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Indian Standard

SPECIFICATION FOR STEEL DOORS, WINDOWS AND VENTILATORS

(Third Revision)

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Indian Standard

SPECIFICATION FOR STEEL DOORS, WINDOWS AND VENTILATORS

(Third Revision)

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Indian Standard

SPECIFICATION FOR STEEL DOORS, WINDOWS AND VENTILATORS

(Third Revision)

0. FOREWORD

0.1 This Indian Standard (Third Revision) was adopted by the Indian Standards Institution on 28 February 1983, after the draft finalized by the Doors, Windows and Shutters Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 This standard was first published in 1957 and was revised in 1968. In the first revision the sizes of steel doors, windows and ventilators were reviewed to bring them in line with the preferred modular sizes of openings based on 10 cm module which is applicable for all types of doors and windows whether of timber or metal. Such variety reduction through adoption of these preferred modular sizes had become particularly significant in view of the development of prefabricated construction and factory production of doors and windows and also for achieving substantial economics in the construction of building.

0.3 In the second revision, reference to rolled steel sections used for fabrication of doors, windows and ventilators had been omitted and included separately (*see* IS : 7452-1982*). With regard to the clearance on all the four sides for the purpose of fitting the doors, windows or ventilators into modular openings and in view of the difficulties experienced with the adoption of 3 mm clearance specified in 1968 version, the provisions had been modified to 10 mm alround. Another important modification incorporated was relating to the process of welding permitted for corner joints. Earlier, only flash butt welding was permitted for jointing of corners of frames. In the second revision, provision had been made to permit any other method of welding provided the joint conforms to the requirements as given in the standard.

0.4 In third revision the doors, windows and ventilators having no openable shutters have been included under the term side-light, fixed-light

*Specification for hot rolled steel sections for doors, windows and ventilators (*first revision*).

or sub-light. Modifications have also been made in regard to sizes of glass panes and the number of glazing clips based on the assumptions that :

a) Height of all 12 and 15 modular shutters shall be identical,

b) Width of all 10 and 15 modular shutters shall be identical,

c) Width of all 12 and 18 modular shutters shall be identical,

d) Horizontal glazing bars in 12 and 15 modular construction windows and fixed lights shall line up with each other,

e) In 15 module high windows, the vertical sub-dividing bars (F4B) shall be continuous through the sub-light portion,

f) Sub-dividing bar of ventilators and fixed-lights shall line up with the corresponding sub-dividing bar of respective modular windows and fixed-light,

g) Glass sizes shall be identical in 20 and 21 modular construction and the variation in height shall be adjusted in the kicking panel,

h) Outer frame of side-light for the doors shall be manufactured from F7D profiles, and

j) Sub-dividing bar shall be T2 in 15 module height.

0.5 Fixing and glazing of steel doors, windows and ventilators have been covered separately in IS : 1081-1960* and reference should be made to this standard while fixing the components.

0.6 This standard contains clauses **5.2.2** and **8.1** which call for the agreement between the purchaser and the manufacturer, and clause **4.4** and Appendix A which require the purchaser to supply certain information while placing order.

0.7 In the formulation of this standard, due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

0.8 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the reult of a test or analysis, shall be rounded off in accordance with IS : 2-1960†. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Code of practice for fixing and glazing of metal (steel and aluminium) doors, windows and ventilators.

†Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard lays down the requirements regarding meterial, fabrication and finish of steel doors, windows, ventilators and fixed-lights manufactured from rolled steel sections to specified sizes and designs.

1.2 This standard does not cover steel doors, windows, ventilators and fixed-lights for use in industrial buildings.

2. TERMINOLOGY

2.1 For the purpose of this standard, the components of doors, windows, ventilators and fixed-lights shall be as defined in **2.1.1** to **2.1.2.2** and as illustrated in Fig. 1.

2.1.1 *Sub-Dividing Bars* — These are vertical bars in a fixed-light or window or ventilator.

2.1.2 *Fixed-Light* — Doors, windows and ventilators where there is no openable shutter.

2.1.2.1 *Sub-Light* — A fixed-light above openable door or window.

2.1.2.2 *Side-Light* — A fixed-light of door height to couple with door.

3. SYMBOLIC DESIGNATION

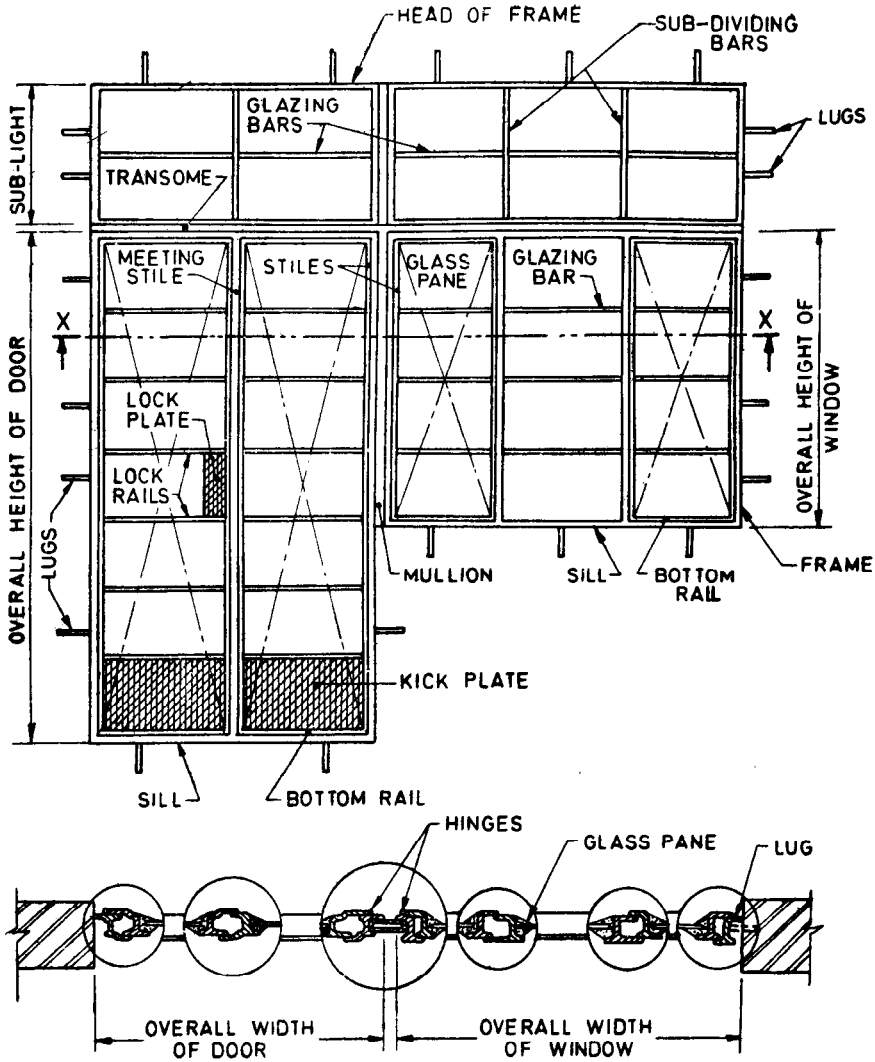
3.1 The direction of closing and faces of doors, windows and shutters shall be designated in accordance with IS : 4043-1969*.

4. STANDARD SIZES, TOLERANCES AND DESIGNATIONS

4.1 Sizes — Types and overall sizes of steel doors, windows, ventilators and fixed lights shall be as given in Fig. 2.

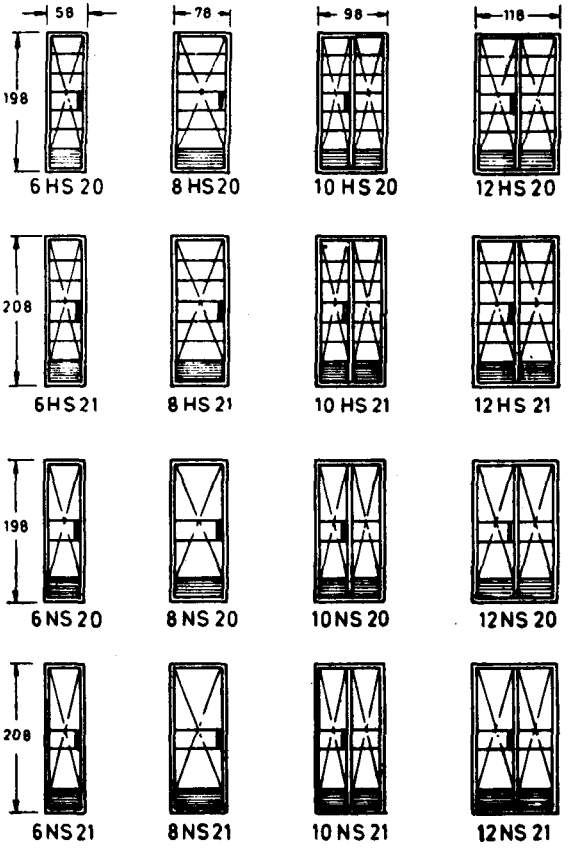
4.1.1 The dimensions shown in Fig. 2 are overall heights and widths to the outside of frames of steel doors, windows, ventilators and fixed-lights. These sizes are derived after allowing 10 mm clearance on all the four sides for the purpose of fitting doors, windows, ventilators or fixed-lights into modular openings (*see* Fig. 3).

*Recommendations for symbolic designation of direction of closing and faces of doors, windows and shutters.

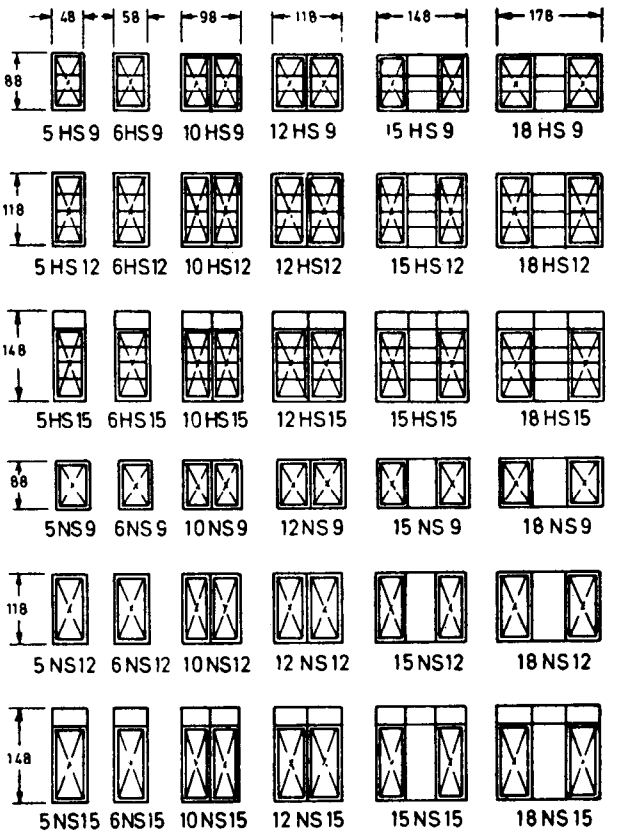


ENLARGED SECTION X X

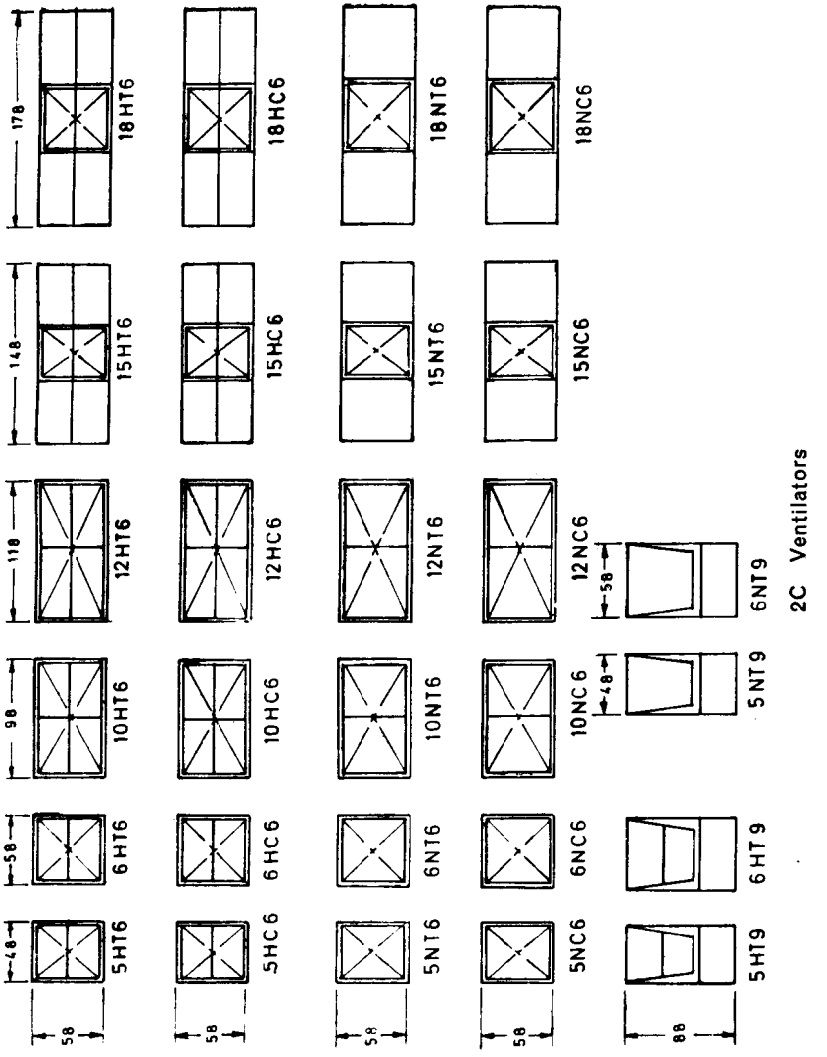
FIG. 1 TERMINOLOGY FOR STEEL DOORS, WINDOWS AND SUB-LIGHT



2A Doors (As viewed from inside)


48
58
98
118
148
178
88
5 HS 9
6HS9
10 HS9
12 HS 9
15 HS 9
18 HS 9
118
5 HS 12
6HS12
10 HS12
12HS12
15 HS 12
18HS12
148
5HS15
6HS15
10HS15
12HS15
15HS15
18 HS15
88
5NS9
6NS 9
10NS9
12NS 9
15 NS 9
18 NS9
118
5 NS12
6NS12
10NS12
12 NS12
15NS12
18NS12
148
5NS15
6NS15
10NS15
12 NS 15
15NS15
18NS 15

2B Windows


5HT6
6HT6
10HT6
12HT6
15HT6
18HT6
5HC6
6HC6
10HC6
12HC6
15HC6
18HC6
5NT6
6NT6
10NT6
12NT6
15NT6
18NT6
5NC6
6NC6
10NC6
12NC6
15NC6
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5HT9
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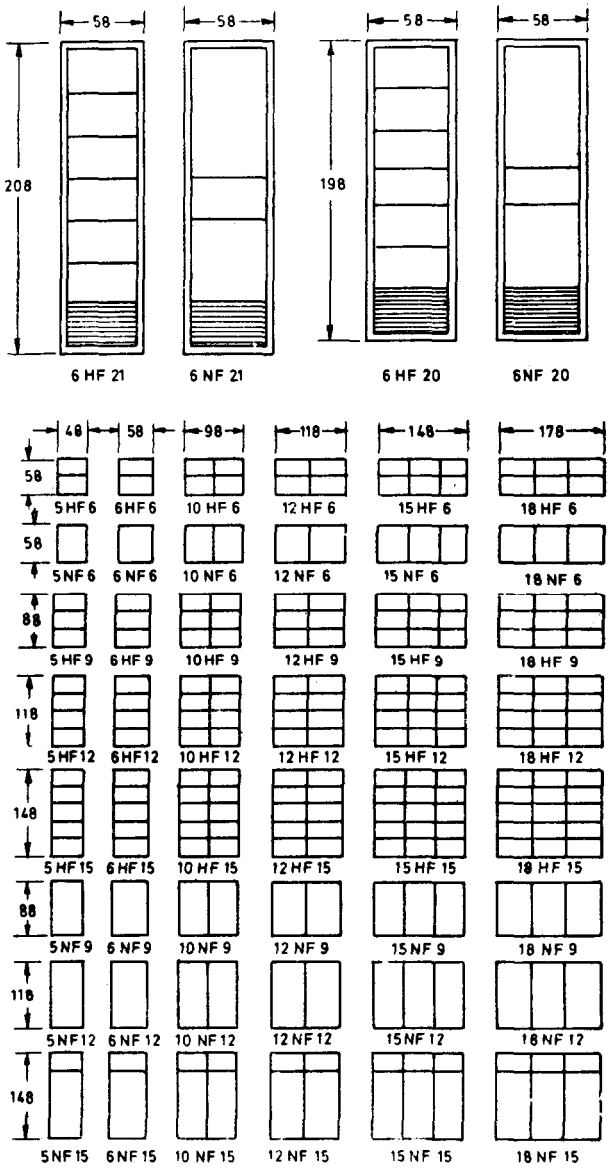
5NT9
6NT9
2C Ventilators
48
58
98
118
148
178
88



2D Fixed-Lights

All dimensions in centimetres.

FIG. 2 TYPE AND OVERALL SIZES OF STEEL DOORS, WINDOWS, VENTILATORS AND FIXED-LIGHTS

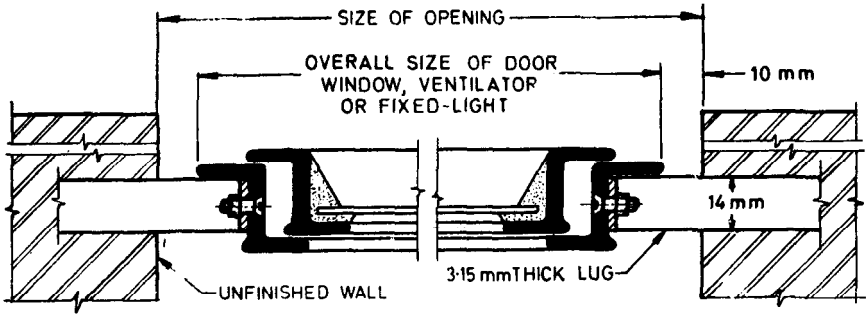


FIG. 3 SIZE OF STEEL DOORS, WINDOWS, VENTILATORS OR FIXED-LIGHTS IN RELATION TO SIZE OF OPENING

4.2 Tolerances — The sizes indicated in Fig. 2, for door, window and ventilator or fixed-light frames shall not vary by more than ± 1·5 mm.

4.3 Designation — Doors, windows, ventilators and fixed-lights shall be designated by symbols denoting their width, type and height in succession in the following manner:

a) *Width* — It shall be indicated by the number of modules in the width of opening.

b) *Type* — It shall be indicated by the following letters of alphabet:

C = Centre hung shutter,
F = Fixed glass panes,
H = With horizontal glazing bars,
N = Without horizontal glazing bars,
S = Side hung shutters, and
T = Top hung shutters.

c) *Height* — It shall be indicated by the number of modules in the height of opening.

Example:

A window of a width of 10 modules and height 12 modules having horizontal glazing bars and side hung shutters is designated by 10HS12.

4.3.1 Composite doors, windows, ventilators or fixed-lights shall be designated in the following manner:

a) A 12 module wide and 21 module high horizontally glazed side hung door coupled on its two sides with two side hung horizontally glazed windows, 6 module wide and 12 module high is designated by 6HS12/12HS21/6HS12.

b) Two 10 module wide and 12 module high horizontally glazed side hung windows coupled side by side with two fixed-lights at top, each 10 module wide and 6 module high, is designated by $\frac{10HF6/10HF6}{10HS12/10HS12}$.

4.4 The purchaser shall supply the information as given in Appendix A while placing order for steel doors, windows, ventilators and fixed-lights.

5. MATERIALS

5.1 Rolled Steel Sections

5.1.1 Rolled steel sections for the fabrication of steel doors, windows, ventilators and fixed-lights shall conform to IS: 7452-1982*. Steel used in the manufacture of these sections shall conform to IS : 7452-1982*.

5.2 Coupling Sections for Non-modular Openings

5.2.1 Coupling section $K_{11}B$ shall be used as mullions for coupling the units side by side and coupling section $K_{12}B$ to couple independent units one above the other. These sections are covered in IS: 7452-1982*.

5.2.2 Coupling sections manufactured from galvanized steel plate of minimum 1·6 mm thickness conforming to the dimensions shown in Fig. 4 may also be used for coupling if agreed to between the purchaser and the manufacturer.

5.2.3 Tubular section shall be used for coupling at varying angles to form bay composites, right angle composites, etc. (*see* IS: 1081-1960†).

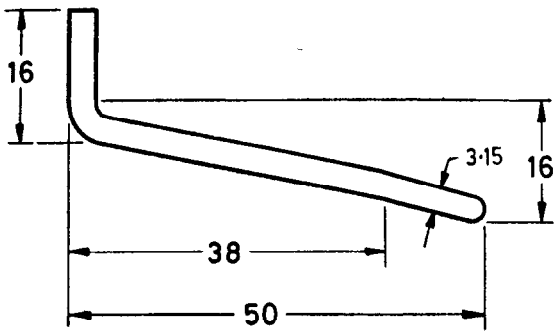
5.3 Glass Panes — Glass panes shall be at least 3 mm thick and shall conform to IS : 2835-1977‡. All glass panes shall have properly squared corners and straight edges. The sizes of glass panes for doors, windows, ventilators and fixed-lights shall be as given in Table 1.

NOTE — The sizes of glass are only indicative and approximate and may vary depending on the tolerances in the doors, windows, ventilators and fixed-lights.

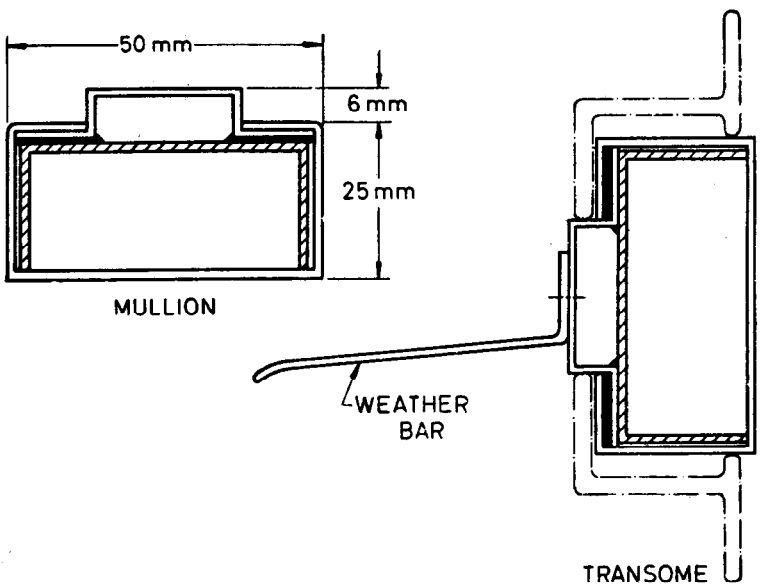
*Specification for hot rolled steel sections for doors, windows and ventilators (*first revision*).

†Code of practice for fixing and glazing of metal (steel and aluminium doors, windows and ventilators).

‡Specification for flat transparent steel glass (*second revision*).



FABRICATED WEATHER BAR
MASS PER METRE 1·8 kg



All dimensions in millimetres.

FIG. 4 DETAIL OF WEATHER BAR WITH STEEL PLATE

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED)

(*Clause* 5.3)

DESIGNATION	QUANTITY	GLASS SIZES (WIDTH × HEIGHT)	NO. OF GLAZING CLIPS AGAINST EACH PANE
(1)	(2)	(3)	(4)
		DOORS (*see* Fig. 2 A)	
		Side Hung Type — Horizontal Glazing Bars	
		mm	
6HS20	1	466 × 249	—
	4	466 × 283	—
	1	362 × 283	—
8HS20	1	666 × 249	—
	4	666 × 283	—
	1	362 × 283	—
10HS20	2	407 × 240	—
	9	407 × 283	—
	1	303 × 283	—
12HS20	2	507 × 249	—
	9	507 × 283	—
	1	403 × 283	—
6HS21	1	466 × 249	—
	4	466 × 283	—
	1	362 × 283	—
8HS21	1	666 × 249	—
	4	666 × 283	—
	1	362 × 283	—
10HS21	2	407 × 249	—
	9	407 × 283	—
	1	303 × 283	—
12HS21	2	507 × 249	—
	9	507 × 283	—
	1	403 × 283	—
6NS20	1	466 × 833	4
	1	362 × 283	—
	1	466 × 575	2
8NS20	1	666 × 833	4
	1	562 × 283	—
	1	666 × 575	2
10NS20	1	407 × 283	—
	1	303 × 283	—
	2	407 × 833	4
	2	407 × 575	2

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3)	(4)
		mm	
12NS20	1	507 × 283	—
	1	403 × 283	—
	2	507 × 833	4
	2	507 × 575	2
6NS21	1	466 × 833	4
	1	362 × 283	—
	1	466 × 575	2
8NS21	1	666 × 833	4
	1	562 × 283	2
	1	666 × 575	—
10NS21	1	407 × 283	—
	1	303 × 283	—
	2	407 × 833	4
	2	407 × 575	2
12NS21	1	507 × 283	—
	1	403 × 283	—
	2	507 × 833	4
	2	507 × 575	2
		WINDOWS (*see* Fig. 2B)	
		Side Hung Type — Horizontal Glazing Bars	
5HS9	1	407 × 273	—
	2	407 × 258	—
6HS9	1	507 × 273	—
	2	507 × 258	—
10HS9	2	425 × 273	—
	4	425 × 258	—
12HS9	2	525 × 273	—
	4	525 × 258	—
15HS9	2	425 × 273	—
	4	425 × 258	—
18HS9	3	475 × 273	—
	2	525 × 273	—
	4	525 × 258	—
	3	575 × 273	—

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3)	(4)
		mm	
5HS12	2	407 × 277	—
	2	407 × 263	—
6HS12	2	507 × 277	—
	2	507 × 263	—
10HS12	4	425 × 277	—
	4	425 × 263	—
12HS12	4	525 × 277	—
	4	525 × 263	—
15HS12	4	425 × 277	—
	4	425 × 263	—
	4	475 × 277	—
18HS12	4	525 × 277	—
	4	525 × 263	—
	4	575 × 277	—
5HS15	2	407 × 277	—
	2	407 × 263	—
	1	435 × 275	—
6HS15	2	507 × 277	—
	2	507 × 263	—
	1	535 × 275	—
10HS15	4	425 × 277	—
	4	425 × 263	—
	2	454 × 275	—
12HS15	4	527 × 277	—
	4	527 × 263	—
	2	554 × 275	—
15HS15	4	425 × 277	—
	4	425 × 263	—
	2	454 × 275	—
	4	475 × 277	—
	1	475 × 275	—
18HS15	4	527 × 277	—
	4	527 × 263	—
	2	554 × 275	—
	4	575 × 277	—
	1	575 × 275	—

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3)	(4)
		mm	
Side Hung Type — No Glazing Bars			
5NS9	1	407 × 807	4
6NS9	1	507 × 807	4
10NS9	2	425 × 807	4
12NS9	2	525 × 807	4
15NS9	2	425 × 807	4
	1	475 × 835	4
18NS9	2	525 × 807	4
	1	575 × 807	4
5NS12	1	407 × 1 107	6
6NS12	1	507 × 1 107	6
10NS12	2	425 × 1 107	6
12NS12	2	525 × 1 107	6
15NS12	2	425 × 1 107	6
	1	475 × 1 135	6
18NS12	2	525 × 1 107	6
	1	575 × 1 135	6
5NS15	1	407 × 1 107	6
	1	435 × 275	—
6NS15	1	507 × 1 107	6
	1	535 × 275	—
10NS15	2	425 × 1 107	6
	2	454 × 275	—
12NS15	2	525 × 1 107	6
	2	554 × 275	—
15NS15	2	425 × 1 107	6
	1	475 × 1 135	6
	2	454 × 275	—
	1	475 × 275	—
18NS15	2	525 × 1 107	6
	1	575 × 1 135	6
	2	554 × 275	—
	1	575 × 275	—

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

DESIGNATION	QUANTITY	GLASS SIZES (WIDTH × HEIGHT)	NO. OF GLAZING CLIPS AGAINST EACH PANE
(1)	(2)	(3)	(4)
		mm	
		VENTILATORS (*see* Fig. 2C)	
		Top Hung Type — Horizontal Glazing Bars	
5HT6	2	407 × 249	—
6HT6	2	507 × 249	—
10HT6	4	449 × 249	—
12HT6	4	549 × 249	—
15HT6	4	463 × 263	—
	2	430 × 249	—
18HT6	4	563 × 263	—
	2	530 × 249	—
5HT9	2	407 × 259	—
	1	435 × 273	—
6HT9	2	507 × 259	—
	1	535 × 273	—
		Centre Hung Type — Horizontal Glazing Bars	
5HC6	2	360 × 226	—
6HC6	2	460 × 226	—
10HC6	4	426 × 226	—
12HC6	4	526 × 226	—
15HC6	4	464 × 263	—
	2	420 × 226	—
18HC6	4	564 × 263	—
	2	520 × 226	—
		Top Hung Type — No Horizontal Glazing Bars	
5NT6	1	407 × 507	2
6NT6	1	507 × 507	2
10NT6	2	449 × 507	2
12NT6	2	549 × 507	2
15NT6	2	463 × 535	2
	1	430 × 507	2
18NT6	2	563 × 535	2
	1	530 × 507	2
5NT9	1	407 × 526	2
	1	435 × 273	—
6NT9	1	507 × 526	2
	1	535 × 273	—

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3)	(4)
		mm	
Centre Hung Type — No Horizontal Glazing Bars			
5NC6	1	360 × 460	2
6NC6	1	460 × 460	2
10NC6	2	426 × 460	2
12NC6	2	526 × 460	2
15NC6	2	464 × 536	2
	1	420 × 463	2
18NC6	2	564 × 536	2
	1	520 × 563	2
FIXED-LIGHTS (*see* Fig. 2D)			
Door Height — Horizontal Glazing Bars			
6HF20	6	535 × 283	—
6HF21	6	535 × 283	—
Door Height — No Glazing Bars			
6NF20	1	535 × 867	4
	1	535 × 283	—
	1	535 × 575	2
6NF21	1	535 × 867	4
	1	535 × 283	—
	1	535 × 575	2
Window Height — Horizontal Glazing Bars			
5HF9	3	435 × 273	—
6HF9	3	535 × 273	—
10HF9	6	463 × 273	—
12HF9	6	563 × 273	—
15HF9	6	463 × 273	—
	3	491 × 273	—
18HF9	6	563 × 273	—
	3	591 × 273	—
5HF12	4	435 × 277	—
6HF12	4	535 × 277	—

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3)	(4)
		mm	
10HF12	8	463 × 277	—
12HF12	8	563 × 277	—
15HF12	8	463 × 277	—
	4	491 × 277	—
18HF12	8	563 × 277	—
	4	591 × 277	—
5HF15	4	435 × 277	—
	1	435 × 291	—
6HF15	4	535 × 277	—
	1	535 × 291	—
10HF15	8	463 × 277	—
	2	463 × 291	—
12HF15	8	563 × 277	—
	2	563 × 291	—
15HF15	8	463 × 277	—
	4	491 × 277	—
	2	463 × 291	—
	1	491 × 291	—
18HF15	8	563 × 277	—
	4	591 × 277	—
	2	563 × 291	—
	1	591 × 291	—
	Window Height — No Glazing Bars		
5NF9	1	435 × 835	4
6NF9	1	535 × 835	4
10NF9	2	463 × 835	4
12NF9	2	563 × 835	4
15NF9	2	463 × 835	4
	1	491 × 835	4
18NF9	2	563 × 835	4
	1	591 × 835	4
5NF12	1	435 × 1 135	6
6NF12	1	535 × 1 135	6
10NF12	2	463 × 1 135	6
12NF12	2	563 × 1 135	6

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3)	(4)
		mm	
15NF12	2	463 × 1 135	6
	1	491 × 1 135	6
18NF12	2	563 × 1 135	6
	1	591 × 1 135	6
5NF15	1	435 × 1 135	6
	1	435 × 291	—
6NF15	1	535 × 1 135	6
	1	535 × 291	—
10NF15	2	463 × 1 135	6
	2	463 × 291	—
12NF15	2	563 × 1 135	6
	2	563 × 291	—
15NF15	2	463 × 1 135	6
	1	491 × 1 135	6
	2	463 × 291	—
	1	491 × 291	—
18NF15	2	563 × 1 135	6
	1	591 × 1 135	6
	2	563 × 291	—
	1	591 × 291	—
Ventilators Height — Horizontal Glazing Bars			
5HF6	2	435 × 263	—
6HF6	2	535 × 263	—
10HF6	4	463 × 263	—
12HF6	4	563 × 263	—
15HF6	4	463 × 263	—
	2	491 × 263	—
18HF6	4	563 × 263	—
	2	591 × 263	—
Ventilator Height — No Horizontal Glazing Bars			
5NF6	1	435 × 535	2
6NF6	1	535 × 535	2
10NF6	2	463 × 535	2
12NF6	2	563 × 535	2
15NF6	2	463 × 535	2
	1	491 × 535	2
18NF6	2	563 × 535	2
	1	591 × 535	2

5.4 Screws — Screw threads of machine screws used in the manufacture of steel doors, windows, ventilators and fixed-lights shall conform to the requirements of IS: 4218 (Part I)-1976*, IS : 4218 (Part II)-1976†, IS: 4218 (Part III)-1976‡, IS: 4218 (Part IV)-1976§, IS: 4218 (Part V)-1967‖ and IS: 4218 (Part VI)-1978¶.

5.4.1 Fixing lugs shall have a standard slot of 8 mm wide for mild steel screw of 6 mm dia and 12 mm long with square nuts as indicated in Fig. 3.

6. FABRICATION

6.1 Frames — Both the fixed and opening frames shall be constructed of sections which have been cut to length and mitred. The corners of fixed and opening frames shall be welded to form a solid fused welded joint conforming to the requirements given in **6.1.1.** All frames shall be square and flat. The process of welding adopted may be flash butt welding or any other suitable method which gives the desired requirements.

6.1.1 *Requirements of Welded Joints*

6.1.1.1 *Visual inspection test* — When two opposite corners of the frames are cut, paint removed and inspected, the joint shall conform to the following:

a) Welds should have been made all along the place of meeting the members,

b) Welds should have been properly ground, and

c) Complete cross section of the corner shall be checked up to see that the joint is completely solid and there are no visible cavities.

6.1.1.2 *Micro and macro examinations* — From the two opposite corners obtained for visual test as in **6.1.1.1**, the flanges of the sections shall be cut with the help of a saw. The cut surfaces of the remaining portions shall be polished, etched and examined.

The polished and etched faces of the weld and the base metal shall be free from cracks and reasonably free from under cutting, overlaps, gross porosity and entrapped slag.

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*ISO metric screw threads: Part I Basic and design profiles (*first revision*).

†ISO metric screw threads: Part II Diameter pitch combinations (*first revision*).

‡ISO metric Screw threads Part III Basic diamensions for design profiles (*first revision*).

§ISO metric screw threads: Part IV Tolerancing system (*first revision*).

‖ISO metric screw threads: Part V Tolerances (*first revision*).

¶ISO metric screw threads: Part VI Limits of sizes for commercial bolts and nuts (diameter range 1 to 52 mm) (*first revision*).

6.1.1.3 *Fillet weld test* — The fillet weld in the remaining portion of the joint obtained in **6.1.1.2**, shall be fractured by hammering. The fractured surfaces shall be free from slag inclusions, porosity, crack, penetration defects and fusion defects.

6.1.2 Tee sections for glazing shall be tennoned and riveted into the frames and where they intersect, the vertical tie shall be broached and the horizontal tee threaded through it, and the intersection closed by hydraulic pressure.

6.1.3 Casements shall be fitted to their frames so as to provide continuous contact for weathering on the inside and outside and shall be secured in closed position by the fittings which shall have been properly checked and adjusted.

6.1.4 Window and doors may have holes in webs of the bars other than those required during manufacture and fixing.

6.1.5 The location of the parts of the doors, windows, ventilators and fixed-lights for which details of fabrication are described in **6.1.6** are indicated in Fig. 5.

6.1.6 Details of construction of doors, windows, ventilators and fixed-lights shall be indicated in Fig. 6 to 12.

6.2 Side Hung Shutter — For fixing steel hinges, slots shall be cut in the fixed frame and the hinges inserted inside and welded to the frame at the back. The hinges shall be normally of the projecting type, with wall thickness of not less than 3·15 mm and width not less than 65 mm and not more than 75 mm (*see* Fig. 13). The hinge pin and washer shall be of galvanized steel or aluminium alloy 51 S-WP of suitable thickness.

For fixing hinges to inside frame, the method described for fixing to outside frame may be adopted but the weld shall be cleaned or holes made in the inside frame and hinge riveted.

6.2.1 Friction hinges may be provided for side hung shutter windows, in which case peg stay as mentioned in **6.2.3** may not be required. The working principle of the friction hinge is illustrated in Fig. 14.

6.2.2 The handle for side hung shutters shall be of pressed brass, cast brass, aluminium or steel protected against rusting and shall be mounted on a steel handle plate. The handle plate shall be welded, screwed or riveted to the opening frame in such a manner that it could be fixed before the shutter is glazed and may not be easily removed after glazing.

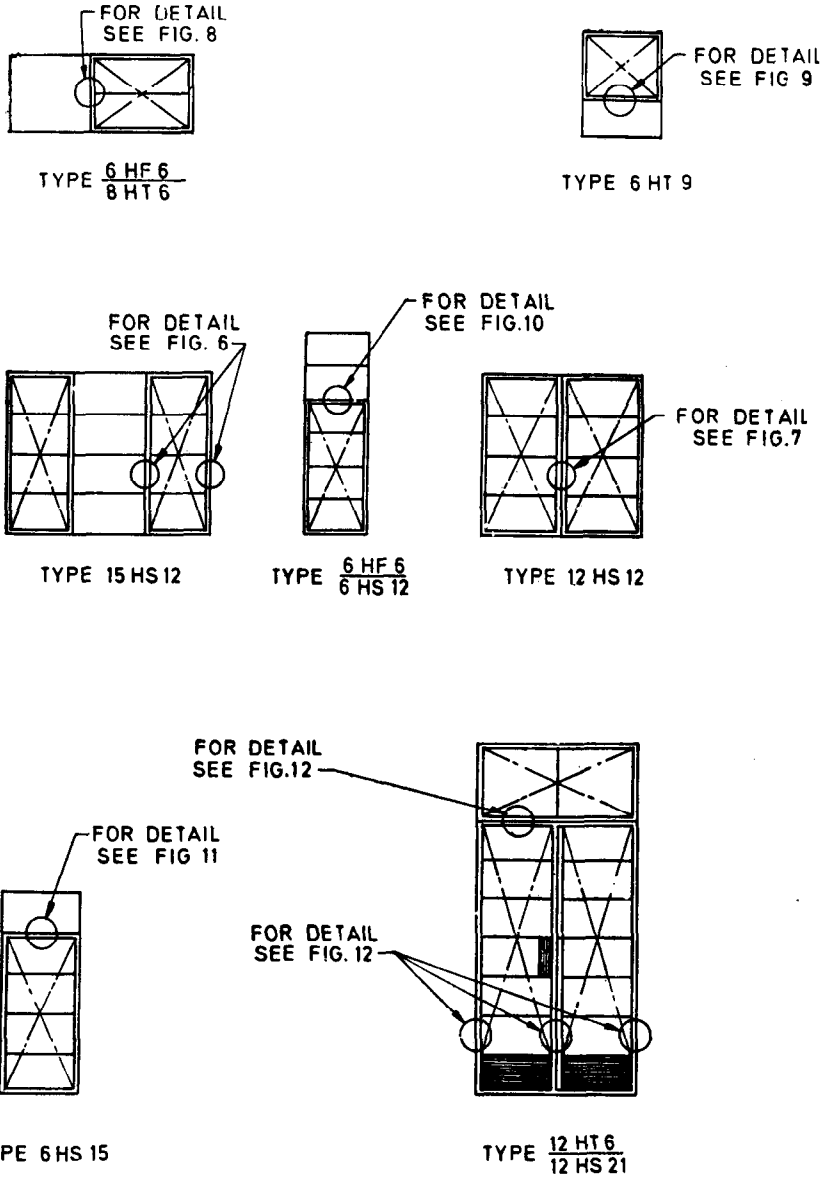


FIG. 5 LOCATION OF PARTS OF STEEL DOORS, WINDOWS, VENTILATORS AND SUB-LIGHTS FOR WHICH DETAILS ARE SHOWN

FIG. 6 MULLION WITH FIXED GLASS ON ONE SIDE AND SIDE HUNG SHUTTER ON OTHER SIDE

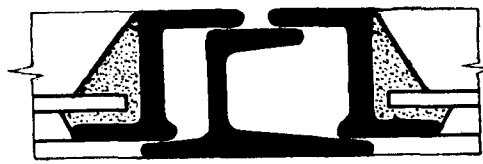


FIG. 7 MULLION WITH SIDE HUNG SHUTTER ON BOTH SIDES

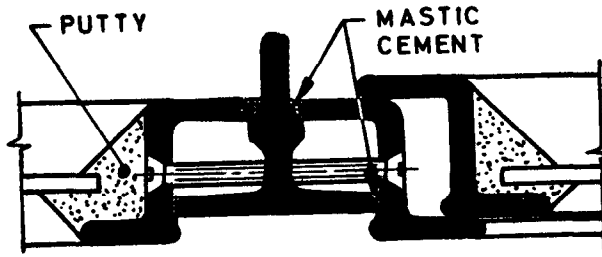


FIG. 8 COUPLING WINDOWS SIDE BY SIDE

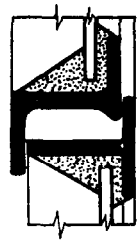


FIG. 9 DETAIL THROUGH BOTTOM OF TOP HUNG VENTILATOR

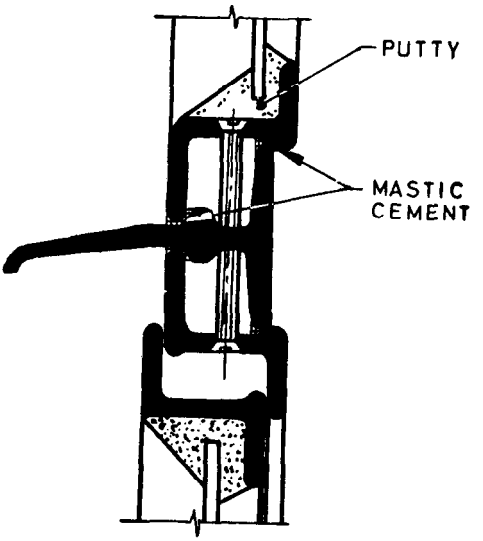


FIG. 10 TRANSOME COUPLING BAR FITTED WITH FIXED-LIGHT ON TOP OF WINDOWS

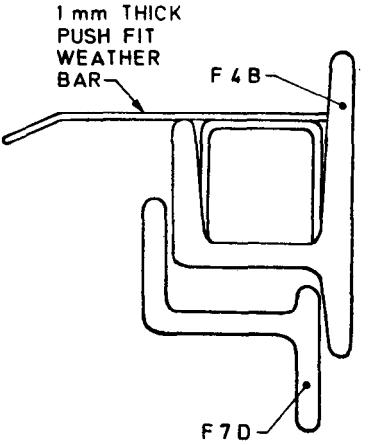
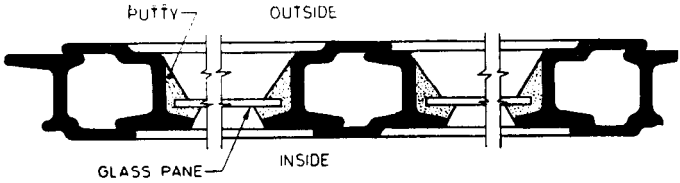
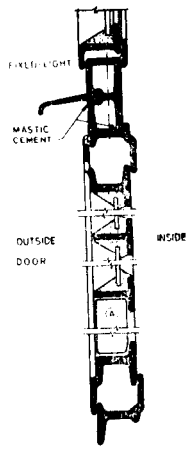


FIG. 11 WEATHER BAR OVER EXTERNAL OPENING SHUTTER WITH FIXED LIGHT ABOVE



12A HORIZONTAL SECTION OF DOOR



12B VERTICAL SECTION AT COUPLING

FIG. 12 DETAILS OF DOUBLE SHUTTER DOOR

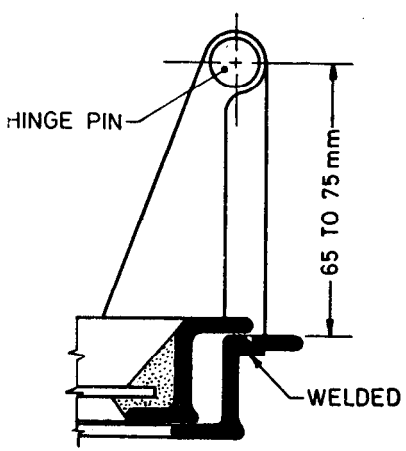


FIG. 13 TYPICAL PROJECTING TYPE HINGE FOR SIDE HUNG SHUTTER

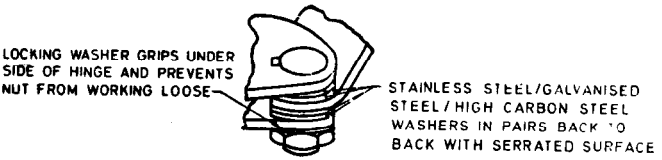


FIG. 14 ILLUSTRATION SHOWING WORKING PRINCIPLES OF FRICTION HINGES

6.2.2.1 The handle shall have a two-point nose which shall engage with a brass or aluminium striking plate on the fixed frame in a slightly open position as well as in a fast position (*see* Fig. 15). The height of the handles in each type of side hung shutter shall be fixed in positions as indicated in Fig. 16. Alternatively, handle with only one-point nose may be used, if agreed to between the purchaser and the manufacturer.

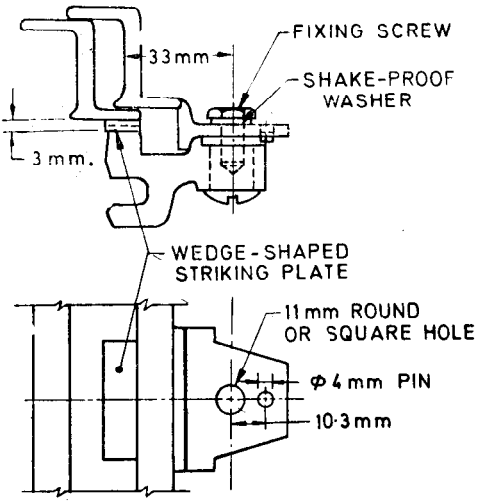


FIG. 15 A TYPICAL HANDLE FOR SIDE HUNG SHUTTER

6.2.2.2 The height of the handle plate in each type of standard window having horizontal glazing bar shall be at the centre of the second pane from the bottom of the window. This dimension shall remain same for the standard windows having no glazing bars also.

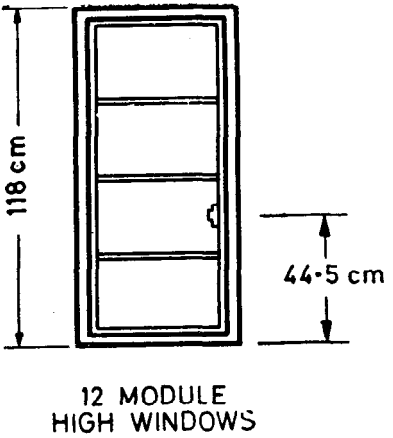
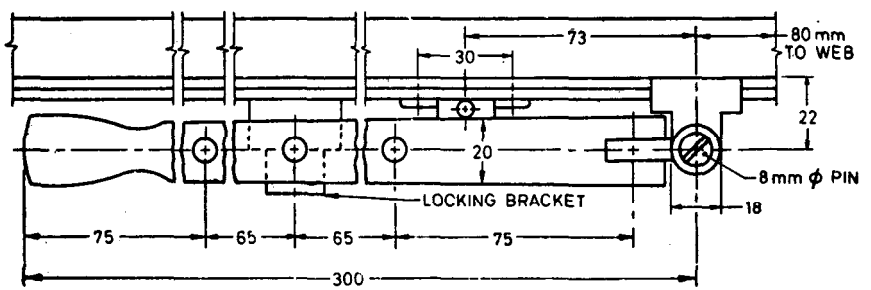


FIG. 16 POSITION OF HANDLE PLATES IN RELATION TO HEIGHTS OF 'HS' TYPE OF WINDOWS

6.2.2.3 The boss of the handle shall incorporate a friction device to prevent the handle from drooping under its own weight and the assembly shall be so designed that the rotation of the handle may not cause it to unscrew from the pin. The strike plate shall be so designed and fixed in such a position in relation to the handle that with the latter bearing against its stop, there shall be adequate tight fit between the casement and the outer frame.

6.2.3 In cases where non-friction type hinges are provided, the windows shall be fitted with peg stays which shall be either of pressed brass, cast brass or steel protected against rusting and shall be 300 mm long with steel peg and locking bracket. The peg stay shall have three holes to open the side hung casements in three different angles (*see* Fig. 17). The peg stay shall be of minimum 2 mm thickness in case of brass or aluminium and 1·25 in case of mild steel.



All dimensions in millimetres.

FIG. 17 A TYPICAL PEG STAY FOR SIDE HUNG SHUTTERS AND TOP HUNG VENTILATORS

Side hung casements fitted with friction hinges shall not be provided with a peg stay.

6.2.4 Alternatively, and if specifically required by the purchaser, side hung and top hung shutters may be fitted with an internal removable fly-proof screen (*see* 1·40 × 0·710 mm MS wire cloth of IS : 1568-1970*) in a 1·25 mm thick sheet steel frame applied to the outer frame of the shutter by brass or aluminium turn buckles at the jambs (*see* Fig. 18) and brass or aluminium studs at the still to allow the screen being readily removed. The windows with removable fly-proof screen shall be fitted with a through-the-screen lever operator at the still to permit the operation of the shutter through an angle of 90° without having to remove the fly-proof screen. The lever shall permit keeping the shutter open in minimum three different positions.

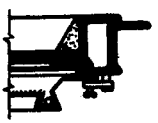


FIG. 18 DETAIL THROUGH JAMB SHOWING TURN BUCKLE

Top hung windows fitted with removable fly-proof screen shall be fitted with a through-the-screen operator to enable operating and keeping the shutter open in minimum three different positions.

6.3 Top Hung Ventilator — The steel butt hinges for top hung ventilators shall be riveted to the fixed frame or welded to it at the back after cutting a slot in it. Hinges to the opening frame shall be riveted or welded and cleaned off.

6.3.1 Top hung casements shall be provided with a peg stay with three holes (*see* Fig. 17) which when closed shall be held tightly by the locking bracket. The locking bracket shall either be fitted to the fixed frame or to the window.

6.4 Centre Hung Windows and Ventilators — Centre hung window (*see* Fig. 19) shall be hung on two pairs of brass or aluminium cup pivots riveted to the inner and outer frames of the windows to permit the window to swing to an angle of approximately 85°. The opening portion of the window shall be so balanced that it remains open at any desired angle under normal weather conditions.

*Specification for wire cloth for general purposes (*first revision*).

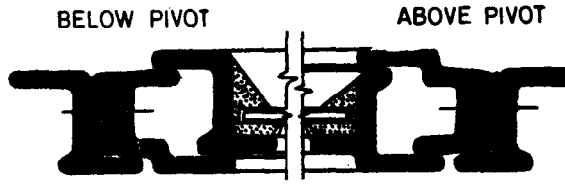
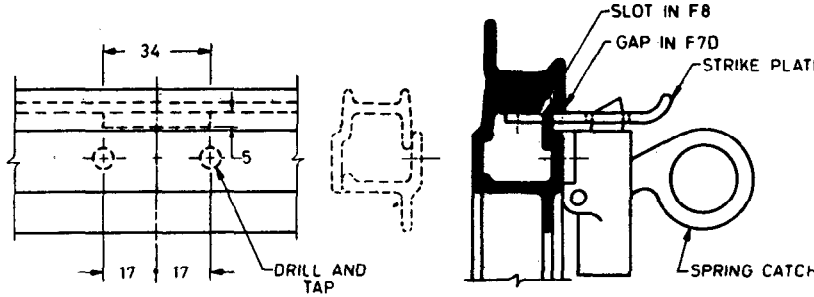


FIG. 19 DETAILS OF HORIZONTAL CENTRE HUNG WINDOWS AND VENTILATORS

6.4.1 A brass or aluminium spring catch shall be fitted in the centre of the top bar of the centre hung window for the operation of the window. This spring catch shall be secured to the frame with MS Screws and shall close into a mild steel or malleable iron catch plate riveted, screwed or welded to the outside of the outer window frame bar (*see* Fig. 20).



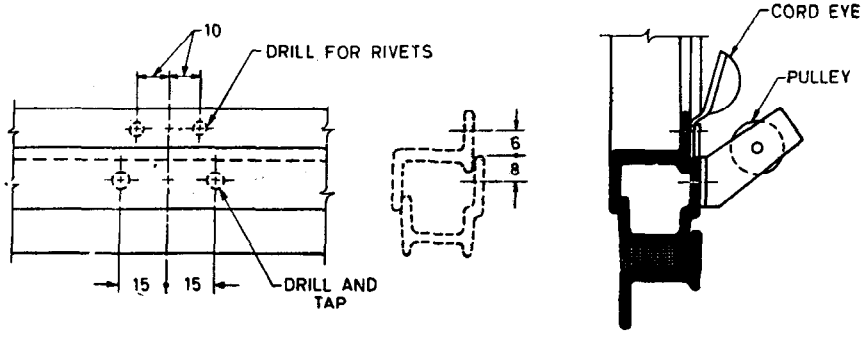
All dimensions in millimetres.

FIG. 20 SPRING CATCH FOR OPENING CENTRE HUNG WINDOWS AND VENTILATORS

6.4.2 A brass or aluminium or malleable iron cord pulley wheel in galvanized mild steel or malleable iron bracket shall be fitted at the sill of the centre hung window with mild steel screws or alternatively, welded to the bottom inner frame of the window in a position corresponding to that of the pulley (*see* Fig. 21).

6.5 Door — Details of construction of the door shall be as indicated in Fig. 12.

6.5.1 The kick panels shall be in double tray construction, and shall be of 1·25 mm thick mild steel sheets. The kick panels shall be welded or screwed to the frame and the glazing bar (*see* detail ' A ' in Fig. 12).



All dimensions in millimetres.

FIG. 21 CORD EYE AND PULLEY ARRANGEMENT FOR CLOSING CENTRE HUNG WINDOWS AND VENTILATORS

6.5.2 *Hinges* — Steel hinges for doors shall be of the same type as for the windows but of larger size. The hinges shall be of 50 mm projecting type (*see* Fig. 22). Non-projecting type of hinges (*see* Fig. 23) and self-aligned type door hings (*see* Fig. 24) may also be used. The hinge pins and washers shall be of galvanized steel or aluminium alloy of suitable thickness.

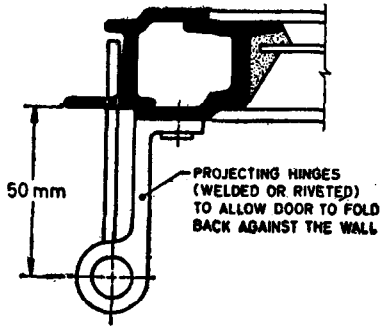


FIG. 22 TYPICAL PROJECTING TYPE HINGE FOR DOORS

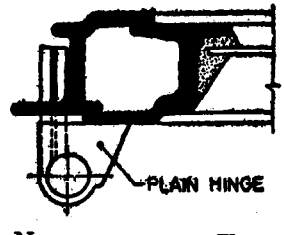
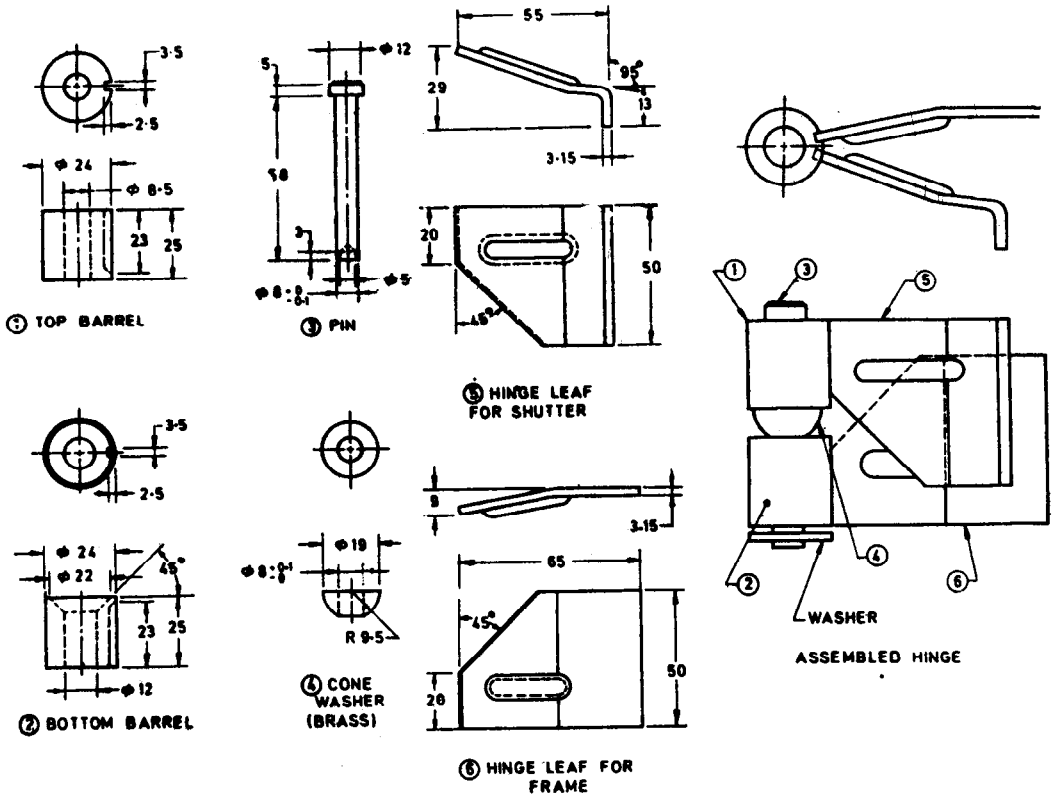


FIG. 23 TYPICAL NON-PROJECTING TYPE HINGE FOR DOORS



All dimensions in millimetres.

FIG. 24 MILD STEEL ALIGNED TYPE HINGE FOR DOORS

6.5.3 The handle for doors may be of the design indicated in Fig. 25.

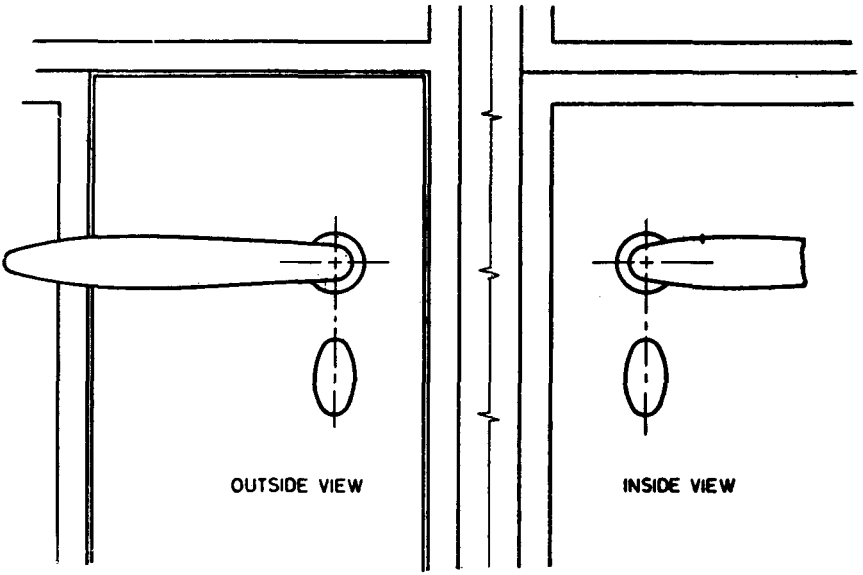


FIG. 25 TYPICAL DOOR HANDLE

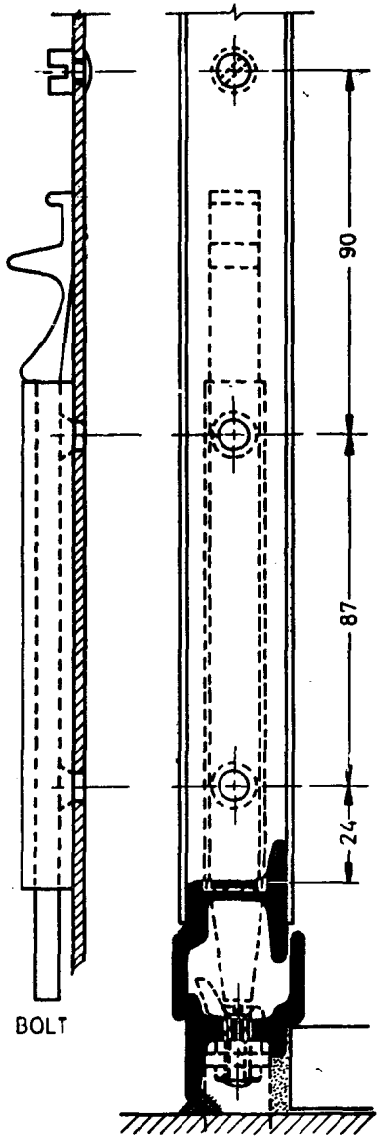
6.5.4 A mortice lock with not less than 4 levers or pins shall be provided for the door. It shall be openable with its key both from the outside as well as from the inside but in addition a bolt shall be provided on the inside so that when the door is locked from the inside and bolted, it cannot be opened from the outside with its key.

6.5.5 In the case of double doors, the first closing leaf shall be at the left hand leaf looking at the door from the push side. The first closing shutter shall have a concealed brass extruded aluminium or steel bolt at top and bottom (*see* Fig. 26). The bolt shall be so constructed as not to work loose or droop by its own weight.

6.5.6 Single and double shutter door may be provided with a three-way bolting device (*see* Fig. 27). Where this device is provided in the case of double shutter doors, concealed brass or steel bolts may not be provided.

6.6 Composite Units — Composite units are to be assembled at site, using coupling sections as illustrated in Fig. 28 (*see also* Fig. 8, 10 and 12).

6.7 Weather Bar — Where fixed light occurs over external opening shutter, a push fit weather bar as shown in Fig. 11 shall be provided.



All dimensions in millimetres.

FIG. 26 TYPICAL VERTICAL BOLT FOR DOUBLE SHUTTER DOOR

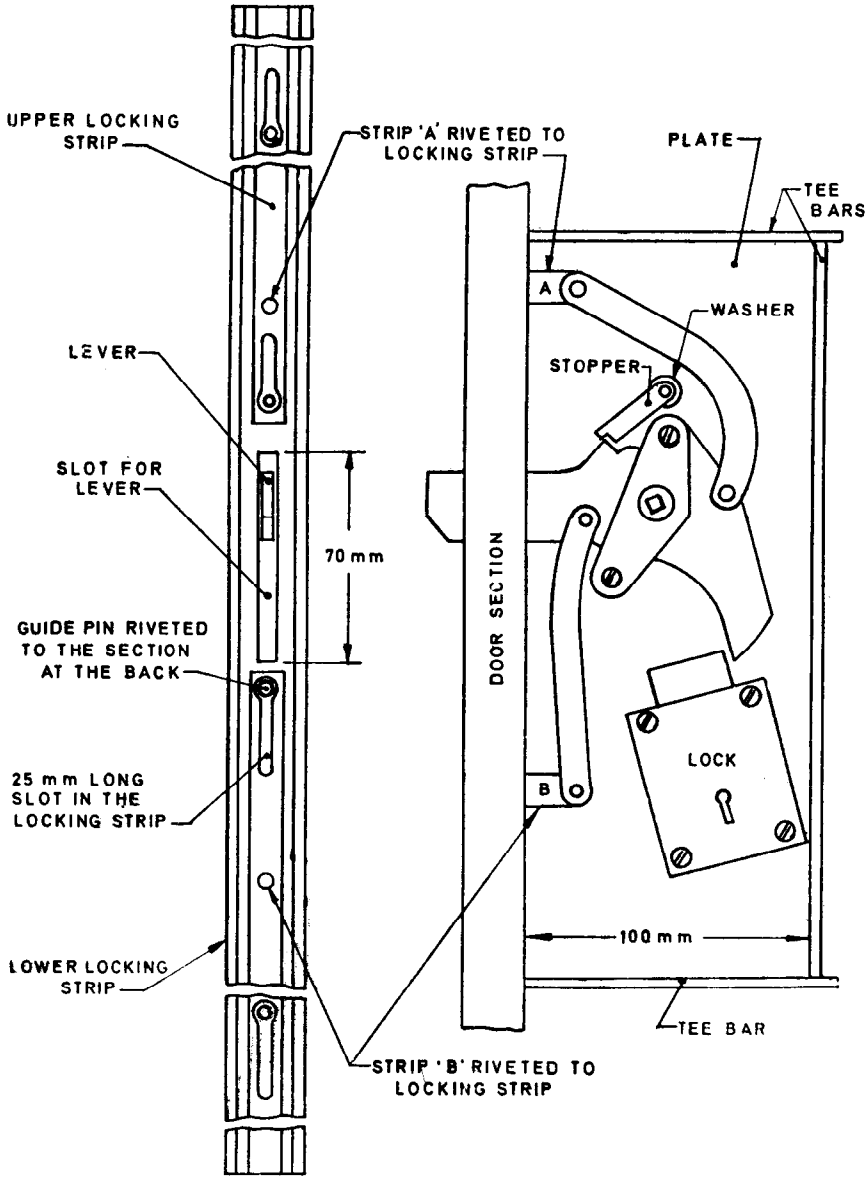


FIG. 27 TYPICAL THREE-WAY BOLTING DEVICE FOR DOORS

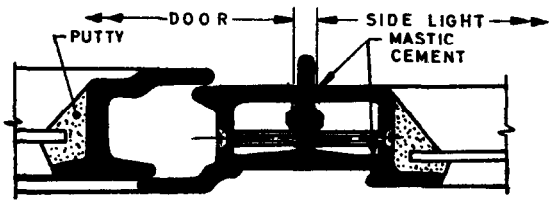


FIG. 28 COUPLING DOOR TO WINDOW OR SIDE-LIGHT

7. POSITION OF HOLES, FIXING SCREWS AND LUGS

7.1 Outer frames shall be provided with fixing holes centrally in the web of the section in positions indicated in Fig. 29. Additional holes are provided in certain types of doors and windows for manufacturing purposes but only the holes indicated in Fig. 29 are for the use for fixing. Fixing lugs and fixing screws are to be supplied for the positions shown in Fig. 29.

7.2 The fixing screws and lugs shall be as given in Table 2.

8. FINISH

8.1 All the steel surfaces shall be thoroughly cleaned free of rust, mill-scale, dirt, oil, etc, either by mechanical means, for example, stand or shot blasting or by chemical means, for example, pickling and then finished either with painting only (*see* **8.1.1**) or phosphating and painting (*see* **8.1.2**); or by hot dip galvanizing (*see* **8.1.3**) as may be agreed to between the purchaser and the manufacturer.

8.1.1 *Painting Only* — After pretreatment of the surfaces two of paint shall be applied on the units by any of the following methods:

a) By brushing, using ready mixed paints (*see* IS : 102-1962*);

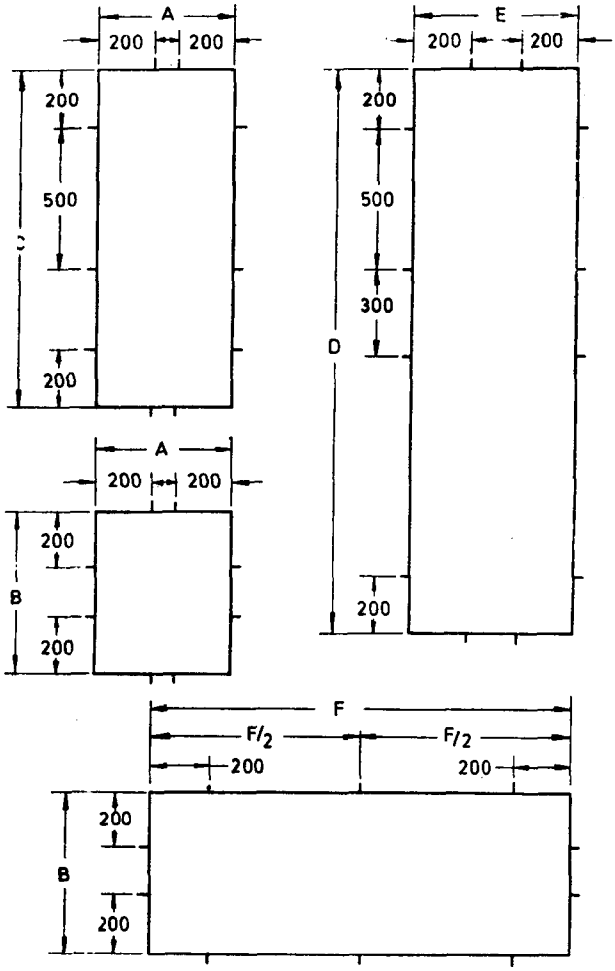
b) By spraying with suitable primers in accordance with the requirements laid down in Appendix D of IS : 1477 (Part II)-1971†; or

c) By dipping the complete unit in bath of suitable primer paint, such as red oxide zinc chrome primer (*see* IS : 2074-1979‡) and then air drying.

*Specification for ready mixed paint, brushing, red lead, non-setting priming (*revised*).

†Code of practice for painting of ferrous metals in buildings: Part II Painting (*first revision*).

‡Specification for ready mixed paint, air drying, red oxide-zinc chrome, priming (*first revision*).



A = 980, 1180
B = 580, 880
C = 1180, 1480
D = 1980, 2080
E = 580, 780, 980, 1180
F = 1480, 1780

All dimensions in millimetres.

FIG. 29 CHART SHOWING APPROXIMATE POSITION OF FIXING HOLES AND NUMBER OF FIXING LUGS

TABLE 2 FIXING SCREWS AND LUGS

(*Clause* 7.2)

Sl No.	Place of Fixing	Size of the Screw or Lug
(1)	(2)	(3)
i)	To wooden frames rebated on the outside	35 mm No. 10 galvanized wood screws conforming to IS : 451-1972* (*see* Fig. 30)
ii)	To plugs in concrete work or brick work rebated on the outside	do
iii)	To plugs in concrete work or brick work rebated on the outside (that is, plain or square jambs)	65 mm No. 10 galvanized wood screws conforming to IS : 451-1972*
iv)	Direct to brick work or masonry (that is, plain or square jambs)	Slotted steel adjustable lugs (natural finish) not less than 70 × 14 × 3·15 mm contersunk galvanized machine screws and nuts 12 × 6 mm (*see* Fig. 31)
v)	To steel work	Fixing clips and 8 mm galvanized bolts and hexagonal nuts (*see* Fig. 32)

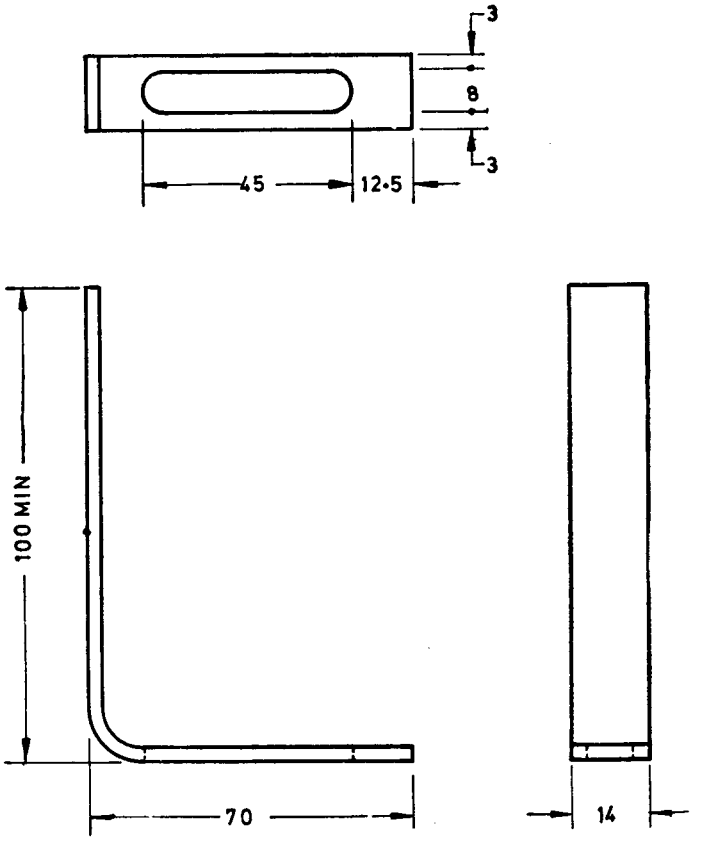
*Technical supply conditions for wood screws (*second revision*).

FIG. 30 FIXING SCREWS FOR WOODEN FRAMES OR PLUGS IN CONCRETE

8.1.2 *Phosphating and Painting* — After pretreatment of the surfaces, the units shall be dipped in phosphating solution in accordance with the requirements laid down in IS : 1477 (Part I)-1977*. This shall be allowed by one coat of paint which shall be air-or stove-dried after applying.

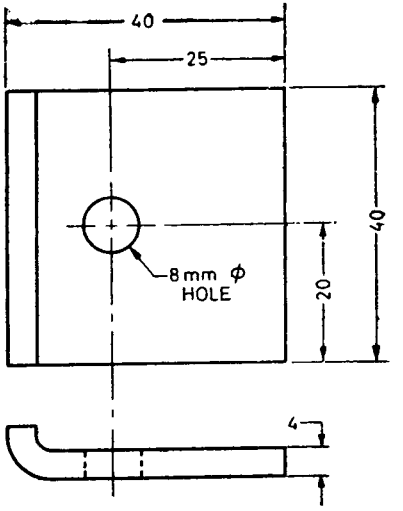
8.1.3 *Hot Dipped Galvanizing* — After pretreatment of the surface the units shall be dipped in a bath of molten zinc in accordance with the requirements laid down in IS : 1477 (Part I)-1977*. The thickness of coating shall be uniform and not less than 0·5 kg/m².

*Code of practice for painting of ferrous metals in buildings: Part I Pretreatment (*first revision*).



All dimensions in millimetres.

FIG. 31 SLOTTED FIXING LUG
(FOR BRICKWORK AND MASONRY)



All dimensions in millimetres.

FIG. 32 FIXING CLIP
(FOR STEEL WORK)

9. GLAZING

9.1 Glazing shall be provided on the outside of the frames.

9.1.1 Glazing clips (*see* Fig. 33) for putty glazing shall be provided as standard fittings. The quantity of glazing clips required for each glass pane of doors, windows, etc, shall be as given in Table 1. The method of fixing glazing clips shall be as given in **9.1.1.1**.

9.1.1.1 The portion 'A' of the glazing clip shall be fitted into the slot in the window frame leaving the clip resting on the glass. The portion 'B' shall then be pressed along the glass towards the frame until it springs into position in the clearance between the edge of the glass and the steel frame.

NOTE 1 — Glazing clips usually not provided for normal size glass panes, where large size glass panes are required to be used or where the casement of the window is located in heavily exposed situation, holes for glazing clips will have to be drilled during fabrication.

NOTE 2 — Where the glass pane size does not exceed 600 × 300 mm, glazing clips not considered necessary (for inside glazed windows for special use only two spring glazing clips per pane should be provided). In case of doors, windows and ventilators without horizontal glazing bars, the glazing clips may be spaced according to the slots in the vartical members, provided the spacing does not exceed 300 mm. The quality of glazing clips required for each for standard size window shall be as given in Table 1.

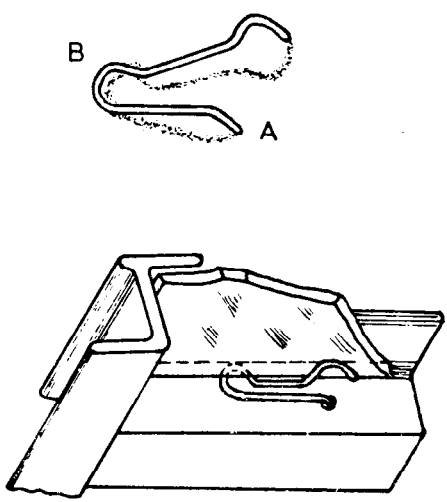


FIG. 33 PICTORIAL VIEW WITH IMAGE OF SPRING GLAZING CLIP AND ITS METHOD OF FIXING

9.1.2 Windows may also be prepared for bead glazing made from either 9·5 × 9·5 mm, aluminium channel of 1 mm thickness or 9.5 × 9.5 mm pressed steel channel of minimum 0.45 mm thick galvanized sheet. Self-tapping screws shall be used for fixing bead or alternatevely bead fixing can be done with concealed screws. Back putty or 'V' shaped rubber channel wall be provided for glazing. No spring glazing clip shall be required for bead glazing.

10. SAMPLING AND CRITERIA FOR CONFORMITY

10.1 The sampling and criteria for conformity for steel doors, windows, ventilators and fixed-lights shall be as given in Appendix B.

11. MARKING

11.1 All doors, windows, ventilators and fixed-lights shall carry an identification of the manufacturer or trade-mark, if any and the process of welding adopted.

11.1.1 Each unit may also be marked with the ISI Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act, 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

12. SUPPLY

12.1 All doors, windows and ventilators shall be despatched with the opening parts suitably secured to preserve alignment when fixing and glazing.

12.2 Fixing lugs, couplings, fittings and all hardware shall be despatched separately.

12.3 Composite windows shall be despatched uncoupled.

APPENDIX A

(*Clause* 4.4)

INFORMATION TO BE SUPPLIED BY THE PURCHASER WHILE PLACING THE ORDER

A-1. The purchaser shall furnish information to the manufacturer or the supplier in regard to the following points:

a) Type and size of door, window or composite unit quoting the designation as given in **4.3**;

b) Whether the units are to be fixed in brick masonry, stone masonry, concrete or steel;

c) Type of hinges required, for example, whether projecting, non-projecting or friction type;

d) Details of fittings required including couplings, weather bars, etc;

e) Whether the mullions and transoms are to be cut to suit masonry or steel work;

f) Whether removable fly-proof screens are required;

g) Whether the shutters are required to be opened from inside or outside;

h) Type of finish to be provided conforming to the requirements laid down in **8**;

j) Whether wood or metal bead is to be provided in place of putty glazing; and

k) Any other relevant information.

APPENDIX B

(*Clause* 10.1)

SCALE OF SAMPLING AND CRITERIA FOR CONFORMITY FOR STEEL DOORS, WINDOWS, VENTILATORS AND FIXED-LIGHTS

B-1. SAMPLING

B-1.1 Lot — In any consignment all the doors/windows/ventilators/fixed-lights of similar raw-materials under relevantly uniform conditions of manufacture shall be grouped together to constitute a lot.

B-1.1.1 Sample shall be selected and inspected for each lot separately for ascertaining its conformity or otherwise to the requirements of the specification.

B-1.2 The number of doors/windows/ventilators/fixed-lights to constitute the sample, to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 1 and 2 of Table 3.

TABLE 3 SCALE OF SAMPLING

Lot Size (No. of Doors/Windows/ Ventilators/ Fixed-lights in the Lot)	Sample Size (No. of Doors/ Windows/Ventilators/Fixed-lights to be Selected in the Sample)	Permissible No. of Defectives	Sub-Sample Size	Permissible No. of Defectives in the Sub-Sample
(1)	(2)	(3)	(4)	(5)
Up to 50	5	0	2	0
51 to 150	8	0	3	0
151 to 300	13	1	5	0
301 to 500	20	2	8	0
501 to 1000	32	3	13	1
1 001 to 3 000	50	5	20	2

B-1.3 The doors/windows/ventilators/fixed-lights for the sample shall be selected at random from the lot. In order to ensure the randomness of selection of the sample procedures given in IS : 4905-1968* may be followed.

B-2. CRITERIA FOR CONFORMITY

B-2.1 The doors/windows/ventilators/fixed-lights selected in the sample under **B-1.2** and **B-1.3** shall be inspected for dimensions (**4.1.1**), tolerances (**4.2**), materials (**5**), fabrication (**6**) [except (**6.1.1**)], positioning of holes, fixing screws and lugs (**7**), finishing (**8**) and glazing (**9**). Any door/window/ventilator/fixed-light not satisfying any one or more of the requirements inspected for shall be classified as defective. A lot shall be considered having satisfied the requirements of the standard with regard to these characteristics if the number of defectives in the sample is less than or equal to the corresponding number given in col 3 of Table 3.

B-2.2 The lot having satisfied the requirements listed in **B-2.1** shall be inspected for requirements of welded joints. For this purpose a sub-sample of the size given in col 4 of Table 3 shall be selected from the doors/windows/ventilators/fixed-lights which have been found non-defective under **B-2.1**. The doors/windows/ventilators/fixed-lights in the sub-sample shall be tested according to **6.1.1.1**, **6.1.1.2** and **6.1.1.3**. A lot shall be considered having satisfied the requirements of welded joints if the number of doors windows/ventilators/fixed-lights tested above from the sub-sample does not exceed the corresponding number given in col 5 of Table 3.

*Methods for random sampling.

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5-8-56C, L.N. Gupta Marg, Nampally Station Road, HYDERABAD 500001	20 10 83
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AMENDMENT NO. 1 JULY 1990
TO
IS : 1038 - 1983 SPECIFICATION FOR STEEL DOORS, WINDOWS AND VENTILATORS

(Third Revision)

(*Page* 3, *clause* **0.2**, *line* 1) — Substitute 'revised in 1968 and 1975' *for* 'revised in 1968'.

[*Page* 4, *clause* **0.4** (j)] — Substitute the following for the existing clause:

'Sub-dividing bar shall be T2 and glazing bar shall be T6 in 15 module or more height for fixed lights only.'

(*Page* 4, *clause* **0.6**) — Insert the following at the end:

'The committee reviewed the size requirements of the standard and to bring in line with the timber doors and windows, decided to permit non-modular sizes in addition to modular sizes specified at present. The relaxation will be for a period of two years from the publication of this amendment and it is intended that the manufacturing and consumer organizations can gradually switch over within this period to the modular sizes which are the preferred sizes. The size aspect will be reviewed thereafter.'

(*Page* 5, *clause* **4.1**) — Insert the following at the end:

'Sizes other than modular sizes, as agreed to between the manufacturer and the purchaser, may also be permitted.'

(*Page* 12, *clause* **5.2.1**, *lines* 1 *and* 2) — Substitute '*K*11*B*' *for* '*K*11*B*' and '*K*12*B*' as transom' *for* '*K*12*B*'.

(*Page* 22, *clause* **6.1** *last sentence*) — Substitute the following for the existing last sentence:

'The process of welding adopted may be flash butt welding or metal arc welding or any other suitable method. The weld shall fulfil the requirements given in **6.1.1**, **6.1.1.1**, **6.1.1.2** and **6.1.1.3**.'

(*Page* 22, *clause* **6.1.1.2**) — Substitute the following for the existing clause:

'*Micro and Macro examinations* — From the two opposite corners obtained for visual test as in **6.1.1.1**, the flanges of the sections shall be cut with the help of a saw. The cut surfaces of the remaining portions shall be polished,

etched and examined at the weld. The specimen shall be prepared according to Appendix A of IS : 3600 (Part 1) 1973 Method of testing fusion welded joints and weld metal in steel : Part 1 General tests.

Micro-Examination — This examination should be carried out at a magnification of not less than 100 to check the proper fusion all along the thickness of the section. This examination shall also reveal the absence of cracks, gross porocity and entrapped slag.

Macro-Examination — This examination should be carried out with hand lense of magnification of 5 and should reveal weld penetration along the whole thickness of the section and absence of undercutting, overlaps and cavities.'

(*Page* 24, *Fig.* 5) — Substitute 'TYPE $\frac{6\ NF\ 6}{8\ HT\ 6}$' and 'TYPE 6 NT 9'

for

'TYPE $\frac{6\ HF\ 6}{8\ HT\ 6}$' and 'TYPE 6 HT 9' respectively,

(*Page* 28, *clause* **6.2.2.1**) — Substitute the following for the existing clause:

'The handle shall have a two point nose which shall engage with a brass or aluminium alloy striking plate on the fixed frame in a slightly open position as well as in a fast position (*see* Fig. 15). The pin of 4 mm dia shown in the figure shall be considered as optional. The height of the handles in each type of side hung shutter shall be fixed in a positions as indicated in Fig. 16 with tolerance of ± 10 mm. Alternatively, handle with only one-point nose may be used, if agreed to between the purchaser and the manufacturer.

(*Page* 37, *clause* **7.1**, *first sentence*) — Substitute the following for the existing sentence:

'Outer frames shall be provided with fixing holes centrally in the web of the section as indicated in Fig. 19. The position of the fixing lugs shown should be followed, with minor variation where necessary.'

(*Page* 37, *clause* **8.1.1**, *line* 1) — Substitute 'two coats of paint' *for* 'two of paint'.

(*Page* 39, *clause* **8.1.2**, *line* 4) — Substitute, 'followed' *for* 'allowed'.

(CED 11)

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TO
IS 1038 : 1983 SPECIFICATION FOR STEEL DOORS, WINDOWS AND VENTILATORS

(Third Revision)

(*Page* 3, *clause* **0.3**, *line* 3) — Substitute 'IS 7452 : 1990' *for* 'IS : 7452-1982'.

(*Page* 3, *foot-note*) — Substitute the following for the existing foot-note:

'*Specification for hot rolled steel sections for doors, windows and ventilators (*second revision*).'

[*Page* 4, *clause* **0.4**(e)] — Insert the word 'openable' between the words 'high' and 'windows'.

(*Page* 4, *clause* **0.6**) — Add the following matter at the end of the clause:

'The typical diagrams given in the standard are for guidance only but the dimensions, if given in such typical diagrams, shall be adhered to.'

[*Page* 12, *clause* **4.3.1**(b), *second line*] — Insert the words 'horizontally glazed' between the words 'two' and 'fixed-lights'.

(*Page* 12, *clause* **5.1.1**) — Substitute 'IS 7452 : 1990' *for* 'IS : 7452-1982'.

[*Page* 12, *clause* **5.2.1** (*see also Amendment No.* 1)] — Substitute the following for the existing clause:

'**5.2.1** Coupling section K11B shall be used as mullions for coupling the units side by side and coupling section K12B as transom to couple independent units one above the other. The sections are covered in IS 7452 : 1990*. The coupling bar K11B may be used in case lower window is of fixed type.'

(*Page* 12, *clause* **5.2.2**) — Delete.

(*Page* 12, *clause* **5.2.3**) — Renumber the existing clause as '**5.2.2**'.

(*Page* 12, *clause* **5.3**) — Substitute 'IS 2835 : 1987' *for* 'IS : 2835-1977'.

(*Page* 12, *foot-notes with* '*' *and* '‡' *marks*) — Substitute the following for the existing foot-notes:

'*Specification for hot rolled steel sections for doors, windows and ventilators (*second revision*).

‡Specification for flat transparent sheet glass (*third revision*).'

(*Page* 13, *Fig.* 4) — Delete.

(*Pages* 14 *to* 21, *Table* 1) — Substitute the following for the existing table:

Price Group 1

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED)

(*Clause* 5.3)

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3)	(4)
	DOORS (*see* Fig. 2A)		
	Side Hung Type — Horizontal Glazing Bars		
		mm	
6HS20	1	466 × 249	2
	4	466 × 283	2
	1	362 × 283	2
8HS20	1	666 × 249	2
	4	666 × 283	2
	1	362 × 283	2
10HS20	2	407 × 240	2
	9	407 × 283	2
	1	303 × 283	2
12HS20	2	507 × 249	2
	9	507 × 283	2
	1	403 × 283	2
6HS2I	1	466 × 249	2
	4	466 × 283	2
	1	362 × 283	2
8HS21	1	666 × 249	2
	4	666 × 283	2
	1	362 × 283	2
10HS21	2	407 × 249	2
	9	407 × 283	2
	1	303 × 283	2
12HS21	2	507 × 249	2
	9	507 × 283	2
	1	403 × 283	2
6NS20	1	466 × 833	4
	1	362 × 283	2
	1	466 × 575	2
8NS20	1	666 × 833	4
	1	562 × 283	2
	1	666 × 575	2

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3) mm	(4)
10NS20	1	407 × 283	2
	1	303 × 283	2
	2	407 × 833	4
	2	407 × 575	2
12NS20	1	507 × 283	2
	1	403 × 283	2
	2	507 × 833	4
	2	507 × 575	2
6NS21	1	466 × 833	4
	1	362 × 283	2
	1	466 × 575	2
8NS21	1	666 × 833	4
	1	562 × 283	2
	1	666 × 575	2
10NS21	1	407 × 283	2
	1	303 × 283	2
	2	407 × 833	4
	2	407 × 575	2
12NS21	1	507 × 283	2
	1	403 × 283	2
	2	507 × 833	4
	2	507 × 575	2
WINDOWS (*see* Fig. 2B)			
Side Hung Type — Horizontal Glazing Bars			
5HS9	1	407 × 273	2
	2	407 × 258	2
6HS9	1	507 × 273	2
	2	507 × 258	2
10HS9	2	425 × 273	2
	4	425 × 258	2
12HS9	2	525 × 273	2
	4	525 × 258	2
15HS9	2	425 × 273	2
	4	425 × 258	2

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3) mm	(4)
18HS9	3	475 × 273	2
	2	525 × 273	2
	4	525 × 258	2
	3	575 × 273	2
5HS12	2	407 × 277	2
	2	407 × 263	2
6HS12	2	507 × 277	2
	2	507 × 263	2
10HS12	4	425 × 277	2
	4	425 × 263	2
12HS12	4	525 × 277	2
	4	525 × 263	2
15HS12	4	425 × 277	2
	4	425 × 263	2
	4	475 × 277	2
18HS12	4	525 × 277	2
	4	525 × 263	2
	4	575 × 277	2
5HS15	2	407 × 277	2
	2	407 × 263	2
	1	435 × 275	2
6HS15	2	507 × 277	2
	2	507 × 263	2
	1	535 × 275	2
10HS15	4	425 × 277	2
	4	425 × 263	2
	2	454 × 275	2
12HS15	4	527 × 277	2
	4	527 × 263	2
	2	554 × 275	2
15HS15	4	425 × 277	2
	4	425 × 263	2
	2	454 × 275	2
	4	475 × 277	2
	1	475 × 275	2

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3) mm	(4)
18HS15	4	527 × 277	2
	4	527 × 263	2
	2	554 × 275	2
	4	575 × 277	2
	1	575 × 275	2
	Side Hung Type — No Glazing Bars		
5NS9	1	407 × 807	4
6NS9	1	507 × 807	4
10NS9	2	425 × 807	4
12NS9	2	525 × 807	4
15NS9	2	425 × 807	4
	1	475 × 835	4
18NS9	2	525 × 807	4
	1	575 × 807	4
5NS12	1	407 × 1 107	6
6NS12	1	507 × 1 107	6
10NS12	2	425 × 1 107	6
12NS12	2	525 × 1 107	6
15NS12	2	425 × 1 107	6
	1	475 × 1 135	6
18NS12	2	525 × 1 107	6
	1	575 × 1 135	6
5NS15	1	407 × 1 107	6
	1	435 × 275	2
6NS15	1	507 × 1 107	6
	1	535 × 275	2
10NS15	2	425 × 1 107	6
	2	454 × 275	2
12NS15	2	525 × 1 107	6
	2	554 × 275	2

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3) mm	(4)
15NS15	2	425 × 1 107	6
	1	475 × 1 135	6
	2	454 × 275	2
	1	475 × 275	2
18NS15	2	525 × 1 107	6
	1	575 × 1 135	6
	2	554 × 275	2
	1	575 × 275	2
VENTILATORS (*see* Fig. 2C)			
Top Hung Type — Horizontal Glazing Bars			
5HT6	2	407 × 249	2
6HT6	2	507 × 249	2
10HT6	4	449 × 249	2
12HT6	4	549 × 249	2
15HT6	4	463 × 263	2
	2	430 × 249	2
18HT6	4	563 × 263	2
	2	530 × 249	2
5HT9	2	407 × 259	2
	1	435 × 273	2
6HT9	2	507 × 259	2
	1	535 × 273	2
Centre Hung Type — Horizontal Glazing Bars			
5HC6	2	360 × 226	2
6HC6	2	460 × 226	2
10HC6	4	426 × 226	2
12HC6	4	526 × 226	2
15HC6	4	464 × 263	2
	2	420 × 226	2
18HC6	4	564 × 263	2
	2	520 × 226	2

(Continued)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3)	(4)
		mm	
Top Hung Type — No Horizontal Glazing Bars			
5NT6	1	407 × 507	2
6NT6	1	507 × 507	2
10NT6	2	449 × 507	2
12NT6	2	549 × 507	2
15NT6	2	463 × 535	2
	1	430 × 507	2
18NT6	2	563 × 535	2
	1	530 × 507	2
5NT9	1	407 × 526	2
	1	435 × 273	2
6NT9	1	507 × 526	2
	1	535 × 273	2
Centre Hung Type – No Horizontal Glazing Bars			
5NC6	1	360 × 460	2
6NC6	1	460 × 460	2
10NC6	2	426 × 460	2
12NC6	2	526 × 460	2
15NC6	2	464 × 536	2
	1	420 × 463	2
18NC6	2	564 × 536	2
	1	520 × 563	2
FIXED-LIGHTS (*see* Fig. 2D)			
Door Height — Horizontal Glazing Bars			
6HF20	6	535 × 283	2
6HF21	6	535 × 283	2
Door Height — No Glazing Bars			
6NF20	1	535 × 867	4
	1	535 × 283	2
	1	535 × 575	2
6NF21	1	535 × 867	4
	1	535 × 283	2
	1	535 × 575	2

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3) mm	(4)
	Window Height — Horizontal Glazing Bars		
5HF9	3	435 × 273	2
6HF9	3	535 × 273	2
10HF9	6	463 × 273	2
12HF9	6	563 × 273	2
15HF9	6	463 × 273	2
	3	491 × 273	2
18HF9	6	563 × 273	2
	3	591 × 273	2
5HF12	4	435 × 277	2
6HF12	4	535 × 277	2
10HF12	8	463 × 277	2
12HF12	8	563 × 277	2
15HF12	8	463 × 277	2
	4	491 × 277	2
18HF12	8	563 × 277	2
	4	591 × 277	2
5HF15	4	435 × 277	2
	1	435 × 291	2
6HF15	4	535 × 277	2
	1	535 × 291	2
10HF15	8	463 × 277	2
	2	463 × 291	2
12HF15	8	563 × 277	2
	2	563 × 291	2
15HF15	8	463 × 277	2
	4	491 × 277	2
	2	463 × 291	2
	1	491 × 291	2
18HF15	8	563 × 277	2
	4	591 × 277	2
	2	563 × 291	2
	1	591 × 291	2

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Contd*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3)	(4)
		mm	
	Window Height — No Glazing Bars		
5NF9	1	435 × 835	4
6NF9	1	535 × 835	4
10NF9	2	463 × 835	4
12NF9	2	563 × 835	4
15NF9	2	463 × 835	4
	1	491 × 835	4
18NF9	2	563 × 835	4
	1	591 × 835	4
5NF12	1	435 × 1 135	6
6NF12	1	535 × 1 135	6
10NF12	2	463 × 1 135	6
12NF12	2	563 × 1 135	6
15NF12	2	463 × 1 135	6
	1	491 × 1 135	6
18NF12	2	563 × 1 135	6
	1	591 × 1 135	6
5NF15	1	435 × 1 135	6
	1	435 × 291	2
6NF15	1	535 × 1 135	6
	1	535 × 291	2
10NF15	2	463 × 1 135	6
	2	463 × 291	2
12NF25	2	563 × 1 135	6
	2	563 × 291	2
15NF15	2	463 × 1 135	6
	1	491 × 1 135	6
	2	463 × 291	2
	1	491 × 291	2
18NF15	2	563 × 1 135	6
	1	591 × 1 135	6
	2	563 × 291	2
	1	591 × 291	2

(*Continued*)

TABLE 1 GLASS SIZES (CLEARANCE ALLOWED) — *Concld*

Designation	Quantity	Glass Sizes (Width × Height)	No. of Glazing Clips Against Each Pane
(1)	(2)	(3) mm	(4)
	Ventilator Height — Horizontal Glazing Bars		
5HF6	2	435 × 263	2
6HF6	2	535 × 263	2
10HF6	4	463 × 263	2
12HF6	4	563 × 263	2
15HF6	4	463 × 263	2
	2	491 × 263	2
18HF6	4	563 × 263	2
	2	591 × 263	2
	Ventilator Height — No Horizontal Glazing Bars		
5NF6	1	435 × 535	2
6NF6	1	536 × 535	2
10NF6	2	463 × 535	2
12NF6	2	563 × 535	2
15NF6	2	463 × 535	2
	1	491 × 535	2
18NF6	2	563 × 535	2
	1	591 × 535	2

[*Page* 22, *clause* **6.1**, *last sentence* (*see also Amendment No.* 1)]— Substitute the following for the existing sentence:

'The process of welding adopted shall be flash butt welding or can be any other process as agreed to between the supplier and the purchaser which shall fulfil the requirements given in **6.1.1**.'

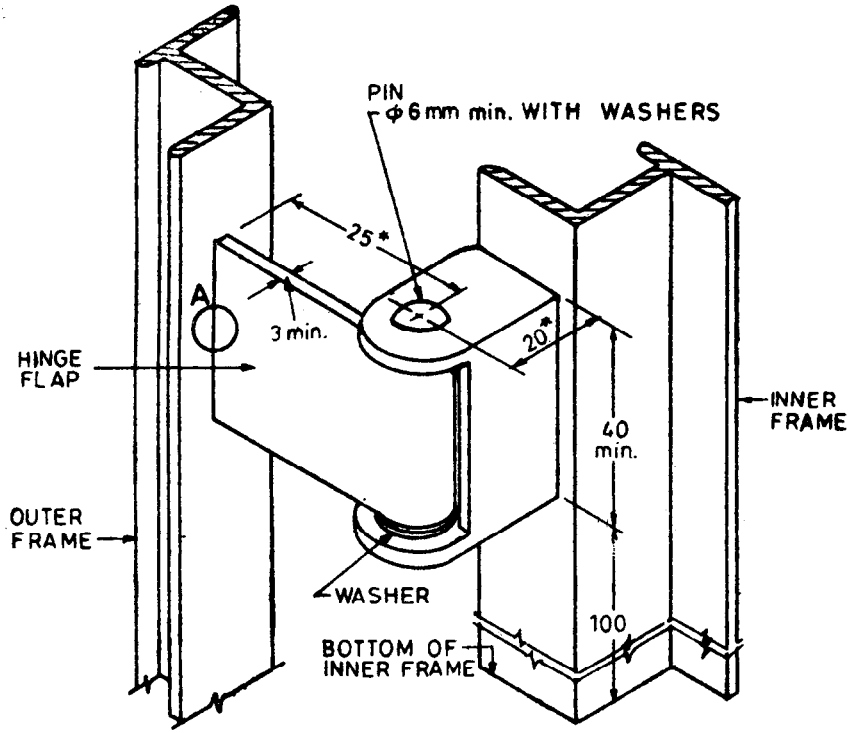
(*Page* 23, *clause* **6.1.2**) — Substitute 'tee' *for* 'tie' in the second line and add the following matter at the end of the clause:

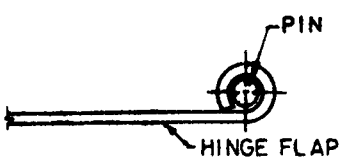
'All subdividing and glazing bars shall be tennoned and rivetted into the frames.'

(*Page* 23, *clause* **6.2**, *second para, line* 2) — Substitute 'shall' *for* 'may'.

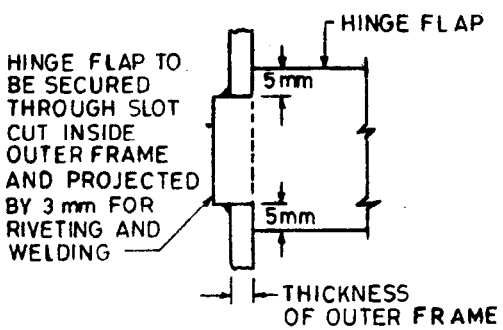
(*Page* 23, *clause* **6.2.1**) — Add the following clause after **6.2.1**:

'**6.2.1.1** *Non-projecting type of hinges* — Non-projecting type of hinges (*see* Fig. 14A) may also be used if agreed to between the purchaser and the supplier. The flap shall be of mild steel sheet of thickness not less than 3 mm. The hinge pin of diameter not less than 6 mm and washers shall be of electrogalvanized steel or aluminium alloy.'





DETAIL OF SECURING PIN & HINGE FLAP



DETAIL AT A

NOTES

1 The dimensions with '*' mark are to be so adjusted as to ensure close fitting of shutter.

2 Hinge box to be welded from inside all through the contact length.

3 Hinge flap should take complete round of pin.

All dimensions in millimetres.

FIG. 14A TYPICAL NON-PROJECTING STEEL HINGE
(Bottom Hinge, Side Hung Shutter)

(*Page* 27, *Fig.* 13) — Substitute 'RIVETTED HINGE PIN' *for* 'HINGE PIN'.

[*Page* 28, *clause* **6.2.2.1** (*see also Amendment No.* 1)] — Substitute the following for the existing clause:

'**6.2.2.1** The handle shall have a two-point nose which shall engage with a brass or aluminium striking plate on the fixed frame in a slightly open position as well as in a fast position (*see* Fig. 15). Alternatively handle with one point nose may be used, if agreed to between the purchaser and the supplier. The thickness of the handle shall not be less than 3·0 mm for mild steel and brass, and 3·5 mm for aluminium. The height of the handles in each type of side hung shutter shall be fixed in position as indicated in Fig. 16 or as specified by the purchaser.'

(*Page* 28, *Fig.* 15):

a) Delete the matter 'ϕ 4 mm PIN' and corresponding details for the pin from the drawing.

b) Substitute '10 mm *min* OVAL OR SQUARE HOLE' *for* '11 mm ROUND OR SQUARE HOLE'.

(*Page* 29, *Fig.* 16) — Substitute '45 $\pm$ 10 cm' *for* '44·5 cm'.

(*Page* 29, *clause* **6.2.3**, *line* 7) — Substitute '1·6 mm *min*' *for* '1·25'.

[*Page* 37, *clause* **7.1** (*see also Amendment No.* 1)] — Substitute 'Fig. 29' *for* 'Fig. 19.'

(*Page* 41, *clause* **9.1.1.1**) — Add the following matter at the end of the clause:

'Glazing clips shall be used for all sizes of glass panes.'

(*Page* 41, *Notes* 1 *and* 2 *under clause* **9.1.1.1**) — Substitute the following for the existing notes:

NOTE 1 — The holes for glazing clips shall be made during fabrication.

NOTE 2— In case of doors, windows and ventilators without horizonal glazing bars, the glazing clips may be spaced according to the slots in the vertical member provided the spacing does not exceed 300 mm. The quantity of glazing clips required for each standard size window shall be as given in Table 1.'

(CED 11)

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