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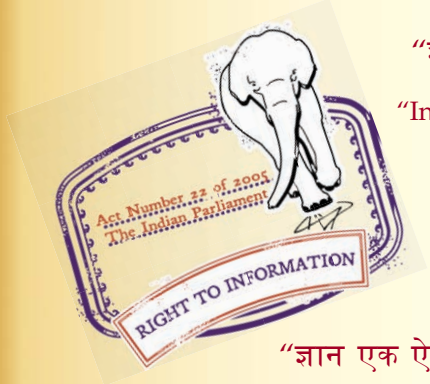

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(Reaffirmed 2006)

Indian Standard

SPECIFICATION FOR ALUMINIUM WINDOWS FOR INDUSTRIAL BUILDINGS

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 6

April 1962

Indian Standard

SPECIFICATION FOR ALUMINIUM WINDOWS FOR INDUSTRIAL BUILDINGS

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SPECIFICATION FOR ALUMINIUM WINDOWS FOR INDUSTRIAL BUILDINGS

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 2 November 1961, after the draft finalized by the Doors, Windows and Building Furniture Sectional Committee had been approved by the Building Division Council.

0.2 This specification is an adjunct to IS : 1361-1959 Specification for Steel Windows for Industrial Buildings which covers steel windows for industrial buildings. With the increasing use of extruded aluminium alloys sections in the manufacture of windows, it was felt that a separate standard be prepared on the lines of IS : 1361-1959 to cover the requirements of aluminium industrial windows and their fittings.

0.3 The sizes of aluminium industrial windows and other requirements and details are identical to those of the steel windows covered by IS : 1361-1959 Specification for Steel Windows for Industrial Buildings, unless otherwise specified.

0.4 The Sectional Committee responsible for the preparation of this standard has taken into consideration the views of producers, consumers and technologists and has related the standard to the manufacturing and trade practices followed in the country in this field. Due weightage has also been given to the need for international co-ordination among standards prevailing in different countries of the world in this field.

0.5 This standard is one of a series of Indian Standards on metal doors and windows. Other standards in the series are:

*IS : 1038-1957 Specification for Steel Doors, Windows and Ventilators

IS : 1081-1960 Code of Practice for Fixing and Glazing of Metal (Steel and Aluminium) Doors, Windows and Ventilators

IS : 1361-1959 Specification for Steel Windows for Industrial Buildings

IS : 1948-1961 Specification for Aluminium Doors, Windows and Ventilators

0.6 Wherever a reference to any Indian Standard appears in this specification, it shall be taken as a reference to the latest version of the standard.

0.7 Metric system has been adopted in India and all quantities and dimensions in this standard have been given in this system.

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 result of a test, shall be rounded off in accordance with IS : 2-1960 Rules for Rounding Off Numerical Values (*Revised*). The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

0.9 This standard is intended chiefly to cover the technical provisions relating to aluminium industrial windows, and it does not include all the necessary provisions of a contract.

*Second revision in 1975.

1. SCOPE

1.1 This standard deals with aluminium windows suitable for use in industrial buildings and designed to suit openings based on a module of 10 cm.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definitions shall apply.

2.1 Sash — A complete window unit whether fixed or the opening type.

2.2 Composite Window — A window comprising two or more sashes joined together with one or more coupling members.

2.3 Ventilator — The opening part of a sash. It consists of an inner frame and outer frame.

2.4 Centre-Hung Ventilator — A ventilator horizontally pivoted at the centre on each side, with the top half opening inwards and bottom half opening outwards.

2.5 Bottom-Hung Ventilator — A ventilator hinged at the bottom, and opening inwards.

2.6 Top-Hung Ventilator — A ventilator hinged at the top, and opening outwards.

3. DESIGNATION

3.1 In designating the different sizes and types of industrial windows, the following notation shall be adopted:

IN × Width of window expressed in number of modules × Type of window × Height of window expressed in number of modules

The letters IN indicate an industrial window; and the type of window is indicated by the following letter symbols:

F = Fixed sash,
C = Centre-hung sash,
B = Bottom-hung sash, and
T = Top-hung sash.

Examples:

1) IN 10 C 15 indicates 'Industrial window for opening 10 module wide (100 cm) by 15 module high (150 cm)' with centre-hung ventilator.
2) IN 16 F 10 indicates 'Industrial window for opening 16 module wide (160 cm) by 10 module high (100 cm)' with fixed glass panes.

3.2 Composite Windows — For composite windows, the notations illustrated below shall be adopted:

a) IN 10 C 10/IN 10 C 10/IN 10 C 10: This indicates three industrial windows of type IN 10 C 10, placed next to one another and coupled.

b) $\frac{\text{IN 10 C 10/IN 10 C 10}}{\text{IN 10 C 15/IN 10 C 15}}$: This indicates the combination of four windows, two of the type IN 10 C 10 on top and two of the type IN 10 C 15 at the bottom, all the four of them coupled both horizontally and vertically.

4. SIZES AND TOLERANCES

4.1 The sizes of industrial sashes shall be as given in Fig. 1 (*see* P 4).

NOTE — The overall width and height of the window are smaller than the dimensions of modular opening by 2·5 cm, thus providing a clearance of 1·25 cm all round when fitted into the opening.

4.2 The ventilators shall be of one size and designed to fit into the outer frame of IN 10 C 10 and with 1·2 mm clearance.

4.3 The overall dimensions of industrial windows shall not differ from those given in Fig. 1 by more than 3 mm.

5. MATERIAL

5.1 Aluminium extruded sections used in the manufacture of industrial windows shall conform to IS Designation HE9-WP of *IS : 733-1956 Specification for Wrought Aluminium and Aluminium Alloys, Bars, Rods and Sections (for General Engineering Purposes). Hollow sections of aluminium alloy employed in the manufacture of windows shall conform to IS Designation HV9-WP of *IS : 1285-1958 Specification for Wrought Aluminium and Aluminium Alloys, Extruded Round Tube and Hollow Sections for General Engineering Purposes. The form of sections, dimensions and weights shall be as given in Fig. 2 (*see* P 5).

5.2 Cord-eyes, pulleys, brackets and catch plates for spring catches shall be of aluminium or galvanized or cadmium-plated steel. Pivots, peg stays and spring catches shall be of non-ferrous metal. Brass or bronze, if used, shall be either chromium- or cadmium-plated.

5.3 Coupling members forming composite windows shall be of extruded aluminium alloy section as shown in Fig. 2 and coupling details shall be as shown in Fig. 3A to 3C (*see* P 6).

5.4 Glass panes shall be free from flaws, specks, bubbles, etc. All panes shall have properly squared corners and straight edges. Glass panes shall weigh 7·5 kg/m².

5.5 Wood screws shall conform to †IS : 451-1961 Specification for Wood Screws (*Revised*). All bolts, nuts, screws, washers and other mild steel fittings shall be suitably corrosion treated.

5.6 Screw threads of machine screws used in the manufacture of aluminium windows for industrial buildings shall conform to the requirements of ‡IS : 1362-1959 Dimensions for Screw Threads for General Purposes (Diameter Range 0·25 to 39 mm). Other threads shall be permissible if agreed to between the purchaser and the vendor.

6. CONSTRUCTION

6.1 Sashes shall be square and flat.

6.2 Sashes shall be constructed of sections which have been cut to the required length and tenoned and riveted or welded at the corners. Tee sections for glazing shall be tenoned and riveted into the frames and where they intersect, the vertical tee shall be broached and the horizontal tee threaded through it, and the intersection closed by hydraulic pressure. Brazing for corner joints may also be done.

6.3 Ventilators, consisting of an inner opening frame and an outer fixed frame, shall be made as separate units which shall be bedded in mastic and screwed into the sash frames or tees with aluminium or galvanized or cadmium-plated steel screws. The bars forming the vertical members of the inner and outer frames of centre-hung ventilators shall be reversed at the point of pivot; the top bars of inner and outer frames of top-hung ventilators, and the bottom bars of inner and outer frames of bottom-hung ventilators shall also be reversed (*see* Fig. 4, P 7).

*Since revised.

*Since revised.

†Second revision in 1972.

‡Superseded by IS : 4218 (Parts I to VI)-1967 ISO metric screw threads.

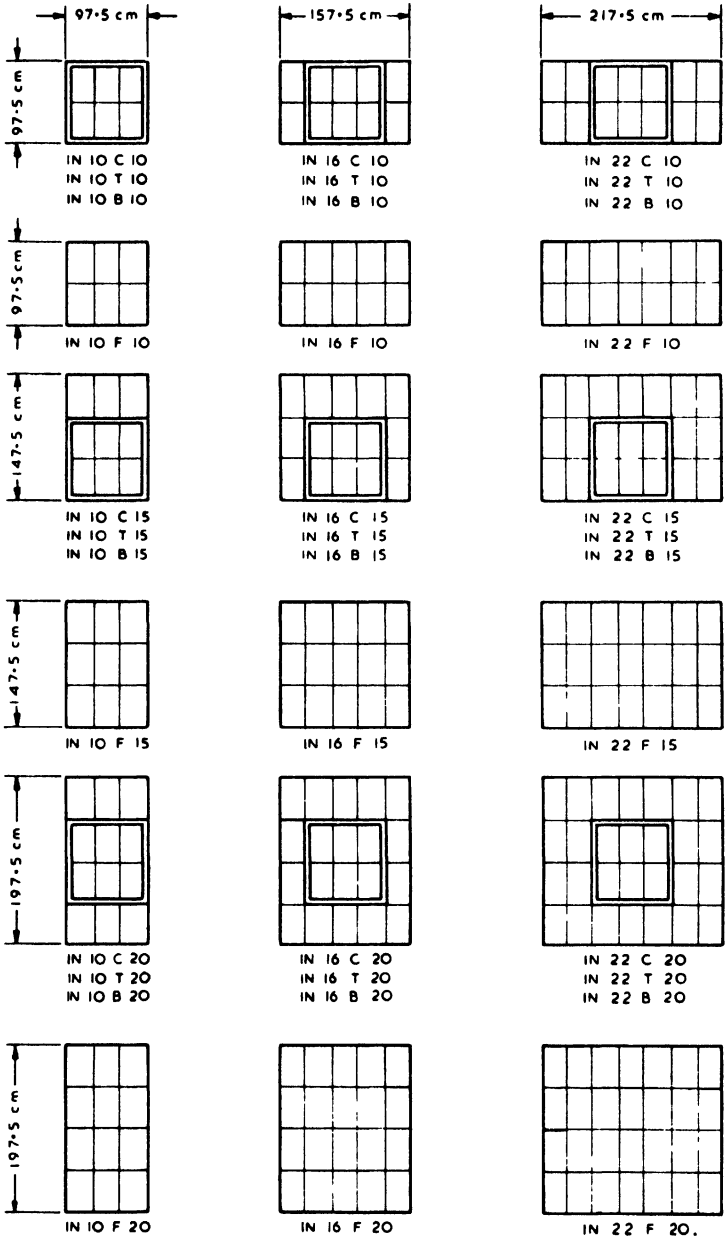
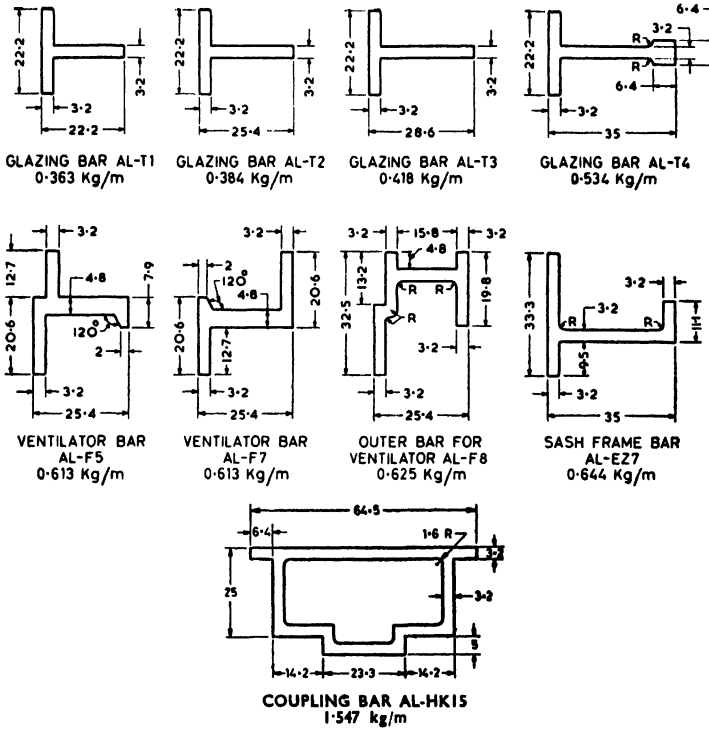


FIG. 1 INDUSTRIAL SASHES



NOTE 1 — All radii = 1·6 mm.

NOTE 2 — The weights of sections per metre length as indicated are nominal.

All dimensions in millimetres.

FIG. 2 EXTRUDED ALUMINIUM SECTIONS FOR INDUSTRIAL SASHES

7. HOLES FOR FIXING, COUPLING AND GLAZING

7.1 Holes for fixing and coupling sashes shall be provided in the web of the outside frame sections and of outer ventilator frame sections where these occur at the perimeter of the sash. These holes shall be of 8 mm diameter, countersunk, and shall be located 1·4 cm from the outside face of the frame section in the positions shown in Fig. 5 (*see* P 8).

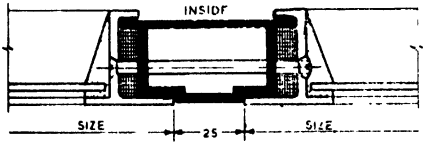
7.2 Holes for glazing clips shall also be provided, one hole being located in the web of the section or tee, on each side of each pane.

8. FITTINGS AND FIXING MATERIALS

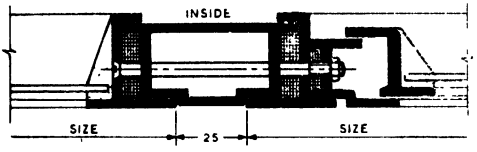
8.1 Centre-hung ventilators shall be mounted on a pair of cup-pivots made out of aluminium alloy sheet conforming to IS Designation NS 4 of *IS : 737-1955 Specification for Wrought Aluminium and Aluminium Alloys, Sheet and Strip (for General Engineering Purposes) and IS Designation A-5-M of IS : 617-1959 Specification for Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes (*Revised*) or of brass which shall be either cadmium- or chromium-plated and each pivot consisting of an inner and outer cup, permitting the swinging of the ventilator through an angle of at least 85°. The ventilator shall be so balanced that it shall be capable of remaining open in any desired position under normal conditions.

8.2 Centre-hung ventilators shall be provided with an aluminium- or cadmium-plated brass pulley-wheel in the centre of the bottom section of the ventilator, and attached with aluminium or galvanized or cadmium-plated steel screws (*see* Fig. 6, P 9). They shall also be provided with

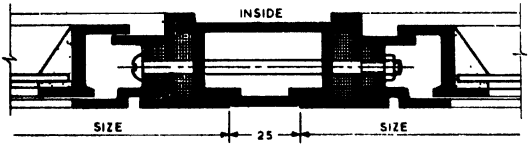
*Since revised.



3A COUPLING OF TWO FIXED SASHES



3B COUPLING OF A FIXED AND OPEN SASH



3C COUPLING OF TWO OPEN SASHES

All dimensions in millimetres.

FIG. 3 COUPLING DETAILS, HORIZONTAL AND VERTICAL

a cord-eye riveted or welded to the bottom inner frame bar of the ventilator in a position corresponding to that of the pulley.

8.3 Centre-hung and bottom-hung ventilators shall have cast aluminium or bronze (gunmetal) spring catch in the centre of the top section of the ventilator, suitable for operation by hand or pole (and by cord, in the case of centre-hung ventilators). This spring catch, which shall be fixed (riveted or welded) to the frame with aluminium or galvanized or cadmium-plated steel screws, shall close into an aluminium catch plate fixed (riveted or welded) to the outside of the outer ventilator frame section.

8.4 Bottom-hung and top-hung ventilators shall be hung on aluminium alloy hinges. The aluminium alloy for cast hinges shall conform to alloy IS Designation A-5-M of IS : 617-1959 Specification for Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes (*Revised*) and for extruded section of hinges to IS Designation HE 10-WP or HE30-WP of *IS : 733-1956 Specification for Wrought Aluminium and Aluminium Alloys, Bars, Rods and Sections (for General Engineering Purposes). The pins for hinges shall be of stainless steel of non-magnetic type or of aluminium alloy HR 30. Irrespective of the hinges being anodized or not, the aluminium alloy pins shall be anodized to a minimum film thickness of 0·025 mm and shall be sealed with oil, wax or lanolin.

8.5 Bottom-hung ventilators shall be provided with a pair of aluminium alloy folding side arms to limit the opening of the ventilator (*see* Fig. 7, P 9). The aluminium alloy arms shall either be cast in alloy IS Designation A-5-M of IS : 617-1959 Specification for Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes (*Revised*) or fabricated from aluminium alloy sheet conforming to IS Designation NS4 of *IS : 737-1955 Specification for Wrought Aluminium and Aluminium Alloys, Sheet and Strip (for General Engineering Purposes). When the ventilator is closed, these side-arms shall be invisible.

8.6 Top-hung ventilators shall be provided with a 300 mm long peg stay of cast aluminium to IS Designation A-5-M of IS : 617-1959 Specification for Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes (*Revised*) or folded from IS Designation NS4 aluminium alloy sheet of *IS : 737-1955 Specification for Wrought Aluminium and Aluminium Alloys, Sheet and Strip (for General Engineering Purposes) complete with cast aluminium peg and locking bracket. The stay shall be welded or riveted on to the bottom inner ventilator frame section and shall lock into the locking bracket of similar material welded to the bottom outer ventilator section (*see* Fig. 8, P 10).

*Since revised.

*Since revised.

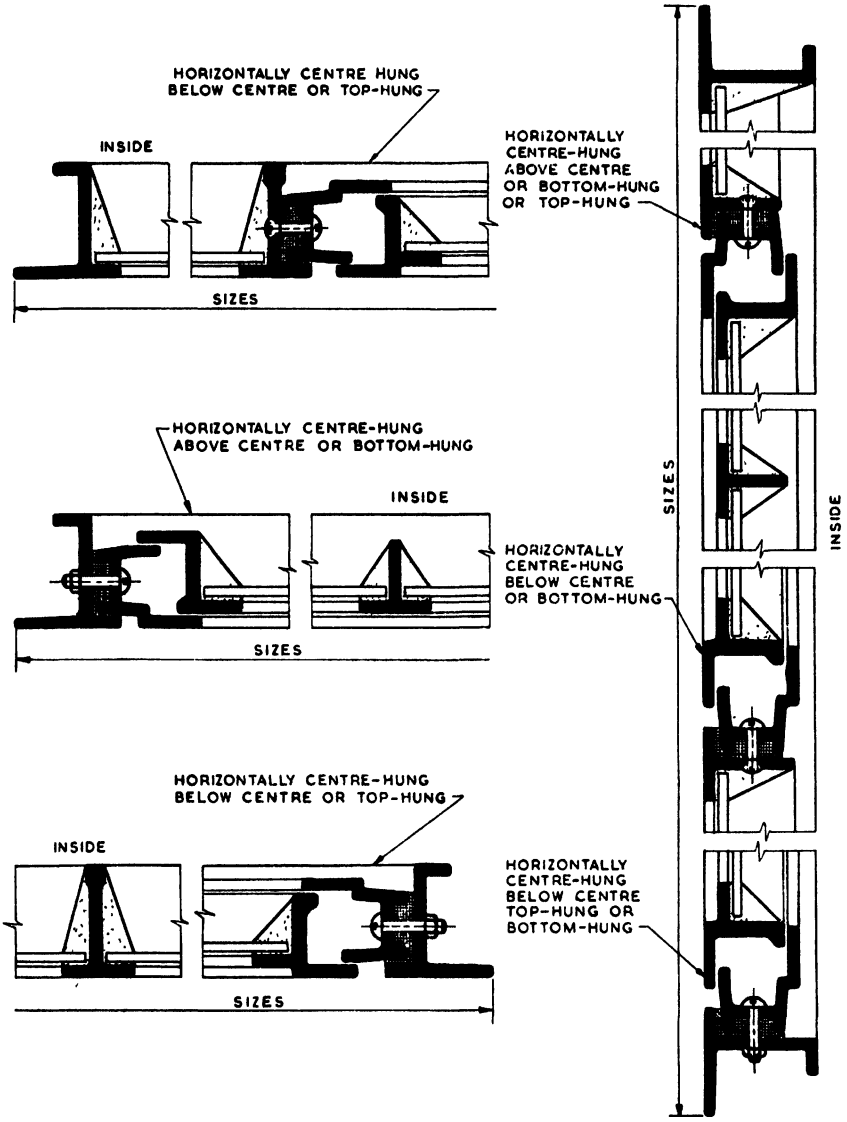
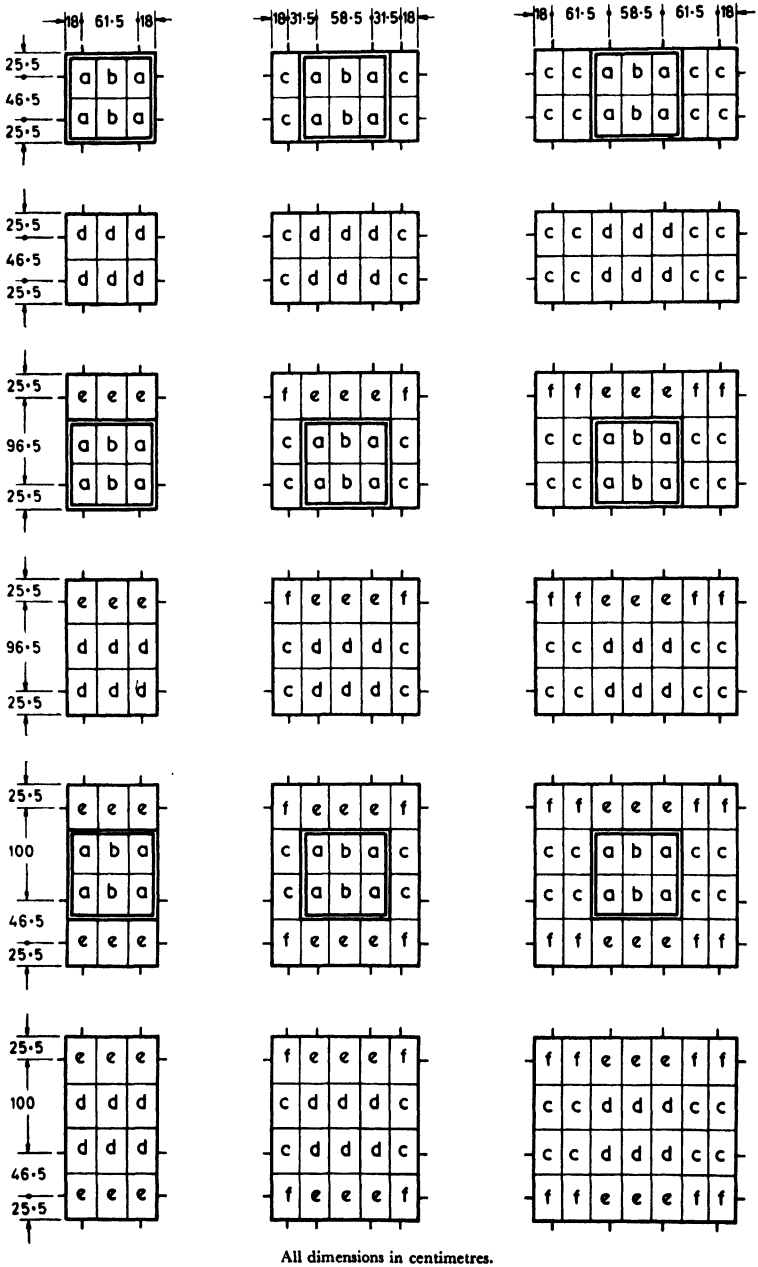
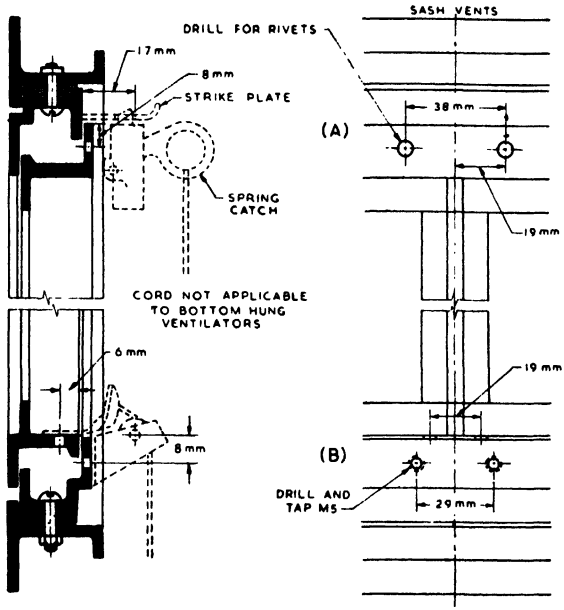


FIG. 4 SECTIONAL DETAILS THROUGH SASHES



All dimensions in centimetres.

FIG. 5 FIXING HOLE CENTRES AND TYPES OF GLASS PANES



A) Preparation for spring catch on horizontally pivoted and bottom-hung ventilators
B) Preparation for pulley and cord-eye on horizontally pivoted ventilators

NOTE — Mastic should be applied to joints where hatching is shown.

FIG. 6 SPRING CATCH, PULLEY AND CORD-EYE

8.6.1 Alternatively, top-hung ventilators may be provided with a 30-cm cam opener of aluminium alloy to IS Designation A-5-M of IS : 617-1959 Specification for Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes (*Revised*) fixed (preferably screwed or riveted) to the ventilator with aluminium alloy or galvanized or cadmium-plated steel screws (*see* Fig. 9, P 10).

8.6.2 Both peg stay and cam opener shall be capable of holding the ventilator open in three different positions.

8.7 All sashes shall be provided with fixing fittings for the fixing holes shown in Fig. 5. These may be slotted reversible steel lugs (holdfasts) (*see* Fig. 10, P 10) complete with countersunk* steel nuts and bolts for fixing to brickwork; wood screws for fixing to wood, plugged concrete or stone, or steel screws, or mild steel fixing clips with steel nuts and bolts (*see* Fig. 11, P 10), for fixing to steel. However, any steel lugs coming in contact with aluminium shall be either galvanized or given one coat of bituminous paint.

8.8 For coupling sashes with members specified to form composite windows, countersunk*

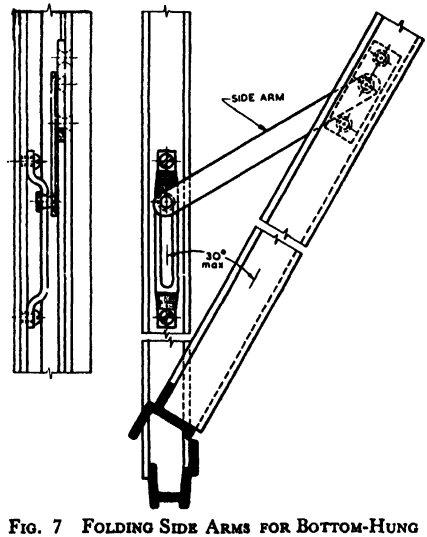
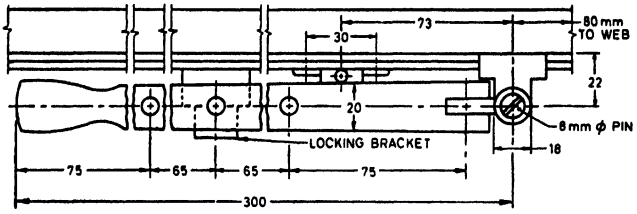


FIG. 7 FOLDING SIDE ARMS FOR BOTTOM-HUNG VENTILATORS

*Where ventilators occur, lug screws and coupling screws may be of round head type.



All dimensions in millimetres.

FIG. 8 A TYPICAL PEG STAY FOR SIDE-HUNG SHUTTERS AND TOP-HUNG VENTILATORS

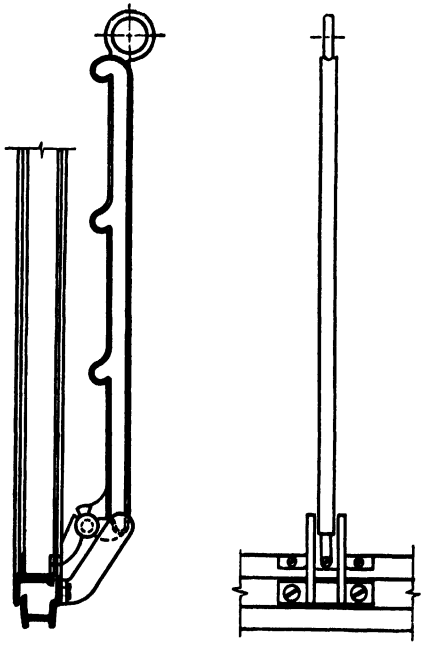


FIG. 9 CAM OPENER

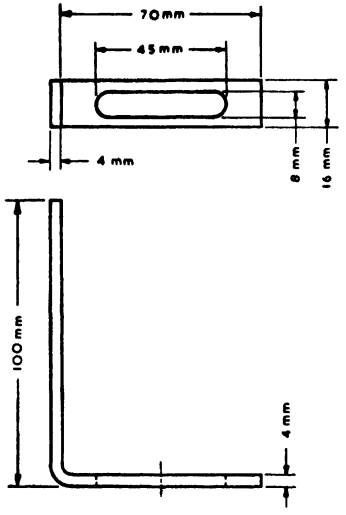
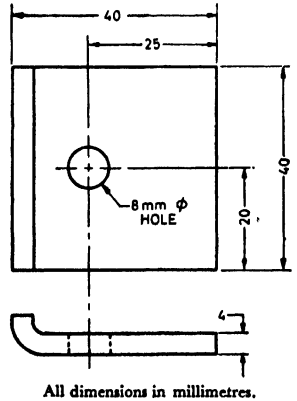


FIG. 10 SLOTTED FIXING LUG FOR BRICK WORK



All dimensions in millimetres.

FIG. 11 FIXING CLIP FOR STEEL WORK

cadmium-plated or galvanized steel bolts and cone-nuts of suitable length and in the quantities specified for fixing, shall be provided.

8.9 Two spring glazing clips per pane shall be provided. These shall be made of spring steel to the design shown in Fig. 12.

9. COMPOSITE WINDOWS

9.1 Composite windows shall be despatched unassembled, but complete with necessary coupling components. In composite windows, each coupling member will increase the overall height or width by 25 mm.

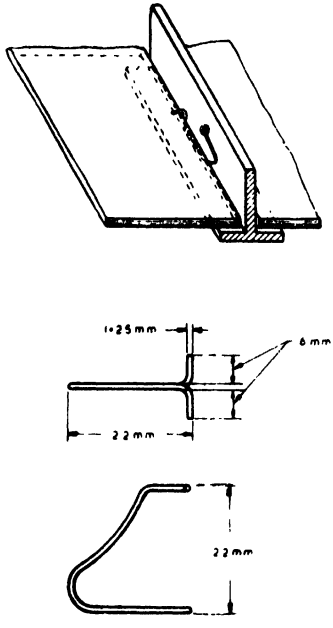


FIG. 12 SPRING STEEL GLAZING CLIP

10. GLASS

10.1 The sizes of glass panes for windows shall be as given in Table I. The sizes specified in the table include clearance. The number and sizes of glass panes for each type of window shall be as shown in Fig. 5.

11. FINISH

11.1 Sashes and coupling members may be supplied in either matt, scratch-brush or polished finish. They may, additionally, also be anodized, if so desired by the purchaser. If colour anodizing is to be done, then only approved light-fast shades should be used.

TABLE I GLASS SIZES
(*Clause* 10.1)

PANE DESIGNATION	WIDTH mm	HEIGHT mm
a	265	420
b	300	420
c	290	455
d	300	455
e	300	490
f	290	490

11.2 A thick layer of clear transparent lacquer, based on methacrylates or cellulose butyrate, shall be applied on aluminium sashes and coupling members by the suppliers to protect the surface from action of wet cement during installation. This lacquer coating shall be removed after installation is completed.

12. PACKING

12.1 Industrial windows shall be despatched with the opening parts suitably secured to preserve alignment when fixing and glazing.

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

12.3 Composite windows shall be despatched uncoupled.

13. MARKING

13.1 Industrial windows shall be marked on the frame with a mark identifying the manufacturer and type.

13.1.1 The windows may also be marked with the ISI Certification Mark.

NOTE — The use of the ISI Certification Mark is governed by the provisions of the Indian Standards Institution (Certification Marks) Act and the Rules and Regulations made thereunder. The ISI 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 ISI and operated by the producer. ISI marked products are also continuously checked by ISI for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the ISI Certification Mark may be granted to manufacturers or processors, may be obtained from the Indian Standards Institution.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act,* 1986 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards : Monthly Additions'.

This Indian Standard has been developed from Doc : No

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Northern	: SCO 335-336, Sector 34-A, CHANDIGARH 160 022	60 3843 60 9285
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