IS : 6461 (Part V) - 1972
(Reaffirmed 1992)

Indian Standard

GLOSSARY OF TERMS RELATING TO CEMENT CONCRETE

PART V FORMWORK FOR CONCRETE

(Second Reprint JUNE 1992)

UDC 001.4:69.057.52:666.972

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

Gr 7 *July* 1972

Indian Standard

GLOSSARY OF TERMS RELATING TO CEMENT CONCRETE

PART V FORMWORK FOR CONCRETE

Cement and Concrete Sectional Committee, BDC 2

Chairman	*Representing*
DR H. C. VISVESVARAYA	Cement Research Institute of India, New Delhi
Members	
DR A. S. BHADURI	National Test House, Calcutta
SHRI E. K. RAMACHANDRAN (*Alternate*)	
SHRI A. K. CHATTERJI	Central Building Research Institute (CSIR), Roorkee
DR S. S. REHSI (*Alternate*)	
DIRECTOR	Central Road Research Institute (CSIR), New Delhi
DR R. K. GHOSH (*Alternate*)	
DIRECTOR (CSMRS)	Central Water & Power Commission, New Delhi
DEPUTY DIRECTOR (CSMRS) (*Alternate*)	
SHRI K. C. GHOSAL	Alokudyog Services Ltd, New Delhi
SHRI A. K. BISWAS (*Alternate*)	
DR R. K. GHOSH	Indian Roads Congress, New Delhi
DR R. R. HATTIANGADI	The Associated Cement Companies Ltd, Bombay
SHRI P. J. JAGUS (*Alternate*)	
JOINT DIRECTOR, STANDARDS (B & S)	Research, Designs & Standards Organization, Lucknow
DEPUTY DIRECTOR, STANDARDS (B & S) (*Alternate*)	
SHRI S. B. JOSHI	S. B. Joshi & Co Ltd, Bombay
SHRI M. T. KANSE	Directorate General of Supplies & Disposals
SHRI KARTIK PRASAD	Roads Wing, Ministry of Transport & Shipping
SHRI S. L. KATHURIA (*Alternate*)	
SHRI S. R. KULKARNI	M. N. Dastur & Co (Private) Ltd, Calcutta
SHRI M. A. MEHTA	Concrete Association of India, Bombay
SHRI O. MUTHACHEN	Central Public Works Department
SUPERINTENDING ENGINEER, 2ND CIRCLE (*Alternate*)	
SHRI ERACH A. NADIRSHAH	Institution of Engineers (India), Calcutta
SHRI K.K. NAMBIAR	In personal capacity ('*Ramanalaya*', *11 First Crescent Park Road, Gandhinagar, Adyar, Madras 20*)
BRIG NARESH PRASAD	Engineer-in-Chiefs' Branch, Army Headquarters
COL J. M. TOLANI (*Alternate*)	

(*Continued on page* 2)

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

(*Continued from page* 1)

Members	*Representing*
PROF G. S. RAMASWAMY	Structural Engineering Research Centre (CSIR), Roorkee
DR N. S. BHAL (*Alternate*)	
DR A. V. R. RAO	National Buildings Organization, New Delhi
SHRI RAVINDER LAL (*Alternate*)	
SHRI G. S. M. RAO	Geological Survey of India, Nagpur
SHRI T. N. S. RAO	Gammon India Ltd, Bombay
SHRI S. R. PINHEIRO (*Alternate*)	
SECRETARY	Central Board of Irrigation & Power, New Delhi
SHRI R. P. SHARMA	Irrigation & Power Research Institute, Amritsar
SHRI MOHINDER SINGH (*Alternate*)	
SHRI G. B. SINGH	Hindustan Housing Factory Ltd, New Delhi
SHRI C. L. KASLIWAL (*Alternate*)	
SHRI J. S. SINGHOTA	Beas Designs Organization, Nangal Township
SHRI A. M. SINGAL (*Alternate*)	
SHRI K. A. SUBRAMANIAM	India Cements Ltd, Madras
SHRI T. S. RAMACHANDRAN (*Alternate*)	
SHRI L. SWAROOP	Dalmia Cement (Bharat) Ltd, New Delhi
SHRI A. V. RAMANA (*Alternate*)	
SHRI D. AJITHA SIMHA, Director (Civ Engg)	Director General, ISI (*Ex-officio Member*)

Secretary

SHRI Y. R. TANEJA
Deputy Director (Civ Engg), ISI

Concrete Subcommittee, BDC 2 : 2

Convener	
SHRI S. B. JOSHI	S. B. Joshi & Co Ltd, Bombay
Members	
DR S. M. K. CHETTY	Central Building Research Institute (CSIR), Roorkee
SHRI C. A. TANEJA (*Alternate*)	
SHRI B. K. CHOKSI	In personal capacity (*'Shri Kunj', Near Parkash Housing Society, Athwa Lines, Surat 1*)
DEPUTY DIRECTOR, STANDARDS (B & S)	Research, Designs & Standards Organization, Lucknow
ASSISTANT DIRECTOR, STANDARDS (M/C) (*Alternate*)	
DIRECTOR	Engineering Research Laboratories, Hyderabad
DIRECTOR (C & MDD)	Central Water & Power Commission, New Delhi
DEPUTY DIRECTOR (C & MDD) (*Alternate*)	
SHRI V. K. GHANEKAR	Structural Engineering Research Centre (CSIR), Roorkee
SHRI A. S. PRASADA RAO (*Alternate*)	
SHRI K. C. GHOSAL	Alokudyog Services Ltd, New Delhi
SHRI A. K. BISWAS (*Alternate*)	
SHRI V. N. GUNAJI	Buildings & Communications Department, Bombay
SHRI P. J. JAGUS	The Associated Cement Companies Ltd, Bombay
SHRI S. R. KULKARNI	M. N. Dastur & Co (Private) Ltd, Calcutta
SHRI B. C. PATEL (*Alternate*)	

(*Continued on page* 27)

Indian Standard

GLOSSARY OF TERMS RELATING TO CEMENT CONCRETE

PART V FORMWORK FOR CONCRETE

0. FOREWORD

0.1 This Indian Standard (Part V) was adopted by the Indian Standards Institution on 25 February 1972, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 Cement concrete is one of the most versatile and extensively used building material in all civil engineering constructions. There are number of technical terms connected with the basic material for concrete as well as the production and use of concrete which quite often require clarification to give precise meaning to the stipulations in the standard specifications, codes of practice and other technical documents. It has, therefore, become necessary to standardize the various terms and definitions used in cement and concrete technology and thus avoid ambiguity in their interpretations. The Sectional Committee has, therefore, decided to bring out a series of glossaries of terms relating to concrete and concrete materials.

0.3 For convenience of reference, the ' Indian Standard Glossary of terms relating to cement concrete ' has been grouped into the following twelve parts:

Part I	Concrete aggregates
Part II	Materials (other than cement and aggregate)
Part III	Concrete reinforcement
Part IV	Types of concrete
Part V	Formwork for concrete
Part VI	Equipment, tools and plant
Part VII	Mixing, laying, compacting, curing and other construction aspects
Part VIII	Properties of concrete
Part IX	Structural aspects
Part X	Tests and testing apparatus
Part XI	Prestressed concrete
Part XII	Miscellaneous

0.3.1 In addition to the above, two separate standards have been brought out concerning terminology relating to hydraulic cement and pozzolanic materials. These standards are IS : 4845-1968* and IS : 4305-1967†.

0.4 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. This has been met by deriving assistance from the following publications:

BS : 2787-1956 Glossary of terms for concrete and reinforced concrete. British Standards Institution.

BS : 4340-1968 Glossary of formwork of terms. British Standards Institution.

ASTM Designation C 125 Definitions of terms relating to concrete aggregate. American Society for Testing and Materials.

ACI SP-19 (1967) Cement and concrete terminology. American Concrete Institute.

ACI 617-1968 Recommended practice for concrete formwork. American Concrete Institute.

1. SCOPE

1.1 This standard (Part V) covers definitions of terms relating to form work for concrete.

2. DEFINITIONS

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

2.1 Accessories — Items other than frames, braces, or post shores used to facilitate the construction of scaffold and shoring.

2.2 Access Door (Access Trap or Inspection Door or Porthole or Trap Door) — A removable panel in the formwork for a high lift to give access for inspection or for placing or compacting concrete (*see also* **2.67**).

2.3 Access Trap — *See* **2.2**.

2.4 Activating Agent — *See* **2.307**.

2.5 Adjustable Prop, Telescopic Prop — A prop whose length may be varied.

*Definitions and terminology relating to hydraulic cement.

†Glossary of terms relating to pozzolana.

2.6 Adjuster — A mechanical device for bringing formwork to its correct line or level or both.

2.7 Anchor — A device for providing a fixing to a concrete surface (*see also* **2.141**).

2.8 Anchor Bolt — A bolt passing through the member to be anchored and engaging with the anchor.

2.9 Anchor Plate — A plate on the embedded end of an anchor which increases its resistance to being pulled out of the concrete.

2.10 Anchor Slot — *See* **2.106**.

2.11 Angle Fillet (Corner Mould) — A strip used to form an internal or external intersection which is to be other than a sharp angle.

2.12 Arris — Sharp edge or protruding corner formed by meeting of two surfaces, whether plane or curved, applied especially to edges in mouldings and edges separating fluting.

2.13 Back Form (Top Form)

a) A form for a concrete surface which will be unseen in the finished structure.

b) Form required on the upper or outer surface of a sloping slab or thin shell.

2.14 Back Propping — Propping to cast concrete floors which allows them to support formwork for higher floors.

2.15 Ballies — Thin poles in the round usually without bark.

2.16 Barrier Paint — *See* **2.264**.

2.17 Bar Spacer — A device for maintaining reinforcement in its correct position within the formwork (*see also* **2.90**).

2.18 Batten (Batten Strip)

a) A member of relatively small section.

b) A narrow strip of wood placed over the vertical joint of sheathing or panelling, or used to hold several boards together.

c) A piece of sawn timber whose cross-sectional dimensions do not exceed 50 mm in either direction.

2.19 Batter — A small inclination from the vertical.

2.20 Batter Boards — Pairs of horizontal boards nailed to wood stakes adjoining an excavation, used as a guide to elevations and to outline the building.

2.21 Bay — An area of concrete bounded by construction joints, expansion joints or free edges.

2.22 Beam Box (Beam Casing) — The assembled side and bottom formwork for a beam.

2.23 Beam Casing — *See* **2.22.**

2.24 Beam Clamp (Beam Cramp or Clamp, or Cramp) — A yoke or other device, which holds a beam box tightly against the pressure of freshly placed concrete.

2.25 Beam Cramp — *See* **2.24.**

2.26 Beam Hanger (Form Hanger or Beam Saddle)

a) A support to the soffit form for the encasement to a steel joist where the form is hung from the joist itself.

b) A wire, strap, or other hardware device that supports formwork from structural members.

2.27 Beam Side — Vertical side panels or parts of a beam form.

2.28 Bearing — A surface which transmits direct compressive load from one member to another.

2.29 Bearing Area — The area of the interface over which bearing stress exists.

2.30 Bearing Length — That length of beam which rests on a support.

2.31 Bearing Stress — The compressive stress which exists at the interface between two structural members where the forces exerted by one member on the other tend to crush the materials of which the members are made.

2.32 Bent — A two-dimensional frame used as a supporting structure, usually when a number of such frames are used as the supports of a long narrow structure, such as a jetty or pier.

2.33 Bevel — The intersection of one plane surface with another plane surface at an angle other than a right angle.

2.34 Bevel, To — To cut the edge of a panel or board at an angle other than a right angle.

NOTE — This is normally done so that the panels or boards may easily be struck or to form an intersection between two such panels or boards.

2.35 Binding — The adherence of forms to the concrete when the supports are removed and striking is attempted.

2.36 Bleb — *See* **2.39.**

2.37 Block (Blocking Piece) — A piece of wood or other material used to pack out or separate, or, when glued, to stiffen other members (*see also* **2.204**).

2.38 Blocking Piece — *See* **2.37**.

2.39 Blowhole — A small hole, generally smaller than about 16 mm across in a concrete face, caused by an air pocket.

2.40 Blow Out, To — To use compressed air for cleaning out the inside of formwork before concreting.

2.41 Board

a) A piece of square-sawn softwood timber under 50 mm thick and 100 mm or over wide.

b) A piece of square-sawn or unedged hardwood timber 50 mm or less in thickness and of the required width.

c) Manufactured rigid or semi-rigid sheets, such as laminated board, wood chipboard and other particle board or hard-board.

2.42 Bolt Sleeve — A cylindrical or other shaped form through which a bolt passes so as to separate the bolt from the surrounding concrete.

2.43 Box — Formwork for a beam or column (*see also* **2.22**, **2.44** and **2.73**).

2.44 Box-Out — The form for a pocket or aperture in concrete.

2.45 Brace (Back Stay)

a) Any structural member used to support another, always designed for compression loads and sometimes for tension under special load conditions.

b) A member in a bracing system.

2.46 Bracing — The system of members, usually diagonal, which acts in compression or tension and stiffens a frame against deformation.

2.47 Break Down, To — To dismantle made-up formwork after it has been struck.

2.48 Brick Seat — Ledge on wall or footing to support a course of masonry.

2.49 Building Board — A loose term applied to most boards.

2.50 Bulkhead — A vertical partition within the forms, blocking fresh concrete from a section of forms or closing the end of a form, such as at a construction joint.

2.51 Butt Joint — A plain square joint between two members.

2.52 Camber — The intentional curvature of a beam or formwork, either formed initially to compensate for subsequent deflection under load or produced as a permanent effect for aesthetic reasons.

2.53 Cantilever Formwork — Formwork which is supported solely by members fixed to, and projecting beyond, previously hardened concrete.

2.54 Carcassing Timber (Framing Timber) — Timber used for any structural purpose in the support of the forms, but not normally in contact with the concrete.

2.55 Cast-in-Socket — An anchor consisting of a female-threaded metal socket cast into concrete as a fixing for a bolt.

2.56 Centering (Centring)

a) The temporary supporting structure to a soffit.

b) Centring is the specialized formwork used in the construction of arches, shells, space structure or any continuous structure where the entire falsework is lowered (struck or decentred) as a unit to avoid introducing injurious stress in any part of structure.

2.57 Centre — *See* **2.136**.

2.58 Chamfer

a) The surface produced by the removal, usually symmetrically, of an external edge.

b) Beveled corner, which is formed in concrete work by placing a three-corner piece of wood (cant strip or skew back) in the form corner.

2.59 Chase — A long groove or recess formed in the concrete surface.

2.60 Chase Form — A form for moulding a chase. It is often a wooden moulding planted on the face of the main form (*see also* **2.62**).

2.61 Check — A small strip of timber fixed to the face of a form to indicate the top of a concrete lift and to form a clean line at the joint with the next lift (*see also* **2.158**).

2.62 Check Out — A piece of wood or other material fixed to the face of a form to form a recess in concrete (*see also* **2.60**).

2.63 Chipboard — *See* **2.347**.

2.64 Cill — *See* **2.274**.

2.65 Clamp — *See* **2.24**, **2.75** *and* **2.341**.

2.66 Cleanout Hole — *See* **2.67**.

2.67 Cleanout Trap (Cleanout Hole) — A removable section at the base of the forms for a column or wall which allows rubbish to be removed before concreting (*see also* **2.2**).

2.68 Cleat

a) A block fixed to a main member to provide a bearing or to resist a thrust (*see also* **2.190**).

b) Small board used to connect formwork members or used as a brace.

2.69 Climbing Formwork (Moving Formwork) — Formwork for vertical or near vertical structures which are constructed in successive lifts and which is supported by the previously poured lift (*see also* **2.189**).

2.70 Coffer Form — *See* **2.337.**

2.71 Coffered Slab — *See* **2.339.**

2.72 Collapsible Forms — Forms which are activated by mechanical means to reduce their volume or surface area to permit striking.

2.73 Column Box (Column Casing) — The assembled forms for a column.

2.74 Column Casing — *See* **2.73.**

2.75 Column Clamp (Column Cramp) — A yoke or other device which holds a column box tightly closed against the pressure of freshly placed concrete.

2.76 Column Cramp — *See* **2.75.**

2.77 Column Guard — A length of metal angle cast into a corner of a column to protect it against damage.

2.78 Column Side — One of the vertical panel components of a column form.

2.79 Cone — A cone-shaped piece of wood, rubber or other material which is placed over the end of a form tie to form a neat hole in the surface of the concrete.

2.80 Construction Joint — The interface between adjacent concrete pours which are designed to act monolithically in the completed structure (*see also* **2.94**).

2.81 Continuously Sliding Form — *See* **2.276.**

2.82 Contraction Joint — *See* **2.270.**

2.83 Control Joint — Groove (formed, saw cut or tooled) in concrete structure to regulate the location of shrinkage cracks.

2.84 Corbel — A projection from the face of a wall or column, usually to provide a bearing for a beam.

2.85 Core

a) A removable former used to produce a cavity of any shape in concrete.

b) The inner layer or layers of a piece of board.

2.86 Corner Mould — *See* **2.11**.

2.87 Counter-Waling — *See* **2.301**.

2.88 Cove — An infill which produces a concave curve connecting the two surfaces forming an internal angle such as that between a wall and a ceiling or floor.

2.89 Cover (Reinforced Concrete) — The least distance between the surface of the reinforcement and the face of the concrete.

2.90 Cover Block — A device which is fixed between reinforcement and the face of a form to ensure correct cover to the reinforcement.

2.91 Cradling — Light timber framing in formwork.

2.92 Cross Brace — A pair of diagonal braces.

2.93 Crown Centre — In centering, a structure which supports ribs at the crown of a dome.

2.94 Day Joint — A construction joint formed at the end of a day's concreting.

2.95 Dead Load — The self-weight of the forms and the permanent structure supported by them (*see also* **2.195**).

2.96 Dead Man — A heavy block or beam, sometimes burried, used to anchor a guy or form tie.

2.97 Dead Shore — A support to hardening concrete designed to be left in place when the soffit form is struck.

2.98 Deal — A piece of square-sawn softwood timber 50 to 100 mm thick and 230 to under 280 mm wide.

2.99 Deck or Decking

a) The form upon which concrete for a slab is placed, also the floor or roof slab itself.

b) The sheeting to a soffit form.

2.100 Deflection — The deformation of a member caused by bending stress.

2.101 Delamination — The separation of the layers which make up plywood or laminated wood.

2.102 **Deviation** — The distance between the actual position of a reference point and its specified position (*see also* **2.323**).

2.103 **Distance Piece (Spacer, Spreader)** — A short piece of timber or other material used to hold parallel forms for walls or beams at the correct spacing.

2.104 **Domed Pan** — *See* **2.337**

2.105 **Double-Headed Nail** — A round-wire nail which has a second head formed in the shank, just below the head struck by the hammer.

NOTE — After being driven home this nail leaves a projecting head for easy withdrawal.

2.106 **Dovetailed Anchor (Anchor Slot or Slot Anchor)** — A device made from sheet steel or other metal and cast into the concrete surface to produce a chase which is narrower at the surface than at its base into which shaped metal tongues are inserted to form an anchor.

2.107 **Dowel** — A cylindrical piece of wood used for positioning and fixing one member to another.

2.108 **Dowel Bar (Dowel Pin)** — A short metal rod or bar cast into concrete with part of its length left projecting as a fixing or (especially in road and other slabs) as a means of transferring forces acting in the plane of a joint from one member or slab to another.

NOTE — One end of a dowel is usually fixed in one member while the other end is free to slide in the other member. Forces may thus be transmitted across the axis of the dowel but not along it.

2.109 **Dowel Pin** — *See* **2.108.**

2.110 **Drawform (Separator Plate)** — A loose vertical metal plate which separates an integral facing from the backing concrete and which is gradually withdrawn as the form is filled to allow the two mixes to bond together.

2.111 **Dressed Timber** — *See* **2.216.**

2.112 **Drip** — A cut out in the underside of a projecting piece of wood, stone or concrete to prevent water from working its way back to the wall.

2.113 **Dummy Joint** — A groove in the surface of the concrete which gives the appearance of a joint.

2.114 **Easing Wedges** — *See* **2.139.**

2.115 **Edge Form** — The formwork to the edge of a road or other slab.

2.116 **End Lug (Lip End)** — An end bearing plate on floor centres.

NOTE — An end lug is sometimes adjustable.

2.117 Expanded Metal — A metal network or mesh formed by suitably stamping or cutting slits in sheet metal and stretching it to form open meshes, usually of diamond shape.

NOTE — Expanded metal may be used as reinforcement in concrete and for forming box-outs and stop ends.

2.118 Expanded Polystyrene (Foamed Polystyrene) — A rigid plastics material, usually in the form of sheets or blocks, which is made by pressing together particles of polystyrene which have been expanded by steam to form non-porous, ultra-lightweight beads (*see also* **2.245**).

NOTE — Expanded polystyrene is used to form box outs and other awkward shapes in concrete.

2.119 Exterior Plywood — Plywood normally bonded with a phenolic resin adhesive, which complies with the ' weather- and boil-proof (WBP) ' requirements.

2.120 External Vibrator — A vibrator which is attached or applied to the outside of the forms.

2.121 Face Mix — *See* **2.175**.

2.122 Fair Face — A plain concrete finish better than that produced from rough formwork.

2.123 Falsework

a) Falsework is the temporary structure erected to support work in the process of construction. It is composed of shores, formwork for beams or slabs (or both), and lateral bracing.

b) That part of formwork which supports the forms usually for a large structure, such as a bridge.

2.124 Fascia — A flat member or bend at the surface of a building or the edge beam on a bridge or exposed eave of a building, etc.

2.125 Feather Edge — The sharp edge produced when two surfaces meet at an acute angle.

2.126 Fibre Glass — A mat or cloth made from strands of glass.

NOTE — Glass fibre is used in glass fibre reinforced plastics in the construction of moulds and forms.

2.127 Fibre Glass Reinforced Plastic — A material made from plastics or resins reinforced by glass fibre, usually by building up successive layers of these component materials.

2.128 Filler — *See* **2.292**.

2.129 Fillet — A piece of timber, of triangular cross-section, fixed at the intersection of two forms to produce a chamfer on the concrete.

2.130 Film Overlay Plywood (Overlay Plywood) — Plywood to the faces of which a layer of resin in the form of a sheet (or film) is permanently bonded during manufacture, usually by means of heat and pressure, so as to form a smooth non-absorbent surface (*see also* **2.219**).

2.131 Fin — An undesirable projection from the face of the concrete caused by grout escaping into a gap along a joint in the form.

2.132 Fishplate — A plate used for connecting the webs of members where these are to be joined end to end.

2.133 Flat Jack — A jack, made of two dished steel sheets with one inverted onto the other and the two welded together round their rims, which is inflated by injection of oil or grout under pressure.

2.134 Flexible Foamed Polyurethane — Polyurethane which has been expanded during manufacture to form a flexible multi-cellular material.

NOTE — Flexible foamed polyurethane is mainly used in formwork by being compressed in the joints between boards and between forms and the concrete to prevent grout loss.

2.135 Flier — *See* **2.137**.

2.136 Floor Centre — A beam of adjustable length, usually a metal-lattice or sheet-metal box beam, used to support decking for a floor slab.

2.137 Flying Shore (Flier) — A horizontal strut fixed above ground between two walls.

2.138 Foamed Polystyrene — *See* **2.118**.

2.139 Folding Wedges (Easing Wedges) — Wedges, usually timber but occasionally metal, used in pairs for levelling and adjusting formwork during erection and/or to release loads on formwork prior to striking. They are also used to tighten or slacken connections between formwork members (*see also* **2.332**).

2.140 Form (Shutter)

a) That part of formwork which consists of the sheeting and its immediate supporting or stiffening members (*see also* **2.200** and **2.212**).

b) A temporary structure or mould for the support of concrete while it is setting and gaining sufficient strength to be self supporting.

2.141 Form Anchor — A device used in the securing of formwork to previously placed concrete of adequate strength. The device is normally embedded in the concrete during placement.

2.142 Form Coating — *See* **2.264**.

2.143 Form Hanger — *See* **2.26** (b).

2.144 Form Lining (Lining) — Prepared timber, board or sheets of plastics, paper or other material, fixed to the inside face of the form to produce a special surface finish.

2.145 Form Plucking (Form Scabbing) — Removal of the surface of the form due to adhesion of the form to the concrete.

2.146 Form Scabbing — *See* **2.145**.

2.147 Form Tie (Wall Tie or Tie)

a) A device for holding the opposing faces of wall, beam or other forms at the correct distance apart against the pressure of fresh concrete.

b) A tensile unit adapted to holding concrete forms against the active pressure of freshly placed plastic concrete.

2.148 Formwork (Shuttering) — Complete system of temporary structure built to contain fresh concrete so as to form it to the required shape and dimensions and to support it until it hardens sufficiently to become self-supporting. Formwork includes the surface in contact with the concrete and all necessary supporting structure (*see also* **2.200**).

2.149 Framing Timber — *See* **2.54**.

2.150 Gang Mould — A series of moulds so arranged that many identical precast units can be formed on the same base.

2.151 Ganged Form — A number of panels fixed together and stiffened with walings, strongbacks or soldiers, or combinations of these.

2.152 Grain (of Wood) — The general direction or arrangement of the fibres, like spiral grain, straight grain, etc.

2.153 Grillage — An assemblage of timber or steel members placed parallel to each other under a sill to spread the load from the sill.

NOTE — Where the load is large a grillage may consist of two or more layers of parallel members placed across each other at right angles.

2.154 Grit Blasting — The abrasion of a surface by blowing grit on to it at high velocity (*see also* **2.269**).

NOTE — Grit blasting is sometimes used to accentuate the grain of timber for greater effect in roughboard formwork.

2.155 Groundcill — A cill which is in direct contact with the ground.

2.156 Grout Loss — The loss of cement and water from fresh concrete by leakage through joints in the forms.

2.157 Grout Seal — Material or method used for sealing joints in forms to prevent grout loss. Normally, a strip of compressible material inserted in the joints.

2.158 Grout Strip — A batten fixed to a form to create a clean line at the top of a concrete lift.

NOTE — The clean line so produced allows even contact of the forms for the next lift and helps minimize grout loss.

2.159 Gusset — A plate made of steel, timber, plywood or other material which is nailed or bolted over main timbers to form or strengthen a joint between them.

2.160 Guy (Guy Rope) — A rope fixed at one end to a structure, and at the other end to a stake, dead man or other secure point in order to provide resistance to lateral forces.

2.161 Guy Rope — *See* **2.160.**

2.162 Hanger — A vertical member giving support from above (*see also* **2.26**).

2.163 Hanging Formwork — Formwork which is supported from above (*see also* **2.26**).

2.164 Hardboard — Fibre building board having a nominal thickness of 3 to 12 mm, usually made from wood fibres.

2.165 Headtree

a) A strutted bearer at the top of a post at right angles to the run of the beam box, which it supports.

b) A bearer placed or fixed on top of a dead shore to spread the support from the dead shore.

2.166 Hollow Form — A form for producing weight-reducing recesses in the soffit of a suspended slab (*see also* **2.333, 2.337** *and* **2.339**).

2.167 Hollow Mould — *See* **2.166.**

2.168 Hydrostatic Pressure — The pressure exerted on the formwork by the freshly placed concrete where this is effectively a fluid.

2.169 Immersion Vibrator (Internal Vibrator) — A vibrator which is inserted into the freshly placed concrete (*see also* **2.223**).

2.170 Independent Prop — *See* **2.97.**

2.171 Inflatable Form — A form which acquires the required shape by internal pressure and which is deflated for striking. It is usually long relative to its cross-sectional dimensions.

2.172 Insert — A piece of timber or other material cast into the concrete surface usually to provide a fixing.

2.173 Inspection Door — *See* **2.2.**

2.174 Insulation (Lagging) — A cover of insulating material intended to reduce loss of heat. It is used on forms in cold weather to reduce loss of heat from the concrete.

2.175 Integral Facing (Face Mix) — A special facing concrete or mortar, cast simultaneously with the backing concrete so as to be monolithic with it. It is often cast by using a drawform.

2.176 Internal Vibrator — *See* **2.169.**

2.177 Jack — A mechanical device for raising heavy loads (*see also* **2.133**).

2.178 Jack Rod — A steel rod upon which jacks act in order to raise slip forms.

2.179 Joist — A horizontal or sloping beam, in particular the horizontal timbers which carry decking for a suspended concrete slab.

2.180 Kerf — A saw cut which is not the full depth of the timber.

2.181 Kerfing — *See* **2.254.**

2.182 Kerf-Sawing — *See* **2.254.**

2.183 Key — The treatment of a concrete surface to ensure the bonding of fresh concrete to that already cast.

2.184 Lacing — Horizontal members which hold together and position props or other vertical supports.

2.185 Lagging — Narrow timbers fixed to a shaped frame for forming curved surfaces.

2.186 Laminated Wood — An assembled product made up of layers of wood and adhesives in which the grain of adjacent layers is parallel.

2.187 Lamination — One of the individual layers of wood used to make up laminated wood.

2.188 Lap — The part of the length or height of a form which covers the previously placed concrete when the form is fixed in place for the next lift.

2.189 Leapfrog Form — A form for a method of casting vertical surfaces in which two or more sets of forms are used so that the form for the last poured lift may be left fixed in place while that from a lower lift is struck and re-erected on top of it, the process being repeated, if necessary.

2.190 Ledge (Cleat) — A member nailed across a number of boards to hold them together.

2.191 Ledger (Runner)

a) A horizontal timber supported on posts or hangers and carrying joists.

b) A timber fixed to the side of a beam box, or elsewhere to support the ends of joists carrying decking.

c) A longitudinal member spanning across a number of support members to lace them together.

d) One of a pair of supports running parallel to the axis of the centering for a deep arch or tunnel. One runner is above the other and they are separated by folding wedges.

2.192 Lift — That height of concrete which is poured in one continuous operation.

2.193 Lining — *See* **2.144.**

2.194 Lip End — *See* **2.116.**

2.195 Live Load — The temporary forces applied to formwork by the weights of men and construction equipment (*see also* **2.95**).

2.196 Loose Tongue — A strip of wood which is inserted into grooves in the edges of adjacent boards where these are to be joined edge to edge (*see also* **2.324**).

2.197 Make-Up Piece — A piece of material used to obtain dimensions greater than those obtainable by use of standard pans or panels.

2.198 Mobile Form — *See* **2.330.**

2.199 Moisture Movement — The swelling and shrinkage of a material caused by varying moisture content.

2.200 Mould — A form for casting precast concrete units.

2.201 Mould Oil — Oil or emulsion applied to the face of forms, its primary purpose being to act as a release agent.

2.202 Moving Formwork — *See* **2.69**, **2.276** *and* **2.330.**

2.203 Nib — A small concrete upstand cast above floor level to position wall or column forms for the next lift and to assist the prevention of grout loss.

2.204 Nogging Piece — A short wooden strut fixed between and at right angles to cleats, joists, studs, walings, etc, in order to stiffen them (*see also* **2.37**).

2.205 Overlay Plywood — *See* **2.130.**

2.206 Pallet — A flat timber or metal plate on which precast concrete units are cast and handled until they have hardened.

2.207 Pan — A form of stiffened steel sheet which is a component of a system of formwork. A number of pans may be fixed together to construct a larger area.

2.208 Panel — A prefabricated form of limited size, designed for repeated re-use, a number of which may be fixed together to form a larger surface (*see also* **2.151**).

2.209 Particle Board — Board made from particles of wood and/or other lignocellulosic material bonded with synthetic resin and/or other organic binder.

2.210 Parting Compound — *See* **2.239.**

2.211 Pencil Round — The junction of two concrete surfaces which is finished with a small radius.

2.212 Permanent Form (Permanent Shutter) — Forms permanently left in place to provide a facing to the concrete.

2.213 Permanent Shore — *See* **2.97.**

2.214 Permanent Shutter — *See* **2.212.**

2.215 Placing Rate — The rate at which the free surface of the concrete rises in the forms during placing.

2.216 Planed Timber (Dressed Timber or Surfaced Timber or Wrought Timber) — Timber made smooth on one or more surfaces by planing (*see also* **2.255**).

2.217 Plank

a) of softwood. A piece of square-sawn timber 50 to 100 mm thick and 280 mm or over wide.

b) of hardwood. A piece of square-sawn or unedged timber over 50 mm thick. The width varies according to the grade and country of origin.

2.218 Plaster Mould — A mould made from plaster.

2.219 Plastics Faced Plywood — Plywood, one or both faces of which have been coated with plastics material or resin which acts as a sealant (*see also* **2.130**).

2.220 Plucking (Scabbing) — Spalling of the concrete face due to adhesion of concrete to the form (*see also* **2.145**).

2.221 Plywood — A product of balanced construction made up of plies assembled by gluing, the chief characteristic being the crossing of alternate plies to improve the strength properties and minimize movement in the plane of the board (*see also* **2.130** and **2.219**).

2.222 Pocket — A recess formed in a concrete surface.

2.223 Poker Vibrator — An immersion vibrator consisting of a vibrating tubular head connected to a source of energy.

2.224 Polystyrene — A transparent, hard plastics material.

2.225 Polyurethane — An organic plastics material (*see also* **2.134**, **2.226** and **2.245**).

2.226 Polyurethane Varnish — Polyurethane in liquid form which is applied to forms to act as a sealant.

2.227 Porthole — *See* **2.2**.

2.228 Post — A vertical support.

2.229 Precast Concrete — Concrete which is cast in moulds before being placed in position.

2.230 Profile — *See* **2.316** (a).

2.231 Profiled Form (Profiled Shutter) — A form for casting a concrete surface which is curved or unusual in shape.

2.232 Profiled Shutter — *See* **2.231**.

2.233 Prop — A strut which is light enough to be man-handled.

NOTE — The term 'prop' is commonly used to describe a strut of proprietary manufacture which is adjustable in length.

2.234 Pun, To — To compact fresh concrete by ramming by hand with a timber or steel rod.

2.235 Raker — *See* **2.236**.

2.236 Raking Strut (Raker) — An inclined strut.

2.237 Random Board Forms — A form, the sheeting of which is made with softwood boards of random widths or lengths or both.

2.238 Rebate Check — A grout which also forms a rebate in the concrete.

2.239 Release Agent — A substance, usually applied to the form face, to prevent adhesion of the concrete to the form and thus facilitate stripping.

2.240 Re-Propping (Re-Shoring) — The application of posts or props to the soffit of a concrete slab or beam to enable it to carry an excess superimposed load, or to carry superimposed loads when the concrete is not fully mature (*see also* **2.14**).

2.241 Re-Shoring — *See* **2.240**.

2.242 Resin Bonded Plywood — Plywood which has been manufactured using a phenolic or other resin as an adhesive (*see also* **2.119**).

NOTE — Resin-bonded plywood is not necessarily of sufficient quality for use in formwork.

2.243 Retractable Form — *See* **2.312**.

2.244 Ribbon — A runner connecting beam bottom support members to prevent spreading of the lower edges of the side of a beam box.

2.245 Rigid Foamed Polyurethane — Polyurethane which has been expanded during manufacture to form a rigid multi-cellular material.

NOTE — Rigid foamed polyurethane is used in formwork for the same purposes as expanded polystyrene.

2.246 Rip, To — To cut a timber parallel with the grain.

2.247 Riser Board — The board which forms the vertical face of a step.

2.248 Road Form — An edge form used in the construction of a road or other ground slab.

NOTE — The term is normally used to describe specially designed proprietary steel products.

2.249 Rough Formwork — Formwork for concrete where no special surface finish is required.

2.250 Roughboard Formwork — Formwork, the face of which consists of softwood boards with a rough grain or sawn texture so that a similar texture is imparted to the concrete surface.

2.251 Runner — *See* **2.191**.

2.252 Sand Box — *See* **2.253**.

2.253 Sand Jack (Sand Box) — A box containing dry sand on which rests the lower end of a vertical strut. On removal of a plug in the side of the box, the sand flows out and the strut is lowered.

2.254 Saw-Kerfing (Kerfing or Kerf-Sawing) — Parallel kerfs cut on one side of a piece of timber so that it may be more easily bent towards that side.

2.255 Sawn Timber — Timber which has not been planed on any surface (*see also* **2.216**).

2.256 Sawnboard Formwork — *See* **2.250**.

2.257 Scabbing — *See* **2.220**.

2.258 Scaffold (Scaffolding) — A temporary structure for gaining access to higher levels of the permanent structure during construction.

2.259 Scaffold Board — A softwood board used with similar boards to form walkways and as toeboards on a scaffold.

2.260 Scaffolding — *See* **2.258**.

2.261 Screed — *See* **2.262.**

2.262 Screed Board (Screed) — A templet for the finishing of a concrete surface (*see also* **2.310**).

2.263 Screed Rail — A guide fixed at the perimeter of a concrete pour to act as a datum and support for a screed board.

2.264 Sealant

a) A paint, or other coating, intended to render impervious the surface of timber formwork or form linings (*see also* **2.142**).

b) A paint or other coating (usually in liquid form) applied to contact surfaces of formwork or form lining either during manufacture or in the field to serve one or more of the following purposes:

1) Alter the texture of the contact surface;
2) Improve the durability of the contact surface;
3) In addition to (2) above, to facilitate release from concrete during stripping; and
4) Seal the contact surface from intrusion of moisture.

2.265 Separator Plate — *See* **2.110.**

2.266 Sheathing — *See* **2.267.**

2.267 Sheeting (Sheathing) — That part of the form which is in contact with the concrete.

2.268 Shore — *See* **2.97** *and* **2.137.**

2.269 Shot Blasting — The abrasion of a surface by blowing metal shot on to it at high velocity (*see also* **2.154**).

NOTE — Shot blasting is sometimes used to accentuate the grain of timber for greater effect in roughboard formwork.

2.270 Shrinkage Joint (Contraction Joint) — A break in the continuity of a concrete structure provided so that shrinkage of the concrete will open this rather than cause cracking of the structure.

2.271 Shutter — *See* **2.140.**

2.272 Shuttering — *See* **2.148.**

2.273 Side Form — A form for the side of a concrete member where the height of the member is not great in proportion to the width of its cross-section.

2.274 Sill (Cill or Sole Plate) — A horizontal timber under the foot of a jack or post used to spread the load from the member above.

2.275 Sliding Formwork — *See* **2.276.**

2.276 Slip Form (Moving Formwork, or Sliding Formwork) — A form which moves, usually continuously, during placing of the concrete. Movement may be either horizontal or vertical.

2.277 Slip Form Paver — A travelling machine, for laying concrete paving, which carries its own edge forms between which the concrete is compacted.

2.278 Slot Anchor — *See* **2.106.**

2.279 Snap Tie — A form tie designed to be broken off beneath the concrete surface after use.

2.280 Soffit — The under surface of concrete, for example, of a concrete arch, or suspended beam or slab.

2.281 Soffit Form — The form to a soffit.

2.282 Soldier — A vertical member, acting as a beam or cantilever, and used in conjunction with form ties or struts to support and prevent movement of forms.

2.283 Sole Plate — *See* **2.274.**

2.284 Spacer — *See* **2.103.**

2.285 Spanish Windlass — A device for drawing two members together against an outward force. It consists of a number of wires from one member to the other between which a bar is inserted and turned to create a tension in the wires by twisting them together.

2.286 Splay — A concrete mass of triangular cross-section across an internal angle.

2.287 Spreader — *See* **2.103.**

2.288 Square-Edged Boards — Boards of rectangular cross-section with plain edges suitable for butt jointing.

2.289 Starter Frame — Shallow formwork projecting above floor level for the construction of a nib, that is, the formwork for a nib.

2.290 Stave — One of a number of vertical members forming a surface which is curved on plan (*see also* **2.185**).

2.291 Stop End — The form for a construction joint in the vertical plane.

2.292 Stopping (Filler) — Materials used for filling screw holes, joints, etc, to form a smooth, even surface.

2.293 Strap — A timber collar or metal band fixed round a box, such as a column box to resist the pressure of freshly placed concrete [*see also* **2.350** (a)].

2.294 Strike, To (Strip, To) — To remove formwork after the concrete has hardened.

2.295 Striking Piece (Stripping Piece) — A narrow, often splayed, member intended to facilitate striking in a confined space.

2.296 Striking Time (Stripping Time) — The time specified for the earliest removal of forms and other support from the concrete.

2.297 Strip

a) Softwood Strip — A piece of square-sawn timber under 50 mm thick and under 100 mm wide.

b) Hardwood Strip — A piece of square-sawn timber usually 50 mm or under thick and 50 to 140 mm wide.

2.298 Strip, To — *See* **2.294.**

2.299 Stripping Piece — *See* **2.295.**

2.300 Stripping Time — *See* **2.296.**

2.301 Strongback (Counter-Waling) — A soldier, often of framed construction, for heavy duty application.

2.302 Strut — A member in compression.

2.303 Stud — A vertical or horizontal stiffener to the back of the form sheeting.

2.304 Subsiding — *See* **2.204.**

2.305 Surface-Active Agent — *See* **2.307.**

2.306 Surface Timber — *See* **2.216.**

2.307 Surfactant (Surface-Active Agent or Activating Agent) — A chemical which lowers the surface tension of water.

NOTE — Surfactants are used in mould oils to reduce the occurrence of blowholes in the concrete face.

2.308 Suspended Formwork — Formwork suspended on hangers.

2.309 Table Form—Formwork for suspended floors which is built up into the form of a table. It stands on the floor previously cast and is lowered and moved in one piece.

2.310 Tamper — A timber or metal beam spanning between edge forms or screed rails and used for compacting concrete.

NOTE 1 — A tamper may be constructed so that it also acts as a screed board.

NOTE 2 — A tamper may also be equipped with one or more vibrators.

2.311 Telescopic Centre — *See* **2.136.**

2.312 Telescopic Form (Retractable Form) — A form used for work, such as tunnelling, which when struck reduces to a size small enough to enable it to pass through similar forms already in position for concreting.

2.313 Telescopic Prop — *See* **2.5.**

2.314 Telltale — Any device designed to indicate movement of formwork.

2.315 Template — *See* **2.316.**

2.316 Templet Profile or Template

a) A shape made of timber or metal and used for building or testing the accuracy of surfaces which are curved or otherwise unusual in shape.

b) A guide or pattern used for accurately locating bolts, etc.

2.317 Thickness, To — To plane timber on opposite faces, usually simultaneously, to produce a uniform thickness.

2.318 Through Tie — A form tie which passes through the concrete and is withdrawn when the forms are struck.

2.319 Tie — *See* **2.147.**

2.320 Tilting Table — A table on which a vertical concrete component is cast horizontally, and which is tilted into a vertical or near vertical position to allow the component to be lifted in its natural position.

2.321 Tilt-Up Construction — The on-site casting of walls horizontally so that they have only to be tilted through 90° to gain their permanent position.

2.322 Tilt-Up Form — A wall form which is built on the ground beside the wall to be cast and then rotated into the vertical plane.

2.323 Tolerance — The difference between the limits between which a size dimension or position should lie (*see also* **2.102**).

2.324 Tongue — A projection on the edge of a board formed by rebating the arris of both faces. It is most usually used for tongued and grooved boarding (*see also* **2.196**).

2.325 Tongued and Grooved Boarding — Boarding laid edge to edge and jointed by a tongue on the edge of one board which fits into a corresponding groove in the edge of the adjacent board (*see also* **2.196**).

2.326 Top Form — A form to the top surface of the concrete where this slopes too steeply to be cast without containment.

2.327 Trammel — An instrument for describing circles or ellipses.

2.328 Trap Door — *See* **2.2.**

2.329 Trapped Form — A form which is lost when no opening is left in the permanent structure through which it can be removed (*see* **2.336**), or which has to be destroyed in striking because of the configuration of the concrete.

2.330 Travelling Formwork (Mobile Form or Moving Formwork) — Formwork, such as that used for walls and tunnel linings carried on wheels or rollers so that it may be struck and moved for re-use without dismantling.

2.331 Trestle — A structure for temporary or permanent support which gains its stability by having its main members at an inclination to the vertical.

2.332 Triple Wedges — A system of folding wedges using three instead of two wedges.

2.333 Trough Form — A form which produces an inverted-trough-shaped concrete soffit.

2.334 Veneer — A thin sheet of wood produced by rotary cutting or slicing.

2.335 Vibrator — A mechanical device for compacting concrete by imparting vibrations to it (*see also* **2.120, 2.169** and **2.223**).

2.336 Void Box — A trapped form used to create a completely enclosed space within the concrete.

2.337 Waffle Form (Coffer Form or Waffle Pan) — A hollow form, usually square on plan and domed in elevation, used for forming the recesses or coffers in a waffle slab.

2.338 Waffle Pan — *See* **2.337.**

2.339 Waffle Slab (Coffered Slab) — A concrete slab designed to span in two directions and containing recesses, which are square on plan, in its under side.

2.340 Waling — A long horizontal member acting as a beam and used in conjunction with form ties, struts or strongbacks to support and prevent movement of forms.

2.341 Wall Clamp (Wall Cramp or Clamp or Cramp) — Two vertical members connected together to form an adjustable yoke to support wall forms in such a way as to avoid the use of form ties through the concrete.

2.342 Wall Cramp — *See* **2.341.**

2.343 Wall Hanger — A metal bracket suspended from a wall to support a ledger [**2.191**(a)] on which in turn is supported formwork for a suspended floor.

2.344 Wall Tie — *See* **2.147.**

2.345 Wedge — A piece of wood or metal tapering to a thin edge, used to adjust elevation, tighten formwork, etc.

2.346 Wedge Bolt — A bolt which is tightened by means of a wedge driven through a slot in its shank.

2.347 Wood Chipboard (Chipboard) — A particle board made from particles of wood bonded with synthetic resin and/or other organic binder.

2.348 Wrecking Strip — A striking piece which is intended to be destroyed in the course of striking.

2.349 Wrought Timber — *See* **2.216.**

2.350 Yoke

a) An assembly of members which restrains forms from movement by encircling, or nearly encircling, them.

b) In a vertical slip form, a yoke in the form of an inverted 'U' which carries the wall forms and is itself carried and raised by a jack.

c) A tie or clamping device around column forms or over the top of wall or footing forms to keep them from spreading because of the lateral pressure of concrete.

(*Continued from page* 2)

Members	*Representing*
SHRI G. C. MATHUR SHRI RAVINDER LAL (*Alternate*)	National Buildings Organization, New Delhi
SHRI M. A. MEHTA SHRI C. L. N. IYENGAR (*Alternate*)	Concrete Association of India, Bombay
DR P. K. MOHANTY DR R. S. PRASAD (*Alternate*)	Tor-Isteg Steel Corporation Ltd, Calcutta
SHRI K. K. NAMBIAR	In personal capacity ('*Ramanalaya*', *11, First Crescent Park Road, Gandhinagar, Adyar, Madras 20*)
DR M. L. PURI	Central Road Research Institute (CSIR), New Delhi
SHRI N. S. RAMASWAMY SHRI R. P. SIKKA (*Alternate*)	Roads Wing, Ministry of Transport & Shipping
SHRI G. S. M. RAO	Geological Survey of India, Nagpur
SHRI T. N. S. RAO SHRI S. R. PINHEIRO (*Alternate*)	Gammon India Ltd, Bombay
SUPERINTENDING ENGINEER, 2ND CIRCLE SHRI S. G. VAIDYA (*Alternate*)	Central Public Works Department
SHRI N. M. THADANI	In personal capacity (*82, Marine Drive, Bombay 2*)
COL J. M. TOLANI MAJ D. D. SHARMA (*Alternate*)	Engineer-in-Chief's Branch, Army Headquarters
DR H. C. VISVESVARAYA	Cement Research Institute of India, New Delhi

BUREAU OF INDIAN STANDARDS

Headquarters :

Manak Bhavan, 9 Bahadur Shah Zafar Marg, NEW DELHI 110002

Telephones : 331 01 31
331 13 75

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices :		*Telephone*
Central	: Manak Bhavan, 9, Bahadur Shah Zafar Marg, NEW DELHI 110002	331 01 31 331 13 75
* Eastern	: 1/14 C.I.T. Scheme VII M, V.I.P. Road, Maniktola, CALCUTTA 700054	37 86 62
Northern	: SCO 445-446, Sector 35-C, CHANDIGARH 160036	2 18 43
Southern	: C.I.T. Campus, IV Cross Road, MADRAS 600113	41 29 16
† Western	: Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093	6 32 92 95

Branch Offices :	
'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001	2 63 48
‡ Peenya Industrial Area, 1st Stage, Bangalore-Tumkur Road, BANGALORE 560058	39 49 55
Gangotri Complex, 5th Floor, Bhadbhada Road, T.T. Nagar, BHOPAL 462003	55 40 21
Plot No. 82/83, Lewis Road, BHUBANESHWAR 751002	5 36 27
Kalai Kathir Building, 6/48-A Avanasi Road, COIMBATORE 641037	2 67 05
Quality Marking Centre, N.H. IV, N.I.T., FARIDABAD 121001	—
Savitri Complex, 116 G.T. Road, GHAZIABAD 201001	8-71 19 96
53/5 Ward No. 29, R.G. Barua Road, 5th By-lane, GUWAHATI 781003	3 31 77
5-8-56C L. N. Gupta Marg, (Nampally Station Road) HYDERABAD 500001	23 10 83
R14 Yudhister Marg, C Scheme, JAIPUR 302005	6 34 71
117/418 B Sarvodaya Nagar, KANPUR 208005	21 68 76
Plot No. A-9, House No. 561/63, Sindhu Nagar, Kanpur Road, LUCKNOW 226005	5 55 07
Patliputra Industrial Estate, PATNA 800013	6 23 05
District Industries Centre Complex, Bagh-e-Ali Maidan, SRINAGAR 190011	—
T. C. No. 14/1421, University P. O., Palayam, THIRUVANANTHAPURAM 695034	6 21 04
Inspection Offices (With Sale Point) :	
Pushpanjali, First Floor, 205-A West High Court Road, Shankar Nagar Square, NAGPUR 440010	52 51 71
Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 411005	5 24 35

*Sales Office Calcutta is at 5 Chowringhee Approach, P. O. Princep Street, CALCUTTA	27 68 00
† Sales Office is at Novelty Chambers, Grant Road, BOMBAY	89 65 28
‡ Sales Office is at Unity Building, Narasimharaja Square, BANGALORE	22 39 71

Reprography Unit, BIS, New Delhi, India