devices shall be used.

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.

6.5 Gaskets for glassholder

6.5.1 The material and characteristics of the gasket used to ensure watertightness between the glassholder and the main frame shall be in accordance with ISO 3902. Its shape is at the option of the manufacturer.

6.5.2 The gaskets shall be secured in grooves by suitable adhesive.

6.6 Fixing device

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

7 MATERIALS

7.1 Main frame, glassholder and glass retaining frame

The main components of the window (main frame, glassholder and glass retaining frame) shall be manufactured from the materials given in table 15, which shall be marine corrosion resistant and shall have the minimum mechanical properties given in table 16.

The material glass code numbers given in table 15, which are for indicating the material in the designation of the windows, are combinations of the material code numbers, given in table 14, for the main frame, the glassholder and glass retaining frame, in that order.

TABLE 14 — **Material code numbers**

Material code number	Material
1	Cu-material (for example, brass)
2	Fe-material (for example, mild steel)
3	Al-material (cast or wrought alloy)
0	No components (for example, glassholder for non-opening windows)