

इंटरनेट

मानक



Disclosure to Promote the Right To Information

Whereas the Parliament of India has set out to provide a practical regime of right to information for citizens to secure access to information under the control of public authorities, in order to promote transparency and accountability in the working of every public authority, and whereas the attached publication of the Bureau of Indian Standards is of particular interest to the public, particularly disadvantaged communities and those engaged in the pursuit of education and knowledge, the attached public safety standard is made available to promote the timely dissemination of this information in an accurate manner to the public.

“जानने का अधिकार, जीने का अधिकार”

Mazdoor Kisan Shakti Sangathan

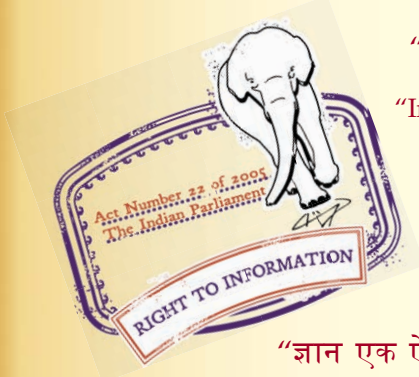
“The Right to Information, The Right to Live”

“पुराने को छोड़ नये के तरफ”

Jawaharlal Nehru

“Step Out From the Old to the New”

IS 2750 (1964): Steel Scaffoldings [CED 7: Structural Engineering and structural sections]



“ज्ञान से एक नये भारत का निर्माण”

Satyanarayan Gangaram Pitroda

“Invent a New India Using Knowledge”



“ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है”

Bhartrhari—Nitiśatakam

“Knowledge is such a treasure which cannot be stolen”



BLANK PAGE



IS : 2750 - 1964
(Reaffirmed 2006)

Indian Standard
**SPECIFICATION FOR
STEEL SCAFFOLDINGS**

Fifth Reprint JULY 1992
(Incorporating Amendments No. 1 & 2)

UDC 69.057.6:669.14

© *Copyright* 1979

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

Gr 6

August 1964

Indian Standard

SPECIFICATION FOR STEEL SCAFFOLDINGS

Construction Plant and Machinery Sectional Committee, BDC 28

<i>Chairman</i>	<i>Representing</i>
MAJ GEN R. A. LOOMBA	Engineer-in-Chief's Branch, Army Headquarters
<i>Members:</i>	
BRIG N. S. BHAGAT	Engineer-in-Chief's Branch, Army Headquarters
LT-COL R. N. KANWAR (<i>Alternate</i>)	Roads Wing, Ministry of Transport
SHRI R. S. BHALLA	Jessop & Co. Ltd., Calcutta
SHRI A. B. CHAUDHURI	Central Water & Power Commission (Ministry of Irrigation & Power)
SHRI S. P. CRUGH	
SHRI C. R. CHOPRA (<i>Alternate</i>)	
SHRI R. K. DAS GUPTA	Simplex Concrete Piles (India) Ltd., Calcutta
SHRI A. D. DHINGRA	Heatly & Gresham Ltd., Calcutta
SHRI N. KUMAR (<i>Alternate</i>)	
DIRECTOR (CIVIL ENGINEERING)	Railway Board (Ministry of Railways)
JOINT DIRECTOR (WORKS) (<i>Alternate</i>)	
BRIG N. B. GRANT	Research and Development Organization (Ministry of Defence)
SHRI M. A. HAFEEZ	National Buildings Organisation
SHRI K. S. SRINIVASAN (<i>Alternate</i>)	
SHRI R. K. JAJODIA	Lynx Machinery Ltd., Calcutta
MR. K. G. JONES	Forbes Forbes Campbell & Co. Ltd., Bombay
SHRI S. B. PATEL (<i>Alternate</i>)	
SHRI A. K. KHANDELWAL	Khandelwal Manufacturing Corporation Private Ltd., Bombay
SHRI M. R. MAHADEVAN	United Provinces Commercial Corporation Private Ltd., New Delhi
SHRI L. R. MARWADI	Hindustan Construction Co. Ltd., Bombay
SHRI B. D. MATHUR	Public Works Department, Government of Rajasthan
SHRI V. R. BHATNAGAR (<i>Alternate</i>)	
SHRI U. MATHUR	Marshalls (Directions) Private Ltd., Calcutta
SHRI S. C. MAZUMDAR	Gannon Dunkerley & Co. Ltd., Bombay
SHRI S. K. GUHA THAKURTA (<i>Alternate</i>)	
SHRI H. V. MISHRANANI	Central Building Research Institute (CSIR), Roorkee
SHRI B. C. SRIVASTAVA (<i>Alternate</i>)	
SHRI B. NAOCHAUDHURI	C. Comens & Sons Ltd., Calcutta
SHRI S. K. BASU (<i>Alternate</i>)	
SHRI K. K. NAMBIAR	The Concrete Association of India, Bombay
SHRI C. V. NAZARETH (<i>Alternate</i>)	

(Continued on page 2)

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

IS: 2750 - 1964

(Continued from page 1)

<i>Members</i>	<i>Representing</i>
SHRI K. NATARAJAN	In personal capacity (T. I. & Sales Ltd., Calcutta)
SHRI I. C. PATEL	Sayaji Iron and Engineering Private Ltd., Baroda
SHRI M. B. MEHTA (<i>Alternate</i>)	
SHRI Y. G. PATEL	Builder's Association of India, Bombay
SHRI RAJKUMAR GAUTAM	William Jacks & Co. Ltd., Calcutta
NABAYAN	
SHRI R. S. GODBOLN (<i>Alternate</i>)	
SHRI G. S. ROVSHEN	Armstrong Smith Private Ltd., Calcutta
SHRI U. G. KALYANPUR (<i>Alternate</i>)	
SHRI V. SANKARAN	National Buildings Construction Corporation Ltd., New Delhi
SHRI Z. S. SHAH	Burmah-Shell Oil Storage & Distributing Co. of India Ltd., Bombay
SHRI M. R. MALYA (<i>Alternate</i>)	
SHRI D. S. SHENOY	Killick Nixon & Co. Ltd., Bombay
SHRI A. T. KOTHAVALA (<i>Alternate</i>)	
SHRI S. K. SINHA	Directorate General of Technical Development
SHRI P. P. SIDDESHAPANDH	Miller's Timber and Trading Co. Ltd., Bombay
MR. W. A. FERNANDES (<i>Alternate</i>)	
DR. BH. SUBBARAJU	Central Road Research Institute (CSIR), New Delhi
SUPERINTENDING SURVEYOR OF WORKS (ELECT)	Central Public Works Department
EXECUTIVE ENGINEER (EL- ECT), MECHANICAL AND WORKSHOP DIVISION (<i>Alternate</i>)	
SHRI J. A. TARAPOREVALA	Shah Construction Co. Ltd., Bombay
MR. N. H. TAYLOR	Recondo Ltd., Bombay
SHRI T. H. PRESHORI (<i>Alternate</i>)	
COL H. C. VIJH	Balmer Lawrie & Co. Ltd., Calcutta
DR. H. C. VISVESVARAYA, Deputy Director (Bldg)	Director, ISI (<i>Ex-officio Member</i>)

Secretary

SHRI Y. R. TANEJA

Extra Assistant Director (Bldg), ISI

Panel for Metal Scaffolding, BDC 28/P-1

Convener

SHRI H. V. MIRCHANDANI Central Building Research Institute (CSIR),
New Delhi

Members

SHRI A. K. KHANDELWAL Khandelwal Manufacturing Corporation Ltd.,
Bombay

SHRI N. KUMAR Heatly & Gresham Ltd., Calcutta

AMENDMENT NO. 3 JULY 1980
TO
IS : 2750-1964 SPECIFICATION FOR
STEEL SCAFFOLDINGS

Alterations

(Page 4, clause 2.2.1) — Substitute the following for the existing clause:

‘2.2.1 Independent Scaffold — The scaffolding supported on two rows of uprights, independent of the structure under construction but securely supported against collapse with the help of proper strutting or bracing and rigidly connected with the building or other structure unless so designed to ensure stability without such connection.’

‘Note — Tall independent scaffoldings are usually tied to the structure at suitable intervals or otherwise supported at suitable intervals for additional stability.’

(Page 6, clause 2.3.14) — Substitute the following for the existing clause:

‘2.3.14 Putlog, Ancillary or Intermediate (or Board Bearer) — A tube or other member spanning from ledger to the wall of a building which may have an attached coupler for the purpose of securing such tube or member to a ledger and which may have a specially formed end (which may be detachable) for the purpose of fixing into brickwork, and used between putlogs for the purpose of supporting scaffold boards at positions and spacing required.’

(Page 7, clause 4.1.1) — Substitute the following for the existing clause:

‘4.1.1 Steel tubes for individual component types scaffolding shall be of heavy class welded or seamless tubes of 40 mm nominal bore and of grade not less than YST 22 of IS : 1161-1968 ‘Specification for Steel Tubes for Structural Purposes (Second Revision)’.”

(Page 7, clause 4.1.2):

- a) Line 3 — Substitute ‘ IS : 1161-1968 ’ for ‘ IS : 1161-1963 ’.
- b) Line 5 — Substitute ‘ IS : 806-1968 Code of Practice for Use of Steel Tubes in General Building Construction (First Revision) ’ for ‘ IS : 806-1957 Code of Practice for use of Steel Tubes in General Building Construction ’.

(Page 13, clause 4.2) — Substitute the following for the existing clause:

Gr 1

“4.2 Steel Fittings — All fittings shall be manufactured from steel which when analysed in accordance with the relevant part of IS : 228 Methods of Chemical Analysis of Pig Iron, Cast Iron and Plain Carbon and Low Alloy Steels shall show not more than 0.06 percent of sulphur, and not more than 0.06 percent of phosphorous and shall also conform to steels of Schedule II of IS : 1570-1961 ‘Schedules for Wrought Steels for General Engineering Purposes’.”

(Page 13, clauses **4.3.1** and **4.3.2**) — Substitute the following for the existing clauses:

“4.3.1 Steel sections and bars shall conform to IS : 226-1975 ‘Specification for Structural Steel (Standard Quality) (Fifth Revision)’.

4.3.2 Rivet bars shall conform to IS : 1148-1975 ‘Specification for Hot Rolled Steel Rivet Bars (Up to 40 mm Diameter) for Structural Purposes (First Revision)’.”

(Page 14, clause **4.4**) — Substitute the following for the existing clause:

“4.4 Bolts and Nuts — Bolts and nuts shall have mechanical properties not less than those specified in Table 5 (4D) of IS : 1367-1967 ‘Technical Supply Conditions for Threaded Fasteners (First Revision)’ and shall also conform to the requirements of IS : 1362-1962 ‘Dimensions for Screw Threads for General Purposes (Diameter Range 1.6 to 39 mm) (Revised)’ where applicable.”

(Pages 14 and 15, clause **6.2**) — Substitute the following for the existing clause:

‘6.2 The manufacturer or supplier shall also produce sufficient evidence (either calculations or test data) in fulfilment of the design criteria (see **5.1** and **5.2**). Where so required by the purchaser or user, the manufacturer or supplier shall furnish and wherever possible suitably exhibit on the scaffolding, the following particulars:

- a) Design load which may be imposed on the scaffolding as a whole, and the distribution of this load upon which the design of trestles, tripods or unit frames is based;
- b) Limitations of height, width or breadth in any direction, with or without supports derived from the structure;
- c) Maximum distance to which the scaffolding can be extended beyond a given dimension in any direction, and the type of support required for the purposes; and
- d) Any other restrictions on the usage or transportation of scaffoldings, fittings, prefabricated frames and components.’

(Page 15, clause **7.3.3.1**) — Delete and renumber subsequent clauses accordingly:

[Page 18, clause 7.3.5.1(a) and (b)] — Substitute the following for the existing matter:

- a) *Test for distortion* — The coupler, connecting two tubes at a 45° angle and suitably prevented from slipping on both tubes as shown in Fig. 9 shall be capable of supporting without distortion a load of 1.5 tonnes.
- b) *Test for slip* — The coupler, connecting two tubes at a 45° angle as shown in Fig. 10 shall be capable of sustaining a load of 1.25 tonnes applied to the vertical tube. During this test the coupler shall not rotate through an angle greater than 10° from the horizontal.

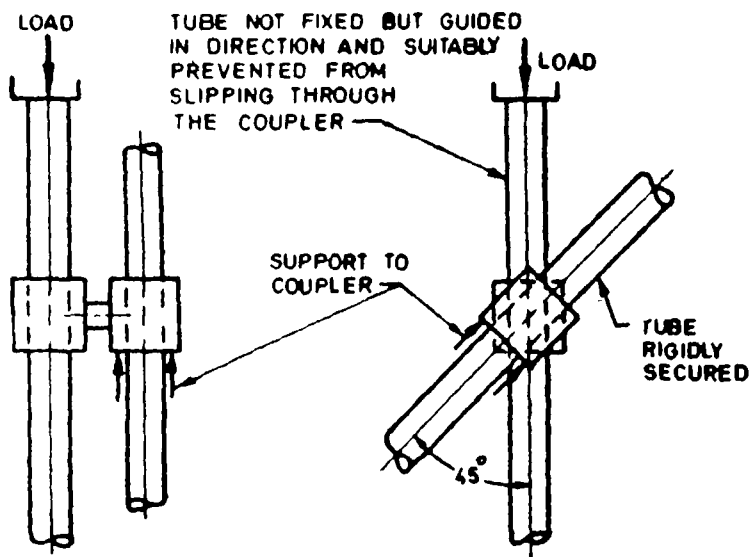


FIG. 9 TEST FOR DISTORTION OF SWIVEL COUPLERS

(Page 18, clause 7.3.6) — Substitute the following for the existing clause:

7.3.6 Putlog Couplers — The grip afforded by a putlog coupler shall offer adequate resistance to horizontal or axial rotation, slip or accidental displacement of a putlog. A putlog coupler shall be capable of passing the following test:

Test for Slip — The coupler connecting two tubes at right angles, as shown in Fig. 11 and assembled as recommended by the manufacturer, shall be capable of sustaining load of 130 kg applied to the horizontal putlog or transom.

NOTE — A putlog coupler shall be capable of satisfying the test for slip and shall be of such a shape as to be readily distinguishable from a right angle coupler.

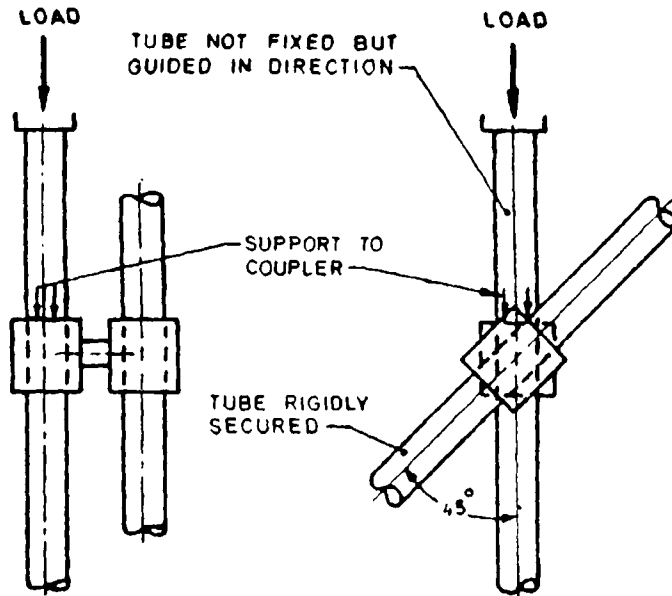


FIG. 10 TEST FOR SLIP OF SWIVEL COUPLER

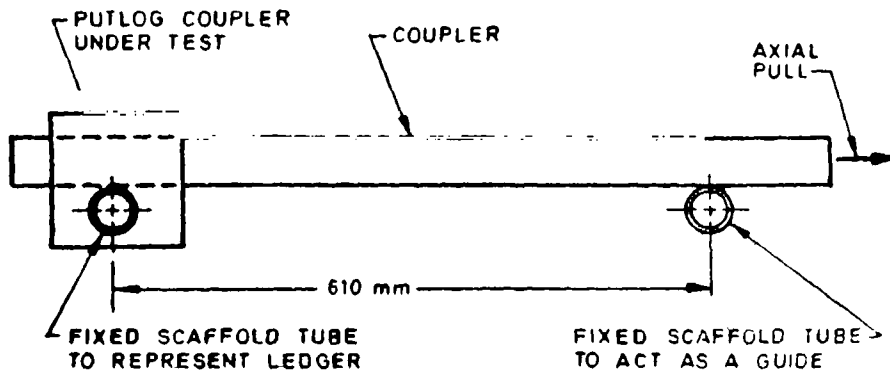


FIG. 11 RIG FOR SLIP TESTS ON PUTLOG COUPLERS

(Page 20, clause 7.3.10.3, line 2) — Substitute ' FIG. 12 ' for ' FIG 9 '.

(Page 20, Fig. 9, caption) — Substitute ' FIG. 12 ' for ' FIG. 9 '.

(Page 21, clause 7.4.4.1) — Substitute the following for existing clause:

7.4.4.1 Adjustment of height of tripod — Where tripods are capable of adjustment for height, the means of adjustment shall be such that when adjusted at any height, it shall be incapable of displacement under vibration or shock during normal conditions of usage.'

(Page 21, clause 7.4.5) — Substitute the following for the existing clause:

7.4.5 The shorter of the base dimensions of a trestle shall be at least one-fourth of the height of the trestle. In case of a trestle of adjustable height, the height for the purpose of this standard shall be maximum height to which the trestle can be adjusted.

7.4.5.1 Adjustment for the height of trestle — Where trestles are capable of adjustment for the height, the means of adjustment shall be such that when adjusted at any height, it shall be incapable of disturbance, or displacement under vibration or shock during normal conditions of usage.'

(Page 22, clause 7.4.7.2) — Substitute the following for the existing clause:

7.4.7.2 Welding — Welding shall be carried out on steel tubes in accordance with IS : 6227-1971 'Code of Practice for Use of Metal Arc Welding in Tubular Structures', and on other steel sections in accordance with IS : 816-1969 'Code of Practice for Use of Metal Arc Welding for General Construction in Mild Steel (First Revision)' or IS : 1323-1966 'Code of Practice for Oxy-Acetylene Welding for Structural Work in Mild Steel (Revised)'."

(Page 23, clause 9.1, line 1) — Substitute ' may ' for ' shall '.

Addenda

(Page 6, clause 2.3.23) — Add the following new clauses after 2.3.23:

2.3.24 Scaffolding — A temporary structure on which persons work, and which provides support for plant and materials used in building construction, maintenance, repair and demolition work.

2.3.25 Sleeve Coupler — An external fitting for connecting two tubes and to end.'

(Page 21, clause 7.3.12.2) — Add the following new clause after 7.3.12.2:

7.3.13 Sleeve Coupler — A sleeve coupler shall be selfcentring when plain ended tubes are being joined so that an equal length of sleeve shall engage both the tubes connected by the sleeve.

It shall have, in every position, a resistance to bending at least equal to that of the tube with which the sleeve coupler is intended to be used. When used in tension, it shall resist, without slipping, an axial load of not less than 635 kg.'

(8DC 28)

Indian Standard
**SPECIFICATION FOR
STEEL SCAFFOLDINGS**

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 27 May 1964, after the draft finalized by the Construction Plant and Machinery Sectional Committee had been approved by the Building Division Council.

0.2 Metal scaffoldings are being increasingly used these days because of their several advantages over the conventional type of timber scaffoldings, such as ease and rapidness with which they may be erected, dismantled, stored and re-used, rigidity of construction and more reliable assessment of their performance. Though metal scaffoldings may be constructed from steel or aluminium alloy tubes and fittings, almost all the metal scaffoldings used in this country at present are constructed from steel tubes and fittings. This standard, covering steel scaffoldings suitable for use in normal building construction work, has been prepared with a view to ensuring their safe and satisfactory performance and it is intended to serve as a guide to the manufacturers and users.

Tubes, fittings and prefabricated frames covered in this standard are intended only for the usage and loading conditions customary in normal building construction practice. Scaffoldings intended for special situations of use, where storage of materials, housing of machinery and equipment or abnormal and heavy concentrated loads occur on the scaffolds, are not covered in this standard, although fittings referred to in this standard may sometimes be used in the construction of such scaffoldings also.

0.3 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.

0.4 Wherever a reference to any Indian Standard appears in this specification, it shall be taken as a reference to its latest version.

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

IS : 2750 - 1964

0.6 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 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.

0.7 This standard is intended chiefly to cover the technical provisions relating to steel scaffoldings, and it does not include all the necessary provisions of a contract.

1. SCOPE

1.1 This standard lays down the requirements for materials, fabrication and performance of steel scaffoldings constructed with tubes, fittings and/or prefabricated frames, suitable for use in normal building construction work.

1.2 It does not include suspended or slung scaffoldings.

1.3 Scaffoldings constructed with materials other than steel are also not covered in this standard.

2. TERMINOLOGY

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

2.1 General

2.1.1 *Design Load* — Total load upon a tripod, trestle, unit frame which the supplier certifies that it can sustain with safety. This load shall ordinarily conform to the provisions as given in 5.

2.1.2 *Purchaser* — The person receiving the assembled scaffold or separate components of scaffolds, whether by sale or on hire.

2.1.3 *Supplier* — The person selling or hiring the assembled scaffold or separate components of scaffold.

2.2 Types of Scaffolding

2.2.1 *Independent Scaffold* — The scaffolding supported on two rows of uprights, independent of the structure under construction. It may be either 'individual component type' or 'unit frame type'.

NOTE — For tall buildings, the independent scaffolding is tied to the structure at suitable intervals for additional stability.

2.2.2 Individual Component Type Scaffold — Independent or putlog scaffold consisting of an assembly of individual tubes and fittings.

2.2.3 Putlog Scaffold — The scaffolding supported by single row of up-rights in combination with load bearing parts of the structure. It may be either 'individual component type' or 'unit frame type'.

2.2.4 Unit Frame Type Scaffold — Independent or putlog scaffold consisting of an assembly of prefabricated frames suitably connected or fitted and used in combination with or without individual tubes.

2.3 Individual Components

2.3.1 Base Plate — A plate for distributing the load from a standard or raker.

2.3.2 Base Plate, Adjustable — A base plate embodying means of vertical adjustment.

2.3.3 Brace — A tube incorporated diagonally in a scaffolding for stability.

2.3.4 Bridle — A horizontal tube slung between putlogs for the purpose of supporting intermediate putlogs where due to window openings and the like, it is impossible to support a putlog in the wall.

2.3.5 Castor — A swivelling wheel attached to the lower end of a tubular column for the purpose of moving and supporting scaffolding.

2.3.6 Coupler — A fitting by which a grip is applied to the external surfaces of two tubes and which thereby holds them together.

2.3.7 Coupler, Double (Right Angled) — A coupler for connecting a tube at right angle.

2.3.8 Coupler Putlog — A non-load bearing coupler used for fixing a putlog or transom to a ledger.

2.3.9 Coupler, Swivel — A coupler for connecting two tubes at any angle other than a right angle.

2.3.10 Joint Pin — An internal fitting for jointing two tubes end-to-end.

2.3.11 Ledger — A tube spanning horizontally and tying a scaffold longitudinally, which may act as a support for putlogs or transoms.

2.3.12 Puncheon — A vertical tube supported otherwise than upon the ground or upon a base plate.

2.3.13 Putlog — A tube or other member spanning from a ledger to the wall of a building and which may have a specially formed end (which may be detachable) for the purpose of fixing into the brickwork.

IS : 2750 - 1964

2.3.14 Putlog, Ancillary or Intermediate — A tube or other member spanning from ledger to the wall of a building which may have an attached coupler for the purpose of securing such tube or member to a ledger and which may have a specially formed end (which may be detachable) for the purpose of fixing into brickwork; and used between putlogs for the purpose of supporting scaffolding at positions and spacing required.

2.3.15 Putlog End — The specially formed end of a putlog, or a fitting for attaching to a tube, for locating the member in a joint of a wall.

2.3.16 Raker — An inclined tube having a bearing on the ground or an adjacent structure.

2.3.17 Reveal Pin — A fitting used for tightening a reveal tie between two opposing surfaces.

2.3.18 Reveal Tie — A tube which is jacked (wedged) between two opposing surfaces, for example, window reveal (opening) to tie a scaffold to a building.

2.3.19 Spigot — An alternative term for a joint pin [also a part of a joint pin (see also 2.3.10)].

2.3.20 Tie — A tube used to connect a scaffold to a reveal tie or other rigid anchorage.

2.3.21 Transom — A tube spanning across ledgers to tie a scaffold transversely and which may also support a working platform.

2.3.22 Tube — Tubing complying with the requirement of this standard.

2.3.23 Upright — A tube used as a vertical support or column in the construction of a scaffold and transmitting a load to the ground or a base plate.

2.4 Scaffoldings Constructed with Supporting Members

2.4.0 In addition to the following definitions, all definitions given in 2.3 shall also apply in the case of scaffoldings constructed with supporting members except that the word 'tube' shall be substituted by 'tubular or steel structural member'.

2.4.1 Base Dimensions — Dimensions of the smallest rectangle enclosing the base of a tripod or trestle.

2.4.2 Beam — A horizontal member supporting a vertical load.

2.4.3 Diagonal — A bracing member.

2.4.4 Structural Steel Member — Structural steel section complying with the requirements of this standard.

2.4.5 Trestle — A self-supporting metal stand incorporating one or more horizontal beams on which a working platform may be laid.

2.4.6 Tripod — A self-supporting metal stand for supporting one end of a horizontal beam on which a working platform may be laid.

2.4.7 Unit Frame — A metal stand, not self-supporting, incorporating or supporting a platform or one or more horizontal beams on which a working platform may be laid.

3. TYPES

3.1 The various types of scaffolding shall be as follows (see 2.2):

- a) Individual Component Type Putlog Scaffold,
- b) Unit Frame Type Putlog Scaffold,
- c) Individual Component Type Independent Scaffold, and
- d) Unit Frame Type Independent Scaffold.

3.1.1 Typical details of scaffoldings erected with individual tubes and fittings are shown in Fig. 1, 2 and 5 and typical details of scaffoldings erected with unit frames are shown in Fig. 3 and 4. These figures are diagrammatic and are not intended to represent standard methods of construction.

4. MATERIALS

4.1 Steel Tubes

4.1.1 Steel tubes for individual component type scaffolding shall be heavy class welded or seamless tubes of 40 mm nominal bore conforming to *IS:1161-1963 Specification for Steel Tubes for Structural Purposes (Revised).

4.1.1.1 The following values for the properties of scaffolding tubes of 40 mm nominal bore are given below for information:

Cross-sectional area	$A = 5.57 \text{ cm}^2$	} (about a dia- metral axis)
Moment of inertia	$I = 13.77 \text{ cm}^4$	
Section modulus	$Z = 5.70 \text{ cm}^3$	
Radius of gyration	$K = 1.57 \text{ cm}$	
	$K^2 = 2.47 \text{ cm}^2$	

4.1.2 For other types of scaffoldings, the individual tube or tubes forming part of the unit frame shall conform to the requirements of IS:1161-1963*. The sizes of such tubes shall be governed by the design requirements stated in 5 and the minimum thickness of metal for such tubes shall conform to 6.3 of *IS:806-1957 Code of Practice for Use of Steel Tubes in General Building Construction.

*Since revised.

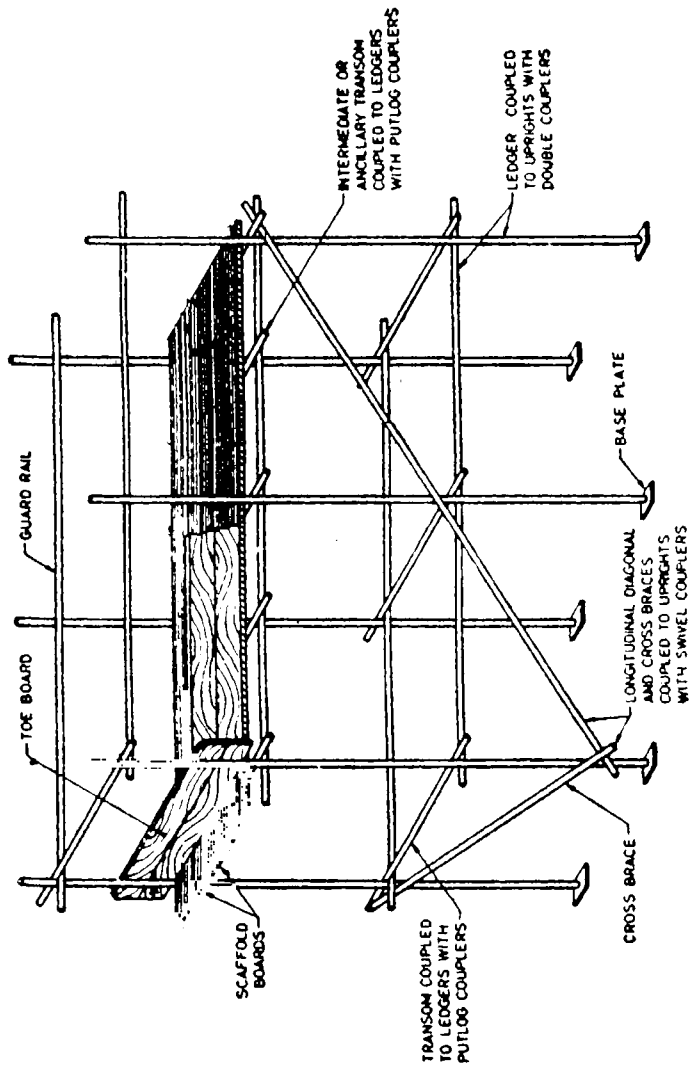


FIG. 1 TYPICAL SKETCH OF INDEPENDENT SCAFFOLD (INDIVIDUAL COMPONENT TYPE)

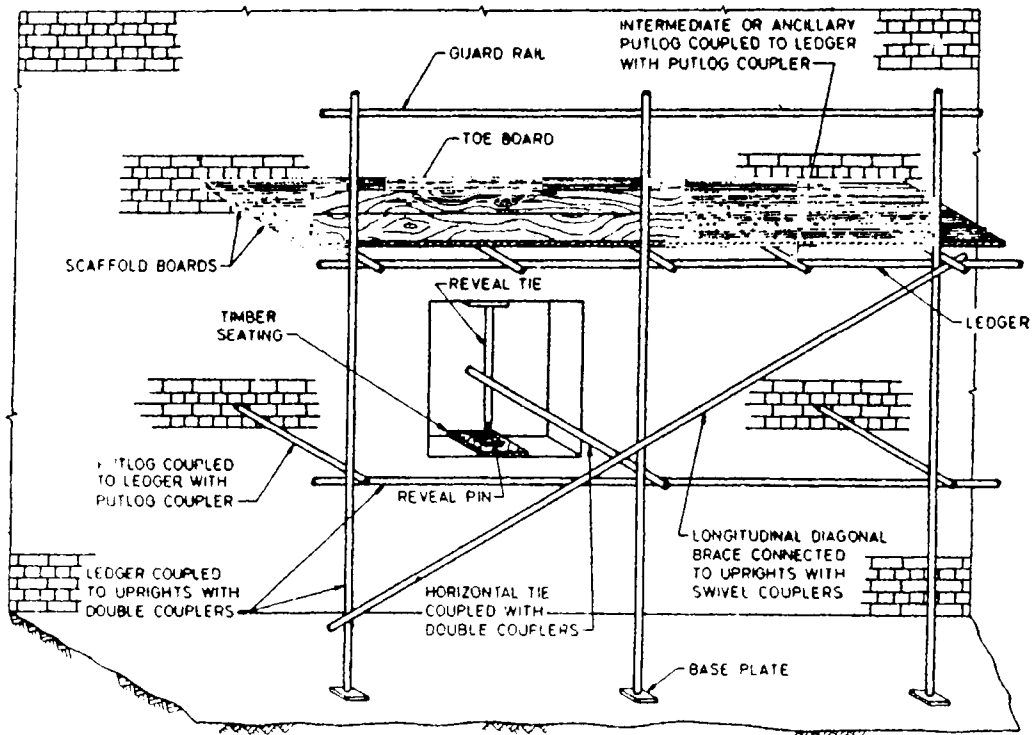


FIG. 2 TYPICAL SKETCH OF PUTLOG SCAFFOLD (INDIVIDUAL COMPONENT TYPE)

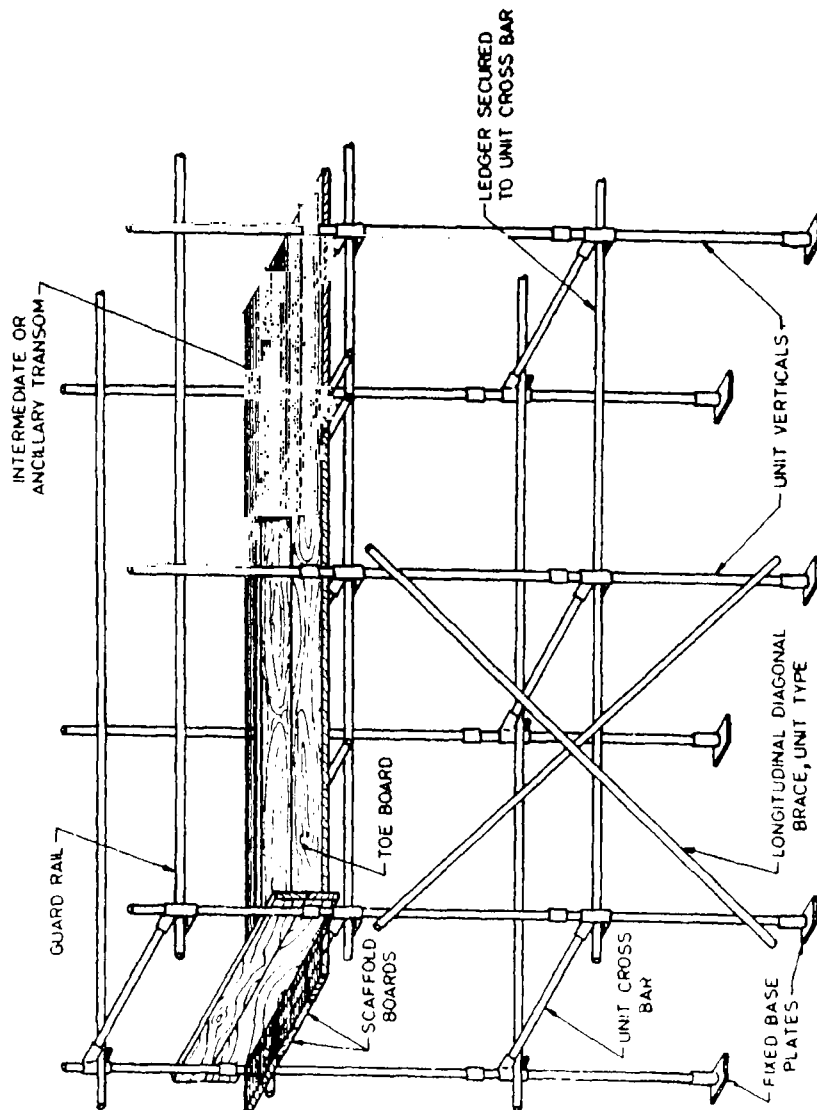


FIG. 3 TYPICAL SKETCH OF INDEPENDENT SCAFFOLD (UNIT FRAME TYPE)

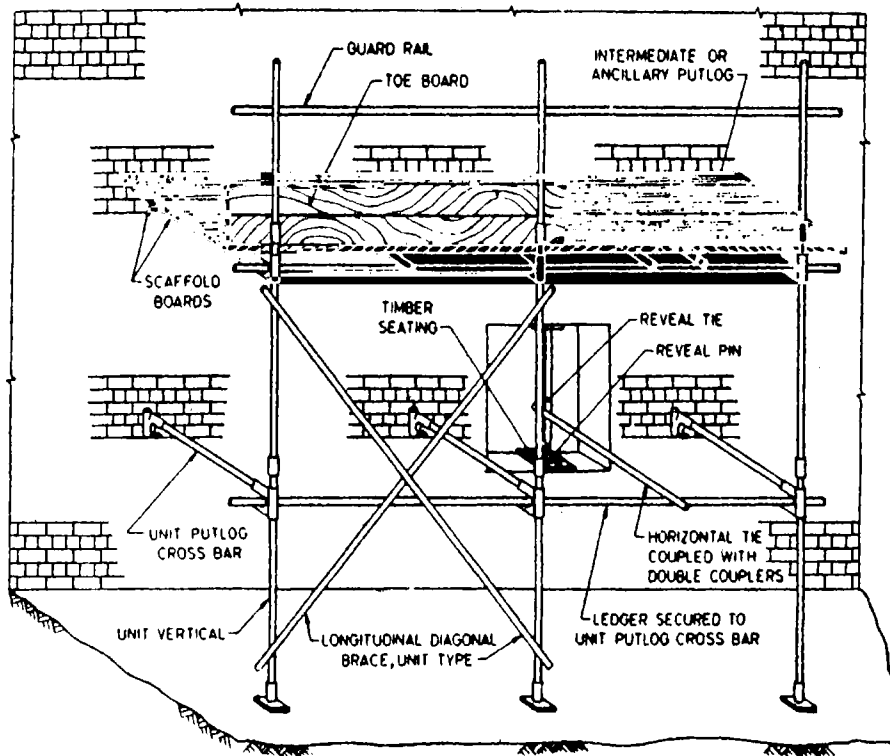
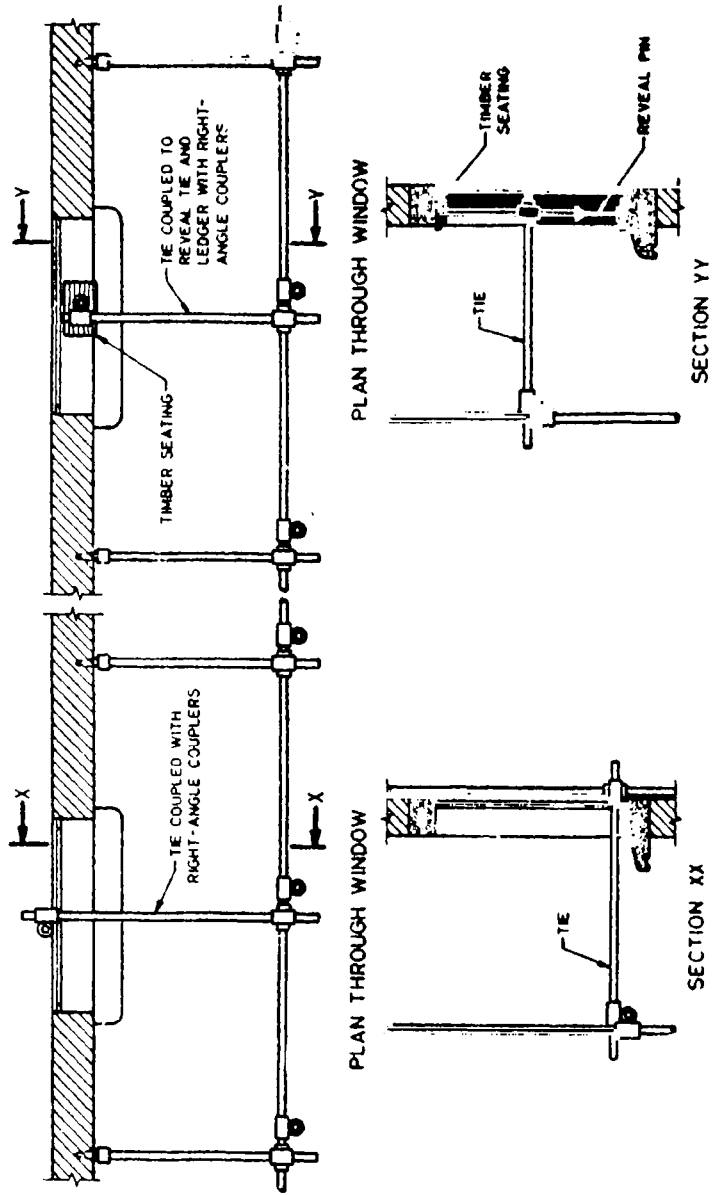
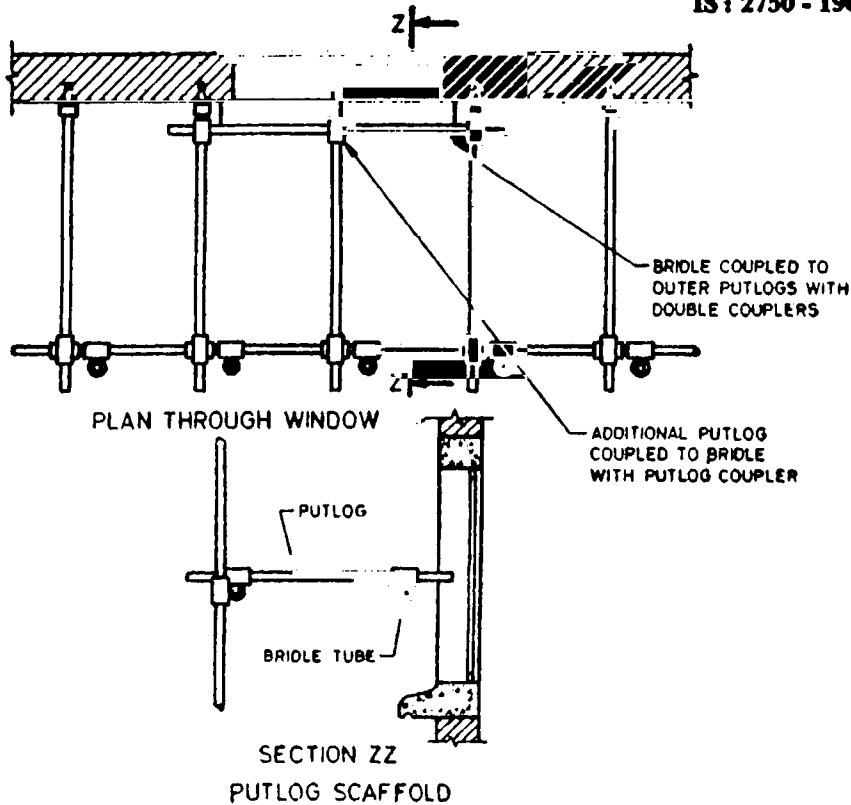


FIG. 4 TYPICAL SKETCH OF PUTLOG SCAFFOLD (UNIT FRAME TYPE)



5A 5B Methods of Tying in Window Opening
 5A 5B
 FIG. 5 TYPICAL DETAILS OF TYING IN AND BRIDLING PAST WINDOW — Contd



5C Bridling to Pass Window Opening

FIG. 5 TYPICAL DETAILS OF TYING IN AND BRIDLING PAST WINDOW

4.2 Steel Fittings — All fittings shall be manufactured from steel which when analyzed in accordance with *IS:228-1959 Methods of Chemical Analysis of Pig Iron, Cast Iron and Plain Carbon and Low-Alloy Steels (*Revised*) shall show not more than 0.06 percent of sulphur and not more than 0.06 percent of phosphorus, and shall also conform to grade C15 or C20 of IS:1570-1961 Schedules for Wrought Steels for General Engineering Purposes.

4.3 Steel Sections, Bars and Rivets

4.3.1 Steel sections and bars shall conform to †IS:226-1962 Specification for Structural Steel (Standard Quality) (*Third Revision*).

4.3.2 Rivet bars shall conform to ‡IS:148-1957 Specification for Rivet Bars for Structural Purposes.

*Since revised and split into parts

†Fifth revision in 1975

‡Second revision in 1973

IS : 2750 - 1964

4.4 Bolts and Nuts — Hexagonal, square and round head bolts and nuts shall be of mild steel and shall conform to the requirements of IS : 1362-1962 Dimensions for Screw Threads for General Purposes (Diameter Range 1.6 to 39 mm) (*Revised*), and ~~IS~~ 1367-1961 Technical Supply Conditions for Threaded Fasteners; and other relevant Indian Standards.

5. DESIGN CRITERIA

5.1 General

5.1.1 All types of scaffoldings shall be capable of carrying and transmitting to the ground, all resultant loads by themselves or jointly with load carrying parts of the building, which have achieved adequate strength for this purpose. The loadings on the scaffoldings shall comply with the appropriate requirements of relevant Indian Standards regarding loading on temporary structures and scaffoldings. All scaffoldings shall be adequately stiffened, both longitudinally and transversely to take up horizontal loading due to wind pressure on the scaffolding or tensioning ropes, if any, or both; and the forces resulting from inclined supports or support derived from the parts of a structurally stable building, lifting tackle, etc. The scaffoldings shall be adequately rigid at all stages of erection and dismantling.

5.1.2 Where the supports cannot be fixed vertically due to any reason, the eccentricity of the loading so carried should also be taken into account. The braces should be designed to carry, in addition to any applied horizontal loads, and the horizontal loads induced by the non-vertical supports, an additional horizontal load equal to 1/100 of the vertical loads carried by each platform and applied on its upper surface, and 1/100 of vertical loads carried by the ground applied at the base of scaffolding.

5.2 The permissible stresses and other design considerations shall comply with the appropriate requirements of relevant Indian Standards on structural design of tubular steel scaffolding.

6. SUPPLIER'S CERTIFICATE

6.1 The supplier shall, when required, furnish the purchaser a certificate that the tubes, fittings and prefabricated frames comply in all respects with the requirements of this standard. If used tubes, fittings and prefabricated frames are supplied, the supplier shall, if required, furnish the purchaser a certificate that these components are in satisfactory condition and were originally manufactured as per requirements of this standard.

6.2 The manufacturer or supplier shall also produce sufficient evidence (either calculations or test data) in fulfilment of the design criteria (see 5.1 and 5.2). In all cases, the manufacturer or supplier shall furnish

*Since withdrawn.

†Since revised.

and wherever possible suitably exhibit on the components of the scaffolding the following particulars:

- a) Design load which may be imposed on the scaffolding as a whole, and the distribution of this load upon which the design of trestles, tripods or unit frames is based;
- b) Limitations of height, width or breadth in any direction, with or without supports derived from the structure;
- c) Maximum distance to which the scaffolding can be extended beyond a given dimension in any direction, and the type of support required for the purpose; and
- d) Any other restrictions on the usage or transportation of scaffoldings, fittings, prefabricated frames and components.

7. COMPONENTS OF SCAFFOLDING

7.1 Various components for independent as well as putlog scaffolds shall be so designed and manufactured that the scaffolding erected with them gives satisfactory performance and fulfils the requirements laid down in 5.

7.2 Steel Tubes — The tubes shall conform to the requirements given in 4.1

7.3 Steel Fittings

7.3.1 All fittings shall be free from flaws or other defects. They shall be so designed that when fixed in the normal manner for service as a part of scaffold, they cannot be loosened or rendered unsafe under normal use by a casual or accidental blow, or by movement of traffic upon the scaffold.

7.3.2 All fittings shall be so designed that, when assembled, but before being tightened, no part of the scaffold can become detached by accident.

7.3.3 In addition to the requirements specified in 7.3.1 and 7.3.2, the fittings shall comply with the tests and other requirements for individual fittings as specified in 7.3.4 to 7.3.12.

7.3.3.1 If the fittings are supplied as being suitable for particular type of tubes (welded or seamless), they shall be tested on tubes of that particular type.

7.3.3.2 For the purpose of the tests, the fittings shall be such as can be fixed without undue effort, by means of the tool normally supplied for the particular type of fitting.

7.3.3.3 The fittings shall be capable of passing the necessary tests without damage which would render the fittings, or the tube or tubes, with which they are tested, unserviceable for further use in scaffolding.

7.3.4 Right-Angled Couplers

7.3.4.1 A right-angled coupler shall be so designed and constructed that it will pass the test (a) for distortion and either rotation test (b) or slip test (c) whichever is selected by the manufacturer.

- a) *Distortion test* — The coupler, connecting two tubes at right angle and suitably prevented from slipping on the vertical tube (see Fig. 6) shall be capable of supporting without distortion, a load of 3 tonnes applied to the horizontal tube.

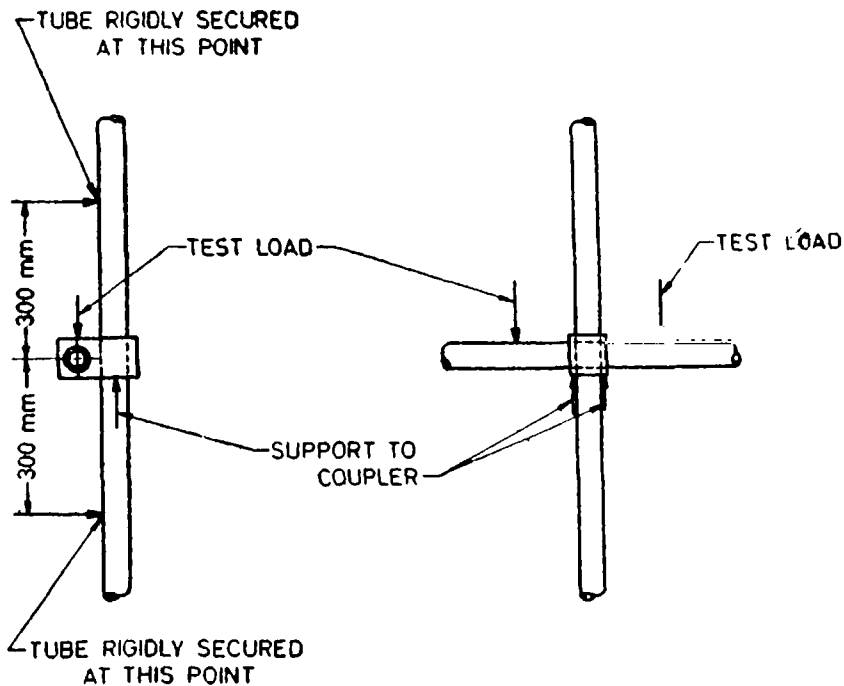


FIG. 6 TEST FOR DISTORTION OF COUPLER

- b) *Rotation test* — The coupler, fitted to a ledger which is rigidly restrained from axial rotation shall have a tube fitted horizontally as a cantilever at right angle to the ledger and of a length suitable to obtain leverage of approximately 1.2 m (see Fig. 7). A load applied to the cantilever shall be increased in increment until the turning moment exerted exceeds 3 220 kg·cm. Alternatively, a fixed load may be used increasing the turning moment by moving the load along the cantilever. Throughout the test the deflection

of the end of the tube from the horizontal shall not exceed one-quarter of the length of the lever arm.

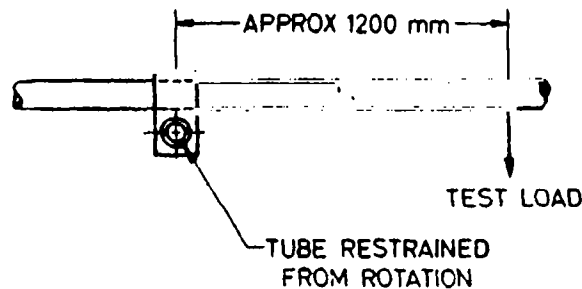


FIG. 7 TEST FOR ROTATION OF COUPLER

- c) *Slip test*— The coupler, connecting two tubes at right angles (see Fig. 8) shall be capable of supporting, without vertical slip and without distortion, a load of 1.25 tonnes applied to the horizontal tube. During this test the coupler shall not rotate through an angle exceeding 10° from the horizontal.

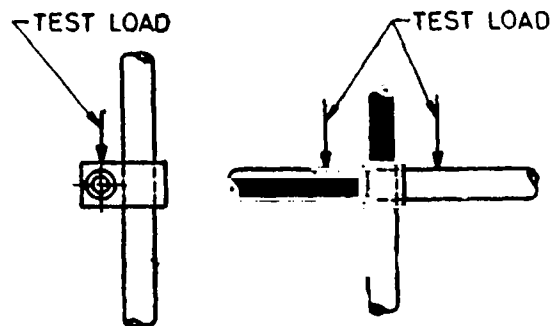


FIG. 8 TEST FOR SLIP OF COUPLER

7.3.4.2 In carrying out the tests stipulated in 7.3.4.1, the coupler shall be tested with each gripping surface in turn subjected to distortion, rotation and slip respectively, and with the test load applied successively in reverse directions for each coupler position.

7.3.5 Swivel Coupler

7.3.5.1 The swivel coupler shall be designed and constructed so that the swivel faces are smooth and in sufficiently close contact to prevent the connecting pin being subjected to bending stresses. This requirement,

however, shall not prohibit a washer of adequate bearing area being interposed between the faces of the coupler, provided it is an exact fit on the pin and the coupler is not rendered less efficient by the use of the washer. The pin connecting the two parts of a swivel coupler shall be of steel and not less than 16 mm in diameter. The swivel coupler shall be capable of passing the following tests:

- a) *Distortion test* — The coupler, connecting two tubes at right angles and suitably prevented from slipping on the vertical tubes, (see Fig. 6) shall be capable of supporting without distortion a load of 1.5 tonnes.
- b) *Slip test* — The coupler, connecting two tubes at right angles (see Fig. 8) shall be capable of supporting, without vertical slip and without distortion, a load of 1.25 tonnes applied to the horizontal tube. During this test the coupler shall not rotate through an angle greater than 10° from the horizontal.

7.3.5.2 In carrying out the tests stipulated in 7.3.5.1, the coupler shall be tested with each gripping surface in turn subjected to distortion and slip respectively, and with the test load applied successively in reverse directions for each coupler position.

7.3.6 Putlog Couplers — The grip afforded by a single coupler which may be attached to intermediate or ancillary putlogs shall offer adequate resistance to horizontal or axial rotation, slip or accidental displacement of a putlog.

NOTE — A putlog coupler, not capable of satisfying the test requirement for right-angled coupler, shall be of such a shape as to be readily distinguishable from a right-angled coupler.

7.3.7 Joint Pins

7.3.7.1 The joint pin shall be self-centring so that in both the tubes which it connects, an equal length of pin shall engage with each of the tubes. This requirement shall be achieved by means of an annular projection encircling the joint pin at the mid-point. This projection shall provide an even bearing surface for the end of any tube which has been cut cleanly and squarely and which otherwise complies with this standard. The bearing surface shall not, under normal loading, tend to bulge or otherwise distort the end of any tube with which it is in contact.

7.3.7.2 Each spigot of the joint pin shall extend not less than 75 mm on the internal surface of any tube which conforms to this standard and shall provide an effective bearing area. Each spigot shall be capable of being expanded within a tube with which it is engaged so as to provide an adequate grip between the tube and the joint pin unless, the joint pin is so designed that, when fully engaged to connect two tubes, it is not possible to disconnect either tube from the joint pin without one complete axial rotation of the tube relative to the joint pin.

7.3.7.3 The net cross-sectional area of the joint pin shall not be less than 80 percent of that of a steel tube conforming to this standard.

NOTE — Joint pins are not intended for use in position where they will be subject to the bending stresses or axial tension.

7.3.8 *Reveal Pin*

7.3.8.1 The end of the reveal pin remote from the tube shall provide a bearing surface perpendicular to and concentric with its axis and having a minimum width of 48 mm.

7.3.8.2 The means for varying the distance between the surface bearing against the end of a tube and the end of the reveal pin shall enable adjustments of this distance to be made readily, smoothly and with infinite variation within the limits of adjustment of the reveal pin.

7.3.8.3 The design of the adjustable portion of the reveal pin shall be such that, when under load, the adjustment cannot be altered by the action of load or by vibration.

7.3.8.4 The reveal pin shall be capable of passing the following test:

A tube of 2 m length conforming to the requirements of this standard and fitted with the reveal pin shall be placed horizontally, so that it is supported solely by the frictional grip exerted upon the smooth, parallel and vertical faces of two abutments by the bearing surface of the reveal pin and the end of the tube respectively. Timber or other suitable packing material may be used against the faces of the abutments. A load of 250 kg shall be applied to the tube midway between the abutments and central deflection measured. The deflection under load with the reveal pin extended to within 2.5 cm of its full working length shall not exceed twice the deflection under the same load with the reveal pin closed to within 2.5 cm of its minimum length. During the test no slip shall occur between the tube or reveal pin and the abutment faces. No permanent set, distortion or other damage shall occur which will render the tube or reveal pin unserviceable for further use in scaffolding.

7.3.9 *Putlogs* — The putlogs shall either be constructed from tube conforming to the requirements given in 3.1.1 or be so designed and constructed as to provide at least equivalent resistance to bending, shear and deflection. A fitting other than a putlog coupler provided for connecting a putlog to a tube shall comply with the requirements of 7.3.6 for putlog couplers.

7.3.10 *Putlog Ends*

7.3.10.1 A putlog end shall have an even bearing surface at least 7.5 cm long and at least 5 cm wide, measured from the end of the tube.

7.3.10.2 Putlog ends shall be considered to be subject to bending, bearing or shear stresses only and shall not be required to transmit axial

IS : 2750 - 1964

pulls or thrusts. Detachable putlog ends shall be provided with means of securing them to the putlog without risk of being accidentally disconnected.

7.3.10.3 A putlog end, when attached to or forming part of a putlog and supported only within 38 mm of its extremity (*see* Fig. 9) shall be capable of supporting without permanent set or other distortion, a maximum distributed load of 455 kg over a span of 120 cm.

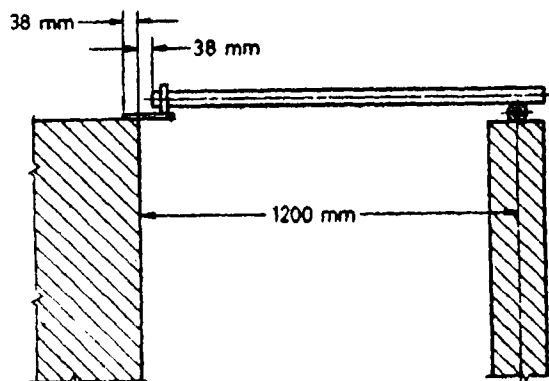


FIG. 9 TEST FOR BENDING PUTLOG END

7.3.11 Base Plates

7.3.11.1 The base plate shall have a level surface of at least 15×15 cm or equivalent area, concentric with the axis of the shank to which it shall be securely attached. The upper surface of the plate shall provide a smooth and even bearing for the end of a tube complying with the requirements of this standard and be such as not to damage or distort the tube under load.

7.3.11.2 The shank shall be a loose fit inside the tube and shall be not less than 5 cm long.

7.3.11.3 The base plate, if of mild steel, shall be not less than 5 mm thick, or if of other metal, shall have a sufficient thickness to provide an equal strength. It shall be provided with not less than two holes, 6 mm in diameter, situated diametrically opposite at a distance of not less than 5 cm from the centre of the plate and not less than 20 mm from the edge of the plate.

7.3.12 Adjustable Base Plates

7.3.12.1 The adjustable base plates shall satisfy the requirements relating to base plates laid down in 7.3.11 and the requirements of reveal pins laid down in 7.3.8.2 and 7.3.8.3.

7.3.12.2 When extended to its maximum working position the shank shall be capable of supporting a load of 6 tonnes without distortion. In

applying this test the base plate shall be placed on a smooth horizontal surface and the load applied through the seating on which the scaffold tube normally rests. At the upper end the shank shall not be held in position or restrained in direction.

7.4 Prefabricated Frames

7.4.1 The requirements in this clause apply to tripods, trestles and frames used as the main supporting members in scaffolding. Other members and fittings not forming an integral part of, but used in connection with tripods, trestles or frames shall satisfy the appropriate requirements of this clause as well as that of 7.2 and 7.3.

7.4.2 Tripods, trestles and frames shall be so designed and constructed that when used independently or in combination with one another and/or tubes and fittings for erection of scaffolds, the requirements specified in 5 are satisfied.

7.4.3 The frames shall be designed to permit assembling of scaffold from interchangeable units of standard size. Units to be connected shall be provided with an effective method of interlocking and when assembled, the structure shall have adequate stiffness to ensure stability. The method of assembly shall be such that it is not possible to remove structural components from an assembled scaffold and thereby render it unsafe.

7.4.4 The shorter of the base dimension of a tripod shall be at least one-fourth of the height of the tripod. In the case of a tripod of adjustable height, the height for the purpose of this standard shall be the maximum height to which the tripod can be adjusted.

7.4.4.1 *Adjustment for height of tripod* — Where tripods are capable of adjustment for height, the means of adjustment shall be a ratchet and pawl, pin coupler, or other device which, when adjusted at any height, shall be capable of withstanding a shock load without disturbance or displacement.

NOTE — The design load stated on the supplier's certificate [see 6.2(a)] shall be that upon which the design of the tripod is based when extended to its maximum height.

7.4.4.2 *Support for beam* — Tripod shall be designed to hold securely two boards on edge, side by side, each having a minimum thickness of 40 mm.

7.4.5 The shorter of the base dimensions of a trestle shall be at least one-quarter of the height.

7.4.6 Where spigot and socket connections are provided to enable frames to be erected in a vertical series, the depth of the socket shall be not less than one and a half times the bore of the socket.

7.4.6.1 The design of the spigot and socket shall be such that the frames are held in linear alignment.

IS : 2750 - 1964

7.4.7 Fabrication of Frames — Trestles, tripods and frames shall be fabricated from steel tubes and steel sections conforming to requirements of 4. Fabrication shall conform to the requirements given in 7.4.7.1 to 7.4.7.8.

7.4.7.1 All methods of fabrication shall be in accordance with the requirements of IS : 800-1962 Code of Practice for Use of Structural Steel in General Building Construction (*Revised*).

7.4.7.2 Welding — Welding shall be carried out on steel tubes in accordance with IS : 6227-1971 Code of Practice for Use of Metal Arc Welding in Tubular Structures, and on other steel sections in accordance with *IS : 816-1956 Code of Practice for Use of Metal Arc Welding for General Construction in Mild Steel, or *IS : 1323-1959 Code of Practice for Oxy-Acetylene Welding for Structural Work in Mild Steel.

7.4.7.3 All parts shall be dimensionally true, cleanly finished and free from cracks, surface flaws and other defects. Ends of tubes shall be cut cleanly and squarely.

7.4.7.4 Where necessary, units shall be straightened after fabrication. The axial deviation in any member shall not exceed 1.5 mm in any length of 1.5 m.

7.4.7.5 Holes for bolts shall be punched or drilled, preferably the latter. Washers shall be specially shaped, where necessary, to give the heads and nuts of bolts necessary bearing.

7.4.7.6 The threaded portion of each bolt shall project the nut by at least one thread pitch. In all cases where the full bearing area of the bolt is to be developed, the bolt shall be provided under the nut with a washer of such thickness as to avoid any threaded portion of the bolt being within thickness of the parts bolted together.

7.4.7.7 Where there is risk of the nuts becoming loose due to vibration or reversal of stresses, they shall be secured from slacking back by the use of lock nuts, spring washers, cross cutting of threads or other suitable means.

7.4.7.8 Where practicable, all tubular members shall be effectively sealed to prevent corrosion of the interior surface.

8. FINISH

8.1 If not galvanized and unless otherwise specified, the tubes and frames shall be painted or varnished externally throughout their exposed surface. The steel sections shall also be suitably painted or otherwise treated for protection against rust and corrosion.

8.2 All fittings shall be suitably treated so as to render them resistant to corrosion.

*Since revised.

9. MARKING

9.1 Tubes, fittings and prefabricated frames shall be marked with manufacturer's name or trade-mark and other information specified in 6.2.

9.1.1 Tubes, fittings and prefabricated frames 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.