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Indian Standard

CODE OF PRACTICE FOR GLAZING IN BUILDINGS

(First Revision)

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Gr 4

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0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards on 19 September 1988, after the draft finalized by the Building Construction Practices Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Glazing is an important item in building construction and glass has to be selected to cater to several requirements. The fixing of glass is also a specialized operation and, if not satisfactorily done, will lead to the hazards of broken glass. With the wide adoption of glazed windows in industrial structures and also in multi-storeyed buildings, the importance of glazing and the need for proper workmanship has considerably increased. This code is intended to provide guidance in the selection of glazing for building construction and also fixing operations, taking into account the types of sheet glass that are available in this country and also the exposure conditions which the construction will have to stand.

0.3 This standard was first published in 1966. The present revision has been taken up with a view to updating its contents in line with the current practices. The important changes include addition of louvered glazing and new items like safety, wired and figured glasses, and polysulphide based sealants.

0.4 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 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.

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

1. SCOPE

1.1 This standard covers glazing work in buildings including techniques used in glazing.

1.2 This standard does not cover fixing of glass-lens lights in walls or roofs, glazing in curtain walls, or fixing of glass facings.

1.3 This standard does not cover puttyless or patent glazing.

2. TERMINOLOGY

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

2.1.1 *Anchor* — A strip of metal bent to an 'L' shape. The longer leg has countersunk holes for screws to fix the anchor to the background, and the shorter leg supports the glass without protruding beyond the face.

2.1.2 *Back Clearance* — *See* Clearances and Fig. 1A.

2.1.3 *Back Putty* — The portion of putty remaining between the glass and the depth of the rebate after the glass has been pushed into position (*see* Fig. 1B).

2.1.4 *Bead or Glazing Bead* — A strip of wood, metal or other suitable material attached to the rebate to retain the glass.

2.1.5 *Bedding Putty* — The compound placed in the rebate of the opening into which the glass is bedded.

2.1.6 *Block* — A small piece of wood, lead or other suitable material used between the edge of the glass (generally the bottom edge only) to centralize the glass in the frame (frequently called a setting block).

2.1.7 *Clearances* — Edge clearance and back clearance are as shown in Fig. 1A.

2.1.8 *Distance Piece* — A small piece of wood, lead or other suitable material used to locate the glass between the bead and the back of the rebate, and prevent lateral movement.

2.1.9 *Expansion Tape* — *See* Insulating Strip.

2.1.10 *Fixing Compound* — A material used in fixing glass, applied by hand, knife or trowel, or as a pre-formed strip and capable of adhering to a wide variety of surfaces.

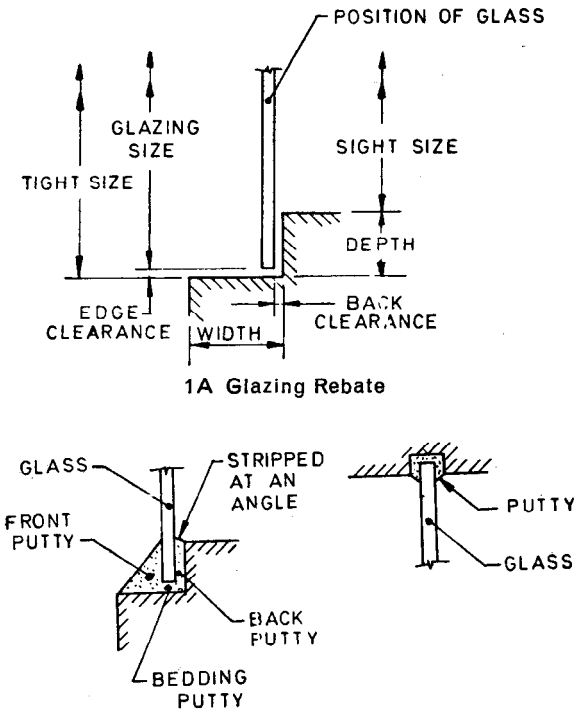


FIG. 1 TYPICAL ILLUSTRATIONS SHOWING GLAZING DETAILS

2.1.11 *Frame* — *See* Surround.

2.1.12 *Front Putty* — The compound forming a triangular fillet between the surface of the glass and the front edge of the rebate.

2.1.13 *Glazing* — The securing of glass in prepared openings, such as windows, door panels, screens and partitions.

2.1.13.1 *Double glazing* — A form of glazing which incorporates, instead of a single pane of glass, two panes separated by substantially stationary air, for the purpose of sound or thermal insulation or both. It may consist of:

a) two separate window frames, each single-glazed fixed in the same wall opening;

b) one window frame carrying two sashes coupled together, each separately glazed;

c) one window frame carrying two separate glasses, usually glazed on site;

d) one window frame single-glazed, with a second glass attached by clips or other means; and

e) one window frame carrying a factory-made hermetically-sealed double glazing unit.

NOTE — Patent glazing systems designed for double glazing are covered in IS : 10439-1983*.

*Code of practice for patent glazing.

2.1.13.2 *External glazing* — Glazing, either side of which is exposed outside the building (contrast with outside glazing).

2.1.13.3 *Louvered glazing (horizontal)* — A glazing with strips of glasses placed angular and one above the other at a distance sloping outside.

2.1.13.4 *Louvered glazing (vertical)* — A glazing with strips of glasses spaced vertically side by side at an angle.

2.1.13.5 *Multiple glazing* — A form of glazing based on the same principle as double glazing, but incorporating three or more panes of glass.

2.1.14 *Glazing Compound* — A material used in glazing, applied by hand, gun, knife or trowel, to provide a bedding for the glass and weather-tight joint between glass and surround.

2.1.15 *Inside Glazing* — External glazing in which the glass is inserted from inside the building.

2.1.16 *Outside Glazing* — External glazing in which the glass is inserted from outside the building.

2.1.16.1 *Outside face* — Keeping of the rough surface of textured or other glass outside while fixing the glass.

2.1.17 *Internal Glazing* — Glazing, neither side of which is exposed outside the building (contrast with inside glazing).

2.1.18 *Insulating Strip* — A strip of resilient material used to insulate the edge of the glass against rigid contact with non-resilient material (sometimes called expansion tape).

2.1.19 *Pane* — A piece of glass cut to size and shape ready for glazing (often called a square).

2.1.19.1 *Louvered pane* — A strip glass cut to the size of louver with smoothened edges ready for fixing.

2.1.20 *Peg* — A small metal component used in glazing to hold the glass in a metal frame (sometimes called spring).

2.1.21 *Pointing Compound* — A plastic non-setting compound having a workable consistency so that it may be handled and filled into joints readily.

2.1.22 *Rebate* — The part of a surround; the cross-section of which forms an angle into which the edge of the glass is received.

2.1.23 *Saddle Bar* — A metal stiffening bar across the face of the glass and secured to the surround, to which a leaded light is tied.

2.1.24 *Sash* — *See* Surround.

2.1.25 *Sealer* — A liquid compound of brushing consistency applied to a surface to prevent the absorption of soils from the glazing or fixing

compounds, or to prevent attack by alkalis on these oils.

2.1.26 *Setting Block* — *See* Block.

2.1.27 *Sizes*

a) Daylight size ... (sight size)
b) Full size ... (tight size)
c) Glass size ... (glazing size)

2.1.27.1 *Sight size* (*daylight size*) — The actual size of the opening which admits light (*see* Fig. 1A).

2.1.27.2 *Tight size* (*full size, rebate size*) — The actual size of the rebate opening (*see* Fig. 1A) (contrast with glazing size).

2.1.27.3 *Glazing size* (*glass size*) — The actual size of a piece of glass cut for glazing (*see* Fig. 1A).

2.1.28 *Spring* — A small headless nail or triangular piece of metal used, in addition to putty, for securing panes of glass in surrounds (*see also* Peg).

2.1.29 *Spring Clip* — A small metal component used, in addition to putty, for securing panes of glass in metal frames.

2.1.30 *Square* — *See* Pane.

2.1.31 *Surround* — Any frame, sash, casement or other building component into which glass is glazed.

3. NECESSARY INFORMATION

3.1 The following necessary information for efficient planning and distribution of the work shall be furnished by the general building contractor:

a) Type of glass to be used with details, such as colour, pattern and ornamentation; and
b) Details of the techniques to be employed in the work and other materials to be used.

3.2 The following information shall be given to the supplier when glass is ordered:

a) Type, quality thickness and substance of glass;
b) In specifying sizes, the first dimension given should be the height. Mode of measurements taken, that is, tight size, glass pane, size, etc, shall be mentioned. In case of extra allowance required for coloured glass, tight size with allowance required shall be indicated;
c) In specifying sizes of preparing templates for shaped glasses, the face side should be specified;
d) In specifying sizes for bevelled plates, decorated plates, factorymade double glazing units, leaded lights, copper lights or louvre ventilators, both tight and sight sizes should be given;
e) In all cases where patterned glass, decorated glass, leaded lights or copper lights are required to align, this should be specified and a dimensional sketch provided, if necessary;
f) In cases where wired glass is required to align one way between adjacent panes within the limits of manufacture, this should be specified; and
g) When ordering bent glass, the following additional items should be provided:
   1) *Bent one way only to curve or series of curves* — A rigid template cut to the exact curve and marked to indicate whether it represents the concave (hollow) or convex (round) side of the glass;
   2) *Bent one way of the pane only, the curve being arc of a circle* — A drawing showing straight edge, girth and radius of curve may be acceptable to the vendor in place of a template, provided it is marked to indicate whether it represents the concave (hollow) or the convex (round) side of the glass; and
   3) *Bent both ways of the pane, whether the curves are simple curves or not* — A rigid body mould shaped to the exact contour of the pane and marked to indicate which side of the glass it represents.

4. MATERIALS

4.1 Glass used for glazing in buildings should conform to following Indian Standards:

a) Sheet glass — IS : 2835-1977*
b) Safety glass — IS : 2553-1971†
c) Wired and figured glass — IS : 5437-1969‡

4.2 Glazing compound for glazing should conform to following Indian Standards:

a) Putty — IS : 419-1967§
b) Polysulphide based sealants — IS : 11433 (Part 1)-1985‖ IS : 12118 (Part 1)-1987¶

NOTE 1 — *Compounds for Glazing in Concrete, Stone, Brick or Asbestos cement* — These types of compound normally need to be sealed to prevent absorption of oil from the glazing compound, unless the compound has been specially formulated; resistance to alkali is generally important. A non-setting compound may be used, provided it is painted.

*Flat transparent sheet glass (*second revision*).
†Safety glass (*second revision*).
‡Wired and figured glass.
§Putty for use on window frames (*first revision*).
‖Specification for one part gun-grade polysulphide-based joint sealants: Part 1 General requirements.
¶Specification for two parts polysulphide based sealant: Part 1 General requirements.

NOTE 2 — *Non-setting Compounds* — These are needed for use with colour and heat-absorbing glasses which will become hot in sunshine and which are, therefore, liable to expand and contract much more than ordinary glass. The fact that non-setting compounds are easily finger marked make it undesirable to use them without beads, except in relatively inaccessible situations. If, in order to prolong its life, or for other reasons, the compound is required to take paint, reference should be made to the manufacturer of the compound.

5. DESIGN

5.1 Selection of Thickness of Glass — For vertical windows secured on four edges, the minimum thickness of glass shall be found as follows:

a) The maximum wind load average over a one-minute period or preferably 3-second period should be ascertained (*see* Note).

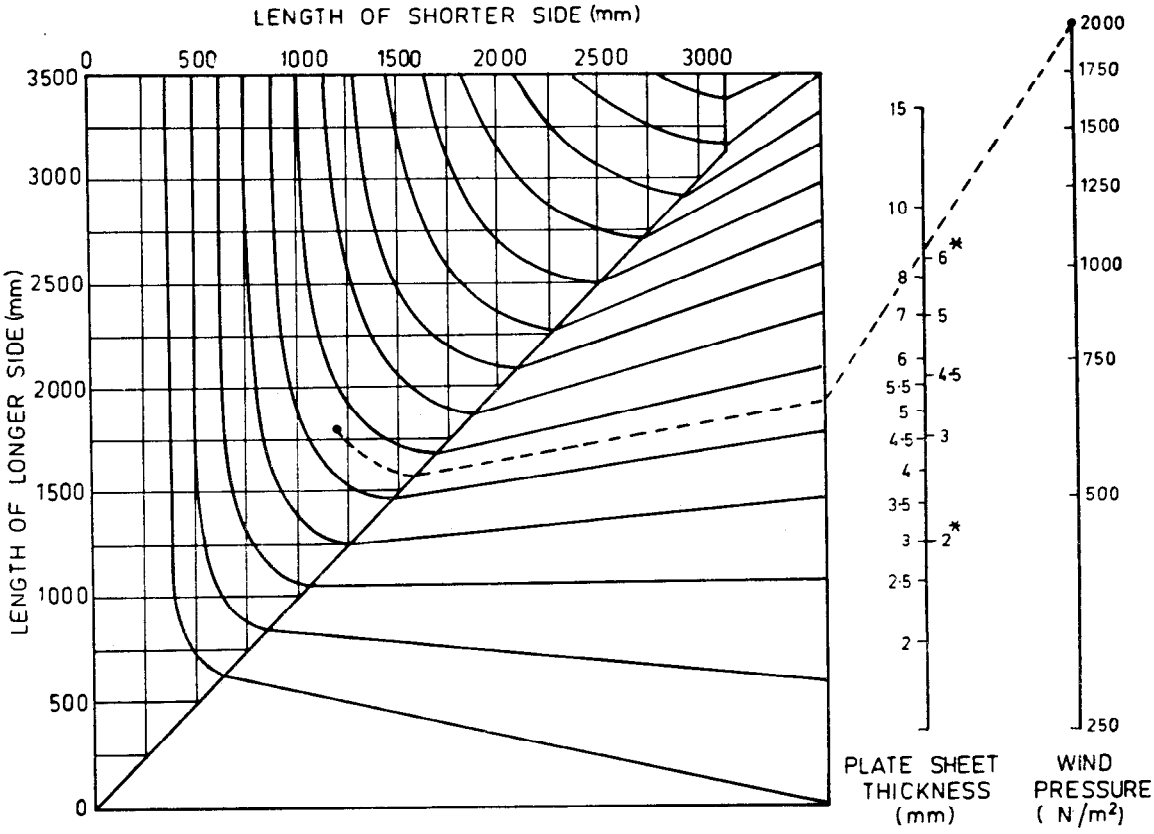
b) Allowance should be made for both inward and outward pressure and the maximum pressure as a result of combination of this fact shall be found; correction for relevant height of the building and also for shield-effect of obstructions sorrounding the buildings should be made in accordance with the principles laid down in IS : 875-1964*.

c) The glass factor for the particular use should be found by dividing the area of the glass pane expressed in m^2 by the perimeter in running metres.

For rectangular area, for instance, this would be $\frac{A \times B}{2(A + B)}$, where A and B are the dimensions of the sides in metres.

d) The minimum thickness of glass corresponding to various wind loads shall be found from Fig. 2, knowing the design pressure and glass factor.

*Code of practice for structural safety of buildings: Loading standards (*revised*).



*Weight of glass in kg/m^2 approximately equal to 2·6 times the thickness in millimetres. Nomogram for determining thickness of window panes for various wind pressures. (Modulus of rupture of sheet glass taken as 38 N/mm^2 and of plate glass as 19 N/mm^2 after making allowance for variability of strength).

FIG. 2 NOMOGRAM FOR DETERMINING THICKNESS OF GLASS PLATE AND SHEET FOR WINDOW PANES

NOTE — Wind load data collected over a long period will be available from the Meteorological Department and from this the maximum wind velocity and pressure corresponding to specific duration may be found. Unless very severe conditions of exposure warrant special considerations for design, the wind pressure data recommended in IS : 875-1964* (which correspond to measurement taken over a period of about 5 minutes) may be used in normal circumstances.

5.2 Durability — Though, under ordinary condition, glass has excellent durability, all glasses are subject to deterioration by action of water and prolonged attack by alkaline solutions may damage glass. If glass is allowed to remain dirty for a long period, the dirt film will tend to hold water and in this way, a process of surface attack may begin.

5.3 Fire Resistance — In regard to fire resistance requirements for glazing, reference may be made to IS : 1642-1960†.

5.4 Thermal Expansion and Contraction — For heat absorbing glass and clear glass with painted surface especially where the colour is black and when ordinary glass is used under dark background, the following special protections are necessary to provide for thermal expansion and contraction, and temperature of the glass may be liable to large variations on exposure to sunshine:

a) Where the longer dimension is less than 750 mm, a glazing allowance of not less than 3 mm shall be given. Where the longer dimensions exceeds 750 mm, not less than 5 mm clearance all round shall be given;

b) The minimum cover necessary for safe glazing, except where toughened glass is used, shall not exceed 10 mm as otherwise there is risk of cracking owing to the shielded edge remaining colder than the exposed area; and

c) Glazing compound should be non-setting compound and all absorbent rebates and grooves should be treated with a sealer and not merely primed.

5.5 Light Transmission and Heat Insulation — For improved heat and sound insulation, double or multiple glazing may be used. The heat insulation depends upon spacing and scarcely at all on the thickness of the glass used. For vertical glazing, the insulating value increases up to a spacing of about 10 mm, beyond which there is little further change. However, the spacing of as little as 3 mm will provide an insulating value of 50 percent of this maximum. For inclined or horizontal glazing, there may be some advantages in using a spacing greater than 20 mm where this is practicable. However, while designing for heat insulation, it should be remembered that frame members of high thermal conductivity may provide direct paths for heat leakage between the inside and outside air and thus appreciably impair the insulating value of the installation as a whole. The values of different light transmittence and heat/light ratio is given in Table 1.

TABLE 1 DIFFUSE LIGHT TRANSMITTANCE AND HEAT/LIGHT RATIO OF GLAZING MATERIALS

MATERRIAL	THICKNESS mm	DIFFUSE LIGHT TRANSMITTANCE	HEAT/ LIGHT RATIO
Clear glass	3·0	0·85	0·86
Double glazing (clear glass)	3·0 each	0·72	0·74*
Heat absorbing glass	3·2-3·5	0·62	0·24
Figured glass	3·2	0·78	0·83
Wire-cast glass	6·0	0·67	0·71

*Double glazing reduces heat/light ratio. Further, the heat insulation of double glazing also improves due to air gap causing reduction of the overall heat transmission coefficient.

5.6 Sound Insulation — For sound insulation, reference may be made to IS : 1950-1962*. For effective sound insulation, spacing of the order of 100 mm and above be adopted in case of double or multiple glazing. Thicker glass also provides insulation. Further improvements may be effected by lining the surrounds between the glasses with a sound absorbing material.

5.7 Rebates and Grooves — These should be rigid and true. Rebates for normal glazing shall be at least 8 mm deep, for small panes rebate may be 6 mm deep. For large windows, such as shop windows, the frame rebates at the tops and sides should be at least 10 mm and at the bottom 12 mm. Rebates for double or multiple glazed sealed units shall be 16 mm deep generally, unless otherwise advised by the manufacturers of the particular units. Rebates for flat glass without beads should be wide enough to accommodate the back putty, the glass and the front putty stripped at an angle. A wider rebate is needed for bent glass than for flat glass. For glazing with beads, rebates should be wide enough to accommodate glass and beads and to allow a minimum clearance of 1·5 mm at both the back and front of the glass. Rebate and grooves shall be clean and unobstructed before glazing.

*Code of practice for structural safety of buildings: Loading standards (*revised*).

†Code of practice for fire safety of buildings (general): Materials and details of construction.

*Code of practice for sound insulation of non-industrial buildings.

6. GLAZING

6.1 Size for Glass — The size of glass for glazing shall allow a clearance between the edge of glass and surround as specified below:

For wood or metal surrounds	2·5 mm
For stone concrete or brick	3·0 mm

The clearance may be increased, provided the depth of the rebate or groove is sufficient to provide not less than 1·5 mm cover to the glass.

6.2 Location of Glass in Frame — The glass shall rest upon two blocks to locate the pane properly within the surround. In the case of small panes, use of blocks may not be necessary. When glazing in side-hung windows or doors, the glass shall be located by blocks so that it bears on the bottom of the surround at a point near the hinge, but is not brought into contact with the surround and does not suffer undue stress.

6.2.1 When glazing in horizontal centre-hung sashes, which may be turned through about 180°, additional blocks shall be placed between the top edge of the glass and the surround to prevent movement of the glass when the sash is inverted. Where the panes are more than 90 mm high, the glass shall be located at the two pivoting points by blocks of suitably resilient material, such as chloroprene.

6.3 Preparation of Rebates and Grooves in Wood — Rebates or grooves should be primed to prevent excessive absorption of oil from the putty. If a shellac varnish or gloss paint is used for this purpose, the wood may be completely sealed and setting of the putty unduly delayed.

6.3.1 Absorbent hardwood frames that are not to be painted should either be primed with a medium composed of equal parts of exterior varnish and white spirit, and glazed with linseed oil putty or be completely sealed with a coat of unthinned exterior quality varnish and glazed with metal casement putty (which will need to be painted), or with a non-setting compound. Where hardwoods such as teak which are completely non-absorbent are recommended metal casement putty should be used. If the wooden frame has been treated with a preservative, according to the instructions of the manufacturer of the glazing compound, preparation of rebates and grooves should be made.

6.3.2 In the case of stone, concrete, brick or other similar materials, the rebates of grooves should be sealed with an alkali-resisting sealer and allowed to dry before glazing. The compound shall be metal-casement putty.

6.4 Glazing with Compound — This method is suitable for window and door panes where the combined height and width do not exceed the maximum shown in Fig. 1 for appropriate exposure grading.

6.5 Glazing with Beads — This method should be used for window and door panes where the combined height and width exceed the maximum shown in Fig. 1 for glazing in unpainted hardwood frames and framed shopfronts for double and multiple glazing units as defined in **6.9** (d), and wherever a non-setting compound is used in a position where it is liable to be disturbed.

6.6 Glazing with Compound into Rebates — Sufficient compound should be applied to the rebate so that, when the glass has been pressed into the rebate, a bed of compound (known as back putty) not less than 1·5 mm thick will remain between the glass and the rebate; there should also be surplus of compound squeezed out above the rebate which should be stripped at an angle (*see* Fig. 1B) not undercut, to prevent water accumulating. The glass should be secured by springs or spring clips spaced not more than 450 mm apart measured around the perimeter of the pane, and afterwards fronted with compound to form a triangular fillet stopping 1·5 mm short of the sight line so that the edge of the compound may be sealed against the glass by painting, without encroaching over the sight line.

6.7 Glazing with Compound into Grooves — The glass should be pressed into glazing compounds previously placed in the groove. The spaces between the glass and the sides of the groove should be filled with compound, which should then be stripped at an angle (*see* Fig. 1C) not undercut.

6.8 Glazing with Beads Alongwith Compound — Sufficient compound should be applied to the rebate so that when the glass has been pressed into the rebate, a bed of compound (known as back putty) not less thad 1·5 mm thick will remain between the glass and the rebate. There should also be a surplus of compound squeezed out above the rebate which should be stripped at an angle not undercut, to prevent water accumulating. Beads should be bedded with compound against the glass and wood beads should also be bedded against the rebate.

6.8.1 Care should be taken to ensure that no voids are left between the glass and the bead. For outside glazing, hollow beads are undesirable unless they can be completely filled.

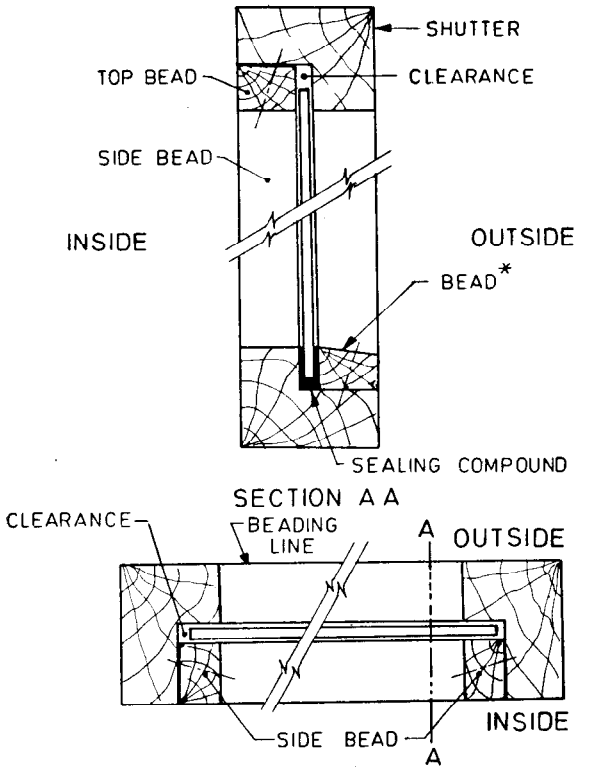
6.8.2 With non-setting compound and where there is a risk of glazing compound being dislodged by pressure, front and back-distance pieces (to maintain face clearances) should be used. Distance pieces should be completely embedded in the compound.

6.8.3 Beads should be secured to wooden frames with either panel pins or screws and to metal frames in the way provided for in the frame. In securing to wooden frames, an adequate

number of fixing for the beads should be used so as to prevent flexing or movement of the beads.

6.8.4 The external glazing should be as far as possible fixed from outside with beads as stated in **6.8.**

6.8.5 Where it is not possible to fix the class from outside, especially in a multistoreyed building, it may be fixed from inside with sealing compound as shown in Fig. 3.



*Can be fixed prior to or after placing the glass pane as per site conditions.

FIG. 3 INSIDE GLAZING

6.8.6 Figured glasses are used to avoid direct sunrays and to get diffused light. This can be achieved advantageously by placing rough surface of the glass facing outside. As the surface of glass from inside is smooth, it will facilitate in pasting of colour plastic film on inside surface, whenever required. In that case, it will be difficult to clean the rough surface of glass which is outside but it can be cleaned by a water jet.

6.9 Double and Multiple Glazing — The problems connected with the application of double and multiple glazing are briefly as follows:

a) *Two Separate Window Frames, Each Single-glazed* — These are preferable for sound insulation. To avoid problems of dirt and moisture in the air space, means of access to the cavity should be provided.

b) *One Window Frame Carrying Two Sashes Coupled Together, Each Separately Glazed* — The glazing may be in separate rebates, one inside-glazed and the other outside-glazed, or in single, wide rebates with spacing beads. The former methods has the advantage that either pane can be replaced without disturbing the other. However, carefully such glazing is done, it may be necessary to open the cavity at frequent intervals for the purpose of cleaning.

c) *One Window Frame of Sash Single-glazed Provided with Clip to Permit the Attachment of a Second Glass* — This system involves no serious cleaning problems since the clipped-on panes can be quickly detached. Their main use is on existing windows which cannot otherwise be modified.

d) *Double or Multiple Factory-made Hermetically Sealed Units* — Problems of cleaning of inner surfaces does not arise. Adequate rebate shall be provided in accordance with manufacturer's instruction.

6.10 Double Glazing Other than Factory-made Sealed Units — To minimize entry of warm moist air from the interior of the building or penetration of rain from outside into the cavity, the glazing should be done in a careful and thorough manner. Where opening sashes are provided, it is essential that they should fit closely. A small breathing hole or tube should be provided from the bottom of the cavity to the outside to ensure that such breathing vents are kept clear of paint or other obstructions.

6.10.1 Where separate panes are glazed in one sash, it is preferable to use preformed strip of compound for the back putty in glazing the second pane, in order to provide full back putty with a neat finish. Usually it is better to glaze the outer pane first.

6.11 Factory-made Double or Multiple Sealed Units — When ordering factory-made double or multiple sealed units, the following points may be taken into account:

a) Both tight size and sight size (not glazing size) should be specified;

b) Sealed units should be checked in the opening for edge clearance consistent with the manufacturer's recommendations. It is essential to follow any recommendations given by the manufacturer concerning the correct edge to be glazed at the bottom. Units should be positioned in the compound approximately one quarter of the total length from each end. The width of the blocks should be not less than the thickness of the sealed units and their thickness should be such as to position the units centrally in the opening. This thickness of glazing compound between the glass and the back of the rebate, and between

the glass and the bead should be about 1 mm;

c) Special techniques of glazing are required to protect the seal and reference should be made to the manufacturer of the glazing units;

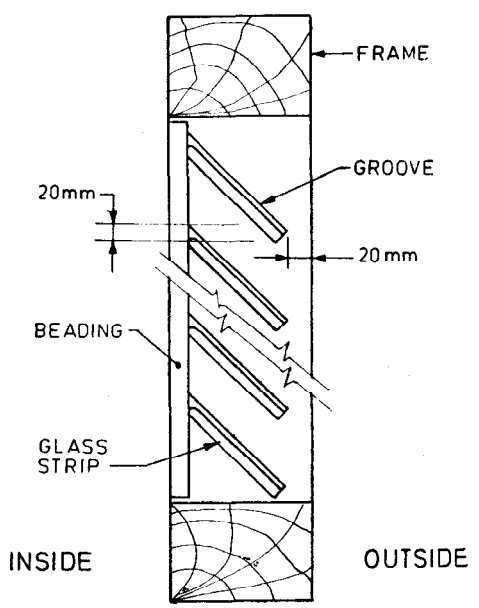
d) A non-setting glazing compound having good adhesion to glass and frame should be used. All absorbent rebates and beads should be treated with a sealer (priming is not sufficient);

e) Glazing with beads should always be used. Hollow beads are not recommended; and

f) Where there is a risk of the glazing being dislodged by pressure, front and back distance pieces should be used to maintain face clearance.

6.12 Louvered Glazing — This type of fixed glass louvers are recommended for toilets, stores, etc, where permanent ventilation is required.

6.12.1 *Louvered Glazing (Horizontal)* — Glass strips with rounded edges are inserted from inside in the grooves placed one above the other. The grooves shall be angular preferably at 45° on the frame. The grooves shall overlap over each other by at least 20 mm as shown in Fig. 4.



NOTE — The depth of groove may be thrice the thickness of glass and width of the groove may be 1 to 1·5 mm more than the maximum thickness of glass.

FIG. 4 FIXED GLAZED LOUVERED WINDOW

6.12.2 *Louvered Glazing (Vertical)* — Glass strips are placed angularly and vertically, and inserted as described in **6.12.1**.

6.13 Maintenance

6.13.1 *Cleaning* — Glass should be cleaned regularly. Failure to do this will result in considerable reduction of daylight indoors, and may also result in discolouration and deterioration of the surface. Warm water with soap or a mild domestic detergent, followed by a clean water rinse is generally adequate for routine cleaning. For transparent glasses, cloth or wash leather should be used; for glasses with a broken or textured surface, a stiff plastic or bristle brush will be found effective. Where the above methods fail to remove obstinate dirt from transparent glass, polishing with whiting in water or methylate spirits may be found to be successful. Corrosive cleaning liquids are also sometimes employed, but should be handled with great care and should be sluiced away with excess of clean water as soon as possible after use to avoid damage to glazing or fixing compounds, window frames or any other materials near to the glass. Organic solvents are also useful for special purposes, for example, petrol or benzene for removing tar, turpentine for paint that has not dried hard and paraffin for grease. The solvents should, however, be carefully cleaned off the glass afterwards and, in some instances, the fire risk may need to be guarded against during use. Plaster or mortar splashed on the glass may be removed with a thin razor blade preferably before the material has set hard. Dried paint may be removed similarly. In using the razor blade, excessive force should not be used.

6.13.1.1 If a trial shows that none of the above methods is likely to be quickly successful, it may be more economical to replace the glass.

6.13.1.2 Where the cleaning of embossed, sand blasted or decorated glasses has been neglected, ordinary window cleaning methods may not be expected to be successful and treatment by a specialist is required.

6.13.2 *Replacement* — If wired glass is broken and allowed to remain exposed to weather conditions, moisture will penetrate to the wire which will rust. This will result in failure of the wire, which may allow the glass to fall. It is, therefore, essential that any breakage be made waterproof at once with a material such as a bituminous paint and replacement undertaken with new glass as soon as is practical.

6.13.3 *Maintenance of Glazing* — Glazing compound shall be regularly painted except where special materials are used. The building maintenance shall ensure that the metal work surrounding the frame do not corrode resulting in closing of gaps between the frame and glass or warping of timber with consequent breakage of glass.