

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 4996 (1984): reinforced concrete fence posts [CED 53: Cement Matrix Products]



“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



Indian Standard
SPECIFICATION FOR
REINFORCED CONCRETE FENCE POSTS
(*First Revision*)

UDC 624.971.012.45 : 69.028.8



© Copyright 1985

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

Indian Standard

SPECIFICATION FOR REINFORCED CONCRETE FENCE POSTS

(First Revision)

Cement and Concrete Sectional Committee, BDC 2

Chairman

DR H. C. VISVESVARAYA

Representing

Cement Research Institute of India, New Delhi

Members

ADDITIONAL DIRECTOR, STANDARDS (B & S)	Research, Designs & Standards Organization (Ministry of Railways), Lucknow
DEPUTY DIRECTOR, STANDARDS (B & S) (<i>Alternate</i>)	
SHRI K. P. BANERJEE	Larsen & Toubro Ltd, Bombay
SHRI HARISH N. MALANI (<i>Alternate</i>)	
SHRI S. K. BANERJEE	National Test House, Calcutta
DR N. S. BHAL	Structural Engineering Research Centre (CSIR), Roorkee
SHRI V. K. GHANEKAR (<i>Alternate</i>)	
SHRI S. P. CHAKRABORTI	Roads Wing, Ministry of Shipping and Transport, New Delhi
SHRI N. SHIVAGURU (<i>Alternate</i>)	
CHIEF ENGINEER (DESIGNS)	Central Public Works Department, New Delhi
EXECUTIVE ENGINEER (DESIGNS III) (<i>Alternate</i>)	
CHIEF ENGINEER (BD)	Beas Designs Organization, Nangal Township
SHRI J. C. BASUR (<i>Alternate</i>)	
CHIEF ENGINEER (RESEARCH-CUM-DIRECTOR)	Irrigation Department, Government of Punjab, Chandigarh
RESEARCH OFFICER (IPRI) (<i>Alternate</i>)	
DR S. K. CHOPRA	Cement Research Institute of India, New Delhi
DR A. K. MULLICK (<i>Alternate</i>)	
DIRECTOR	A. P. Engineering Research Laboratories, Hyderabad
DIRECTOR (C & MDD-I)	Central Water Commission, New Delhi
DY DIRECTOR (C & MDD-I) (<i>Alternate</i>)	
DIRECTOR	Central Soil & Materials Research Station, New Delhi
DY DIRECTOR (<i>Alternate</i>)	
SHRI T. A. E. D'SA	The Concrete Association of India, Bombay
SHRI N. C. DUGGAL (<i>Alternate</i>)	

(Continued on page 2)

© Copyright 1985

INDIAN STANDARDS INSTITUTION

This publication is protected under the *Indian Copyright Act* (XIV of 1957) and reproduction in whole or in part by any means except with written permission of the publisher shall be deemed to be an infringement of copyright under the said Act.

(Continued from page 1)

<i>Members</i>	<i>Representing</i>
SHRI A. V. GOKAK	Cement Controller (Ministry of Industry)
SHRI S. S. MIGLANI (<i>Alternate</i>)	
SHRI A. K. GUPTA	Hyderabad Asbestos Cement Product Ltd, Hyderabad
SHRI P. J. JAGUS	The Associated Cement Companies Ltd, Bombay
SHRI M. R. VINAYAKA (<i>Alternate</i>)	
SHRI N. G. JOSHI	Indian Hume Pipes Company Ltd, Bombay
SHRI S. R. KULKARNI	M. N. Dastur & Co Pvt Ltd, Bombay
SHRI S. K. LAHA	The Institution of Engineers (India), Calcutta
SHRI B. T. UNWALLA (<i>Alternate</i>)	
SHRI G. K. MAJUMDAR	Hindustan Prefab Ltd, New Delhi
SHRI H. S. PASHICHA (<i>Alternate</i>)	
SHRI K. K. NAMBIAR	In personal capacity (' Ramanalaya ' 11 First Crescent Park Road, Gandhinagar, Adyar, Madras)
SHRI Y. R. PHULL	Indian Road Congress, New Delhi
SHRI Y. R. PHULL	Central Roads Research Institute (CSIR), New Delhi
SHRI M. R. CHATTERJEE (<i>Alternate I</i>)	
SHRI K. L. SETHI (<i>Alternate II</i>)	
DR MOHAN RAI	Central Building Research Institute (CSIR), Roorkee
DR S. S. REHSI (<i>Alternate</i>)	
DR M. RAMAIAH	Structural Engineering Research Centre (CSIR), Madras
DR A. G. MADHAVA RAO (<i>Alternate</i>)	
SHRI A. V. RAMANA	Dalmia Cement (Bharat) Ltd, New Delhi
DR K. C. NARANG (<i>Alternate</i>)	
SHRI G. RAMDAS	Directorate General of Supplies and Disposals, New Delhi
DR A. V. R. RAO	National Buildings Organization, New Delhi
SHRI J. SEN GUPTA (<i>Alternate</i>)	
SHRI R. V. CHALAPATHI RAO	Geological Survey of India, Calcutta
SHRI S. ROY (<i>Alternate</i>)	
SHRI T. N. S. RAO	Gammon India Ltd, Bombay
SHRI S. A. REDDI (<i>Alternate</i>)	
SHRI ARJUN RIJHSINGHANI	Cement Corporation of India Ltd, New Delhi
SHRI C. S. SHARMA (<i>Alternate</i>)	
SHRI H. S. SATYANARAYANA	Engineer-in-Chief's Branch, Army Headquarters, New Delhi
SHRI V. R. KOTNIS (<i>Alternate</i>)	
SECRETARY	Central Board of Irrigation and Power, New Delhi
SHRI K. R. SAXENA (<i>Alternate</i>)	
SHRI K. A. SUBRAMANIAM	The India Cement Ltd, Madras
SHRI P. S. RAMACHANDRAN (<i>Alternate</i>)	
SUPERINTENDING ENGINEER	Public Works Department, Government of (DESIGNS) Tamil Nadu, Madras
EXECUTIVE ENGINEER	
(SM & R DIVISION) (<i>Alternate</i>)	
SHRI L. SWAROOP	Orissa Cement Ltd, New Delhi
SHRI D. S. BHANDARI (<i>Alternate</i>)	
SHRI G. RAMAN, Director (Civ Engg)	Director General, ISI (<i>Ex-officio Member</i>)

Secretary

SHRI N. C. BANDYOPADHYAY
Deputy Director (Civ Engg), ISI

(Continued on page 26)

Indian Standard

SPECIFICATION FOR REINFORCED CONCRETE FENCE POSTS (*First Revision*)

0. FOREWORD

0.1 This Indian Standard (First Revision) was adopted by the Indian Standards Institution on 30 April 1984, after the draft finalized by the Cement and Concrete Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 One of the most durable and efficient post-and-wire fence is constructed with the help of concrete fence posts. Properly made reinforced or prestressed concrete fence posts have a long life, require very little or no maintenance and give a neat appearance to the fence. This standard covering reinforced concrete fence posts is intended to serve as a guide in the manufacture, selection, testing and use of suitable type of fence posts.

0.3 This standard was first published in 1968. The present revision has been prepared with a view to incorporating the modifications found necessary consequent to the revision of various related standards since its first publication so as to bring it in line with the present practices in the field in this country. In this revision deformed steel bars conforming to IS : 1139-1966* and IS : 1786-1979† have been allowed in the manufacture of reinforced concrete fence posts. In addition to significant changes in some figures, the requirement of minimum concrete cover to reinforcement and minimum strength of concrete for handling of units have also been modified.

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

*Specification for hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars for concrete reinforcement (*revised*).

†Specification for cold-worked steel high strength deformed bars for concrete reinforcement (*second revision*).

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

1. SCOPE

1.1 This standard covers the requirements for reinforced concrete fence posts for general purposes. Recommendations for the provisions of wire holes and their spacing, as well as the erection of post-and-wire fence have also been included in this standards. The standard does not cover reinforced lightweight concrete fence posts and prestressed concrete fence posts.

2. CLASSIFICATION

2.1 Reinforced concrete fence posts may be classified into the following categories (see Fig. 1):

- a) *Line Posts* — Line posts are intermediate posts forming the majority in a post-and-wire system and are intended to carry the fencing wire between the strainer posts.
- b) *Strainer Posts* — Posts notched on three sides and used with struts or braces as strainers at the corners or ends, or at intermediate positions in a line of fence.
- c) *Strut or Brace* — Member used in incline position for supporting the strainer post.

3. MATERIALS

3.1 The materials used for the manufacture of reinforced concrete fence posts shall comply with the requirements given in Table 1.

TABLE 1 REQUIREMENTS FOR MATERIALS

SL No.	MATERIAL	REF TO INDIAN STANDARDS*
i)	Cement shall be ordinary Portland cement or Portland slag cement or Portland pozzolana cement or rapid hardening Portland cement or hydrophobic Portland cement	IS : 269-1976, IS : 455-1976, IS : 1489-1976, IS : 8041-1978, and IS : 8043-1978
ii)	Water	IS : 456-1978
iii)	Concrete aggregate	IS : 383-1970, IS : 456-1978
iv)	Concrete	IS : 456-1978, IS : 516-1959 and IS : 1199-1959
v)	Reinforcement: Mild steel and medium tensile steel bars and hard-drawn steel wire or hot rolled mild steel, medium tensile steel and high yield strength steel deformed bars, or cold-worked steel high strength deformed bars	IS : 432 (Part 1) - 1982, IS : 432- (Part 2) - 1982, IS : 1139-1966 and IS : 1786-1979

*For titles of Indian Standards, see Appendix F.

3.2 Aggregates — The aggregate used shall consist of a graded mixture of clean coarse and fine aggregates. The nominal maximum size of coarse aggregate shall not exceed 12·5 mm.

3.2.1 Where specified, a sample of aggregates shall be submitted to the purchaser for approval.

3.3 Concrete — The mix proportions of the concrete shall be determined by the manufacturer and shall be such as will produce a dense concrete, but shall not be weaker than Grade M. 20 (*see IS : 456-1978**).

4. MANUFACTURE

4.1 Construction and Finish

4.1.1 Each post shall be made of concrete proportioned, mixed, placed and compacted to give a dense concrete free from voids (*see 3.3*).

4.1.2 Each post shall have a dense surface finish showing no coarse aggregate, and shall have no crevices likely to assist in the disintegration of concrete or rusting of the steel by the action of natural agencies.

4.2 Reinforcement

4.2.1 Preparation — Reinforcement shall be clean and free from loose mill-scale, loose rust, mud, oil, grease and any other coating which could reduce the bond between the concrete and the steel. A slight film of rust shall not be regarded as harmful, but the steel shall not be visibly pitted by rust.

4.2.2 Positioning — Reinforced concrete posts of rectangular cross-section shall be reinforced with a minimum of one longitudinal bar in each corner, and posts which are circular in cross-section shall have at least four bars spaced equidistant around the circumference. The longitudinal reinforcing steel shall be in one piece. The longitudinal bars shall be firmly held by means of at least 3 mm dia steel ties or spacers spaced at not more than 200 mm so that they are not displaced from their correct position during placing and compaction of the concrete.

4.2.3 Anchorage — Adequate hooks, or other form of anchorage, shall be provided to the main reinforcement at the bottom end of the posts.

4.2.4 Cover — To ensure durability in the finished posts, the longitudinal reinforcement shall have a minimum concrete cover of 15 mm, or twice the diameter of the main reinforcement, whichever is greater. The minimum cover shall be provided at the bottom of any corrugations and at any holes in the posts, and also at the top and bottom of all reinforced

*Code of practice for plain and reinforced concrete (*third revision*).

concrete posts and struts. Where the posts and struts are to be used in corrosive and coastal areas, the minimum concrete cover over the longitudinal reinforcement shall be increased to 25 mm.

4.2.4.1 The manufacturer shall ensure that during placing and compaction of the concrete in the moulds, the minimum concrete cover specified above is maintained.

4.3 Curing — After placing, the concrete shall be adequately protected during setting and in the first stages of hardening, from shocks, running or surface water and the harmful effects of sunshine, drying winds and cold. The concrete shall be cured for at least 7 days unless special curing methods are adopted. Steam curing of concrete may be adopted if so desired by the manufacturer, provided the requirements of pressure or non-pressure steam curing are fulfilled.

4.3.1 Maturing — From the date of casting, the posts shall be matured for the following period before testing or despatch including the period of normal moist curing:

Ordinary Portland cement, Portland slag cement, Portland pozzolana cement, hydrophobic Portland cement	28 days
Rapid-hardening Portland cement	14 days

4.3.2 Minimum Strength of Concrete for Handling of Units — To prevent damage to units, concrete shall have a strength at least twice the stress to which the concrete may be subjected at the time of first handling.

4.4 Recommendations for manufacture of reinforced concrete fence posts under field conditions are given in Appendix A.

5. SHAPE AND DIMENSIONS

5.1 The fence posts may be square, rectangular, circular or any polygonal in section. They may be of uniform section throughout their length or tapering on two sides or tapering on all four sides. The cross-sectional dimensions and the reinforcement shall be adequate to conform to the strength requirements given in 7. Unless otherwise specified by the purchaser and provided the strength requirements (see 7) are fulfilled, the dimensions and reinforcement given in Appendix B may be used.

5.2 Tolerances — The tolerance on the overall length of the fence posts shall be ± 15 mm. The tolerance on cross-sectional dimensions shall be ± 3 mm. The tolerance on the straightness of the fence posts shall be ± 0.5 percent.

6. FIXING AND SPACING OF FENCING WIRES

6.1 Fixing of Fencing Wires — Posts shall be designed for the attachment of the fencing wire by one of the following methods. Holes cast in metal projections or clips shall be located at distances from the end of the post varying not more than ± 6 mm from the position specified.

- a) *Using Cast-in Metal Projection or Clips* — Clips shall be embedded in the fence posts along the centre line of the post at right angle to one face of post during casting (*see* Fig. 2A). They shall however, invariably be of galvanized steel or a suitable corrosion resisting material and the inner ends shall be bent or hooked to prevent extraction. The clips shall be sufficiently robust to withstand service conditions and repeated fixing and unfixing of wires. A single wire clip shall not be used for this purpose as it may be too easily broken. In coastal climates, however, this method is not recommended, because even the galvanized steel staples may be subject to corrosion.
- b) *Attaching Fencing Wire with Galvanized Wire* — Fencing wire may be tied to the fence posts with a short piece of light wire, as shown in Fig. 2B. One end of the short wire shall be twisted round the line wire and brought around the back of the fence post, the other end shall then be pulled tight and twisted around the fencing wire on the other side of the post. If the edges of the posts are chamfered, this will enable the tying wire to be pulled tighter. Shallow notches may also be cast in the two back edges of the post so that these will firmly house the line wire and prevent any possibility of its slipping down the post. In order to provide a choice of wire spacing, corrugations with a pitch of approximately 25 mm and a depth of approximately 5 mm may be provided on one side of the posts, so that the attachment of fencing wire in chosen corrugations may be made with galvanized wire in the manner described above.
- c) *Using Holes in the Posts* — Holes may be cast in the fencing posts through which the fencing wire could be passed (*see* Fig. 2C). The holes may be formed by inserting steel rods, slightly greased, horizontally through the holes in the divisions of the mould and withdrawing them before the concrete sets too hard, say 4 or 5 hours after it has been placed. Holes shall have a uniform diameter of not less than 10 mm and shall be along the centre line of the post. They present a reasonably smooth surface. All arrisses shall be removed from the edges of the holes to prevent chaffing of the fencing wire. Holes shall not be provided in struts unless specified by the purchaser, and, when so specified, the holes shall take the form of long slots so that the fencing wires will not be kinked as they pass through.

NOTE — This method is good for plain wire, but if barbed wire is used the holes may have to be bigger which will reduce the cover of the reinforcement bars at these points, unless the section of the post is increased. For barbed wire fencing, holes may be cast in the fence posts in a direction from front to back with an indent at one end instead from side to side as for plain wire. To attach the barbed wire, a piece of plain wire shaped like an hairpin shall be passed over the barbed wire and through the hole in the post. The ends of the hairpin wire shall be twisted around a short piece of rod placed in the indent (see Fig. 2D).

6.2 Fencing Wire Spacing — Spacing of fencing wire will vary with the use for which the fencing is required. Unless otherwise specified, the spacing as recommended in Appendix B may be adopted.

7. STRENGTH OF REINFORCED CONCRETE FENCE POSTS

7.1 Impact Test — When tested in accordance with the method of test described in Appendix C, the test specimen shall show no visible permanent cracking.

7.2 Static Load Test — When tested in accordance with the method of test described in Appendix C, the load required to produce the first visible crack in the reinforced concrete post shall be not less than that specified below and the section modulus of the post should be adequately designed:

<i>Type of Post</i>	<i>Minimum Static Load at First Crack</i>
	N
Line post	700
Strainer post	2 500
Strut or angle post	450

8. ERECTION OF FENCE POSTS

8.1 The general recommendations regarding erection of reinforced concrete fence posts are given in Appendix D.

9. SAMPLING AND INSPECTION

9.1 The method of drawing representative samples of the material and the criteria for conformity shall be as prescribed in Appendix E.

10. MARKING

10.1 The fence posts shall be clearly and indelibly marked with the following particulars either during or after manufacture, but before testing, at a position so as to be easily read after erection in position:

- Year of manufacture,
- Type of fence post (see 2), and
- Maker's serial number or trade-mark.

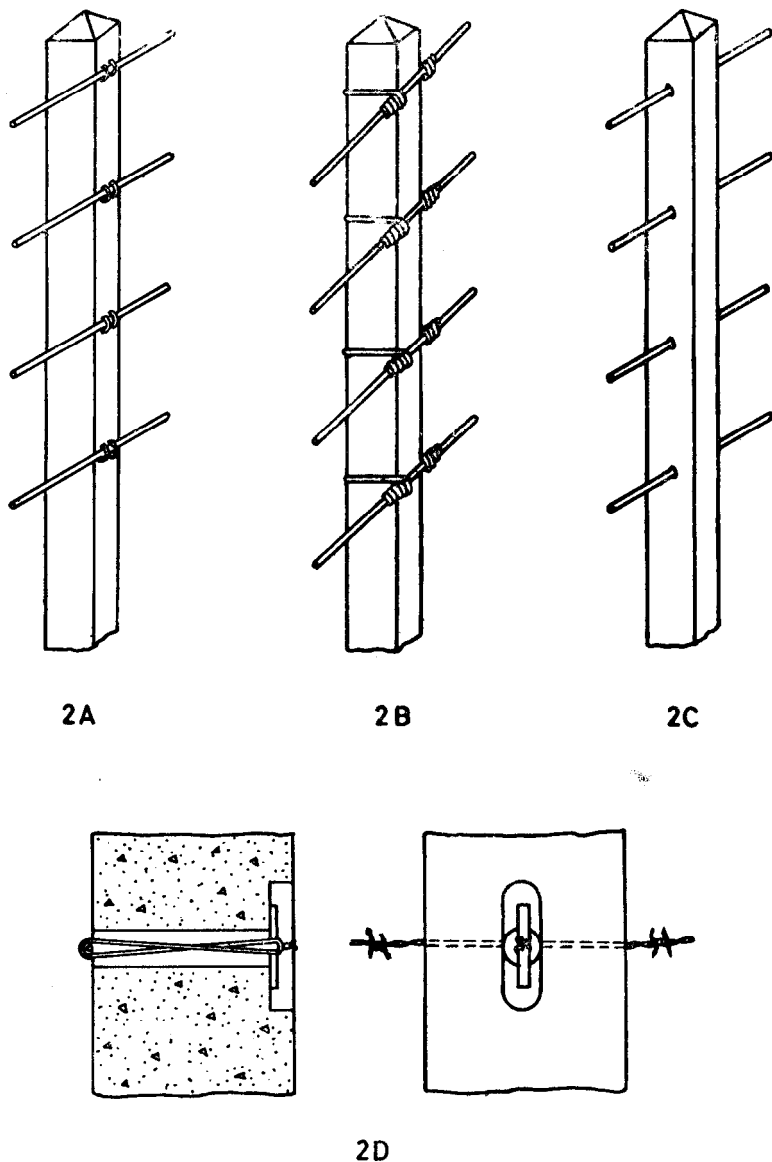


FIG. 2 TYPICAL ARRANGEMENT FOR FIXING FENCING WIRES

10.1.1 Each fence post 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.

A P P E N D I X A

(Clause 4.4)

RECOMMENDATIONS FOR THE MANUFACTURE OF REINFORCED CONCRETE FENCE POSTS UNDER FIELD CONDITIONS

A-1. GENERAL

A-1.1 This Appendix gives recommendations for the manufacture under field conditions of reinforced concrete posts complying with the performance requirements of the specification. Details of manufacture not covered specifically in this Appendix shall comply with the appropriate clauses of the specification.

A-2 MANUFACTURE

A-2.1 Cross-Sectional Dimensions and Reinforcement — The minimum cross-sectional dimensions, the minimum reinforcement of posts may be as given in Appendix B.

A-2.2 Concrete — The concrete mix proportions shall not be weaker than that specified in 3.3. The minimum cover shall be as given in 4.2.4.

A-2.3 Minimum amount of water shall be used in the mix so that the concrete shall be non-porous and of high density. While designing water-cement ratio, moisture present in the aggregate shall be considered.

A-2.3.1 The use of mechanical vibrators assists in reducing the amount of water used as a relatively dry mix can be compacted by this means. Effective compaction of the concrete in the moulds and around the reinforcement is essential to produce a strong, durable post. If a mechanical vibrator is not available, thorough rodding of the concrete

with a round-pointed 12 mm diameter rod will be effective. At the beginning of the rodding operation the rod shall be pushed through the concrete almost to the bottom of the mould and the strokes shall be well distributed.

A-2.3.2 When the aggregate has a high proportion of fine material or when hand rodding is used with a wetter mix, some additional cement may be required to give the desired strength. If time is available, a trial mix and the casting of a few posts, subsequently tested for strength, will ensure that the final production of posts is likely to be satisfactory, and more than compensate for any delay.

A-2.4 Typical details of a suitable mould are given in Fig. 3.

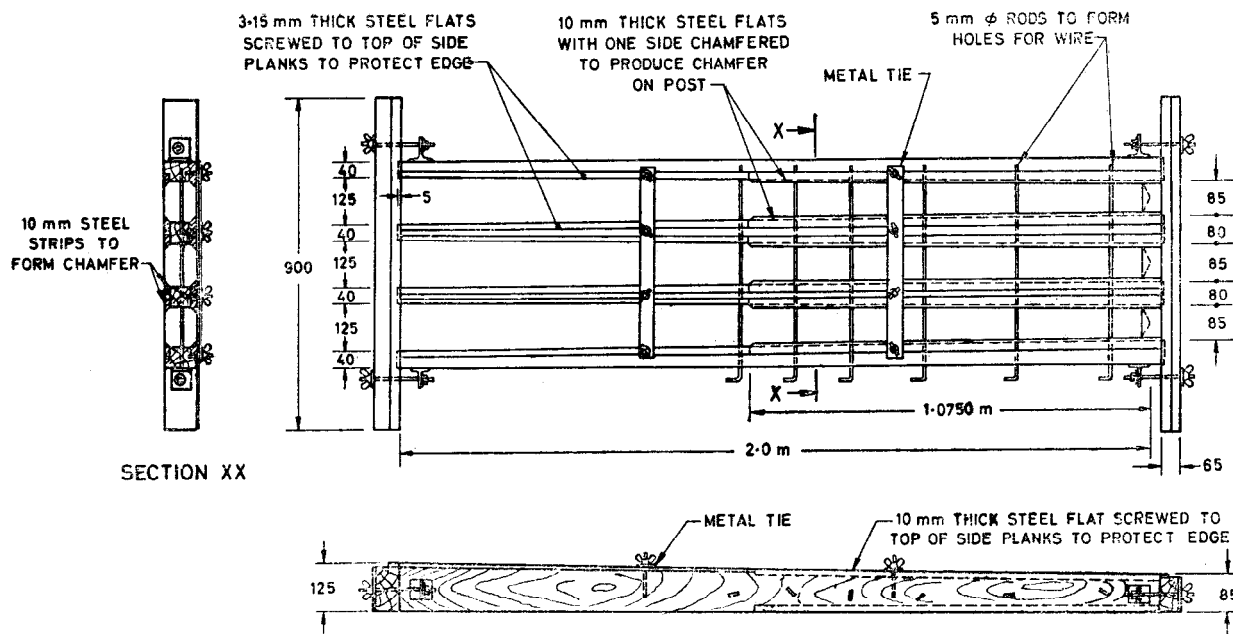


FIG. 3 TYPICAL DETAILS OF A MULTIPLE MOULD FOR MAKING THREE FENCING POSTS AT A TIME

APPENDIX B

(Clauses 5.1, 6.2 and A-2.1)

DIMENSIONS AND REINFORCEMENT

B-1. The design, length and area of cross-section of concrete fence posts vary depending upon the use for which they are intended. Some of the common sizes and shapes are given in Table 2 for general guidance.

TABLE 2 COMMON SIZES FOR REINFORCED CONCRETE FENCE POSTS

SL No.	TYPE OF POST	CROSS-SECTION		LENGTH		REINFORCEMENT		FENCING WIRE SPACING FROM GROUND LEVEL	SPACING OF LINE POST	SPACING OF STRAINER POST	REMARKS
		Bottom	Top	Total	Above Ground Level	GRADE I OR GRADE II MILD STEEL OF IS : 432 (PART 1) - 1982*					
						Longitudinal	Transverse				
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
		mm	mm	m	m			mm	m	m	
	i) Line post	100 × 125	100 × 125	1·5	1·0	6 mm ϕ 4 No.	3·15 mm ϕ at 100 mm c/c	150, 300, 450, 650, 900 and 1 150	3	30	Suitable as barbed or plain wire fencing for residential homes and housing estates (see Fig. 4 for typical details)
	Strainer post or	125 × 125	125 × 125	1·6	1·0						
	Corner post										
	Strut or brace	85 × 85	85 × 85	1·6	—						

ii) Line post	125 × 125	85 × 85	1·85	1·25	6 mm ϕ 4 No.	3·15 mm ϕ at 100 mm c/c	150, 300, 450, 650, 900 and 1 150	3	30	Suitable as barbed or plain wire fencing for farms and gardens (see Fig. 4 for typical details)
Strainer	150 × 150	125 × 125	2·15	1·25						
Strut or brace	110 × 110	110 × 110	2·15	—						
iii) Line post	100 × 100	75 × 75	1·85	1·25	10 mm ϕ 4 No.	6 mm ϕ at 150 mm c/c	150, 300, 500, 725, 950 and 1 175	3	30	Suitable as permanent barbed or plain wire cattle fencing. Vertical or diagonal wires in between the fence posts may also be used depending upon the security required (see Fig. 5 for typical details)
Strainer	125 × 125	90 × 90								
Strut or brace	100 × 100	100 × t^\dagger								
iv) Line post	150 × 125	150 × 125	2·0	1·30	10 mm ϕ 4 No.	6 mm ϕ at 150 mm c/c	100, 200, 350, 550, 750, 950, and 1 200	3	30	Suitable as barbed or plain wire fencing for heavy stock and estate work (see Fig. 4 for typical details)
Strainer	150 × 150	150 × 150	2·30	1·30						
Strut or brace	110 × 110	110 × 110	2·30	—						

*Specification for mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement: Part 1
Mild steel and medium tensile steel bars (third revision).

t^\dagger is the thickness of the line post at the height where the strainer post meets the line post.

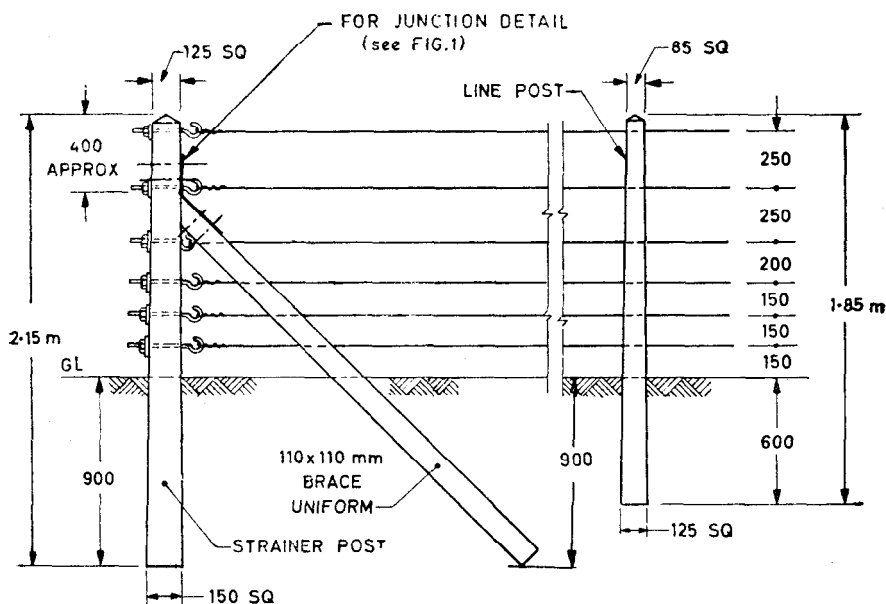
(Continued)

TABLE 2 COMMON SIZES FOR REINFORCED CONCRETE FENCE POSTS — *Contd*

SL No.	TYPE OF POST	CROSS-SECTION		LENGTH		REINFORCEMENT GRADE I OR GRADE II MILD STEEL OF IS : 432 (PART 1) - 1982*	FENCING WIRE SPACING FROM GROUND LEVEL	SPACING OF LINE POST	SPACING OF STRAI- NER POST	REMARKS	
		Bottom	Top	Total	Above Ground Level						
(1)	(2)	(3)	(4)	(5)	(6)	Longitu- dinal	Trans- verse	(9)	(10)	(11)	(12)
		mm	mm	m	m			mm	m	m	
v)	Line post	150 × 150	100 × 100	2·0	1·40	10 mm ϕ 4 No.	6 mm ϕ	100, 200,	3	30	Suitable as bar- bed or plain wire fencing for heavy stock and estate work (see Fig. 4 for typical details)
	Strainer	150 × 150	125 × 125	2·30	1·40		at	300, 450,			
	post or						150 mm	650, 850,			
	Corner post						c/c	1 050 and 1 300			
	Strut or brace	110 × 110	110 × 110	2·30	—						
vi)	Line post	150 × 150	100 × 100	3·60	3·0	10 mm ϕ 4 No.	6 mm ϕ	150, 300,	3·	30	Goose neck posts. Suitable as security fencing with barbed or plain wire. Vertical and diagonal wire may be intro- duced in bet- ween the fen- cing posts (see Fig. 6 for typi- cal details)
	Strainer	150 × 150	100 × 100	3·60	3·0		at	450, 600,			
	post or						150 mm	825, 1 050,			
	Corner post						c/c	1 275, 1 500,			
	Strut or brace	150 × 150	150 × 150	—	—			1 725, 1 950, 2 175, 2 400, 2 550, 2 700, 2 850, and 2 950			

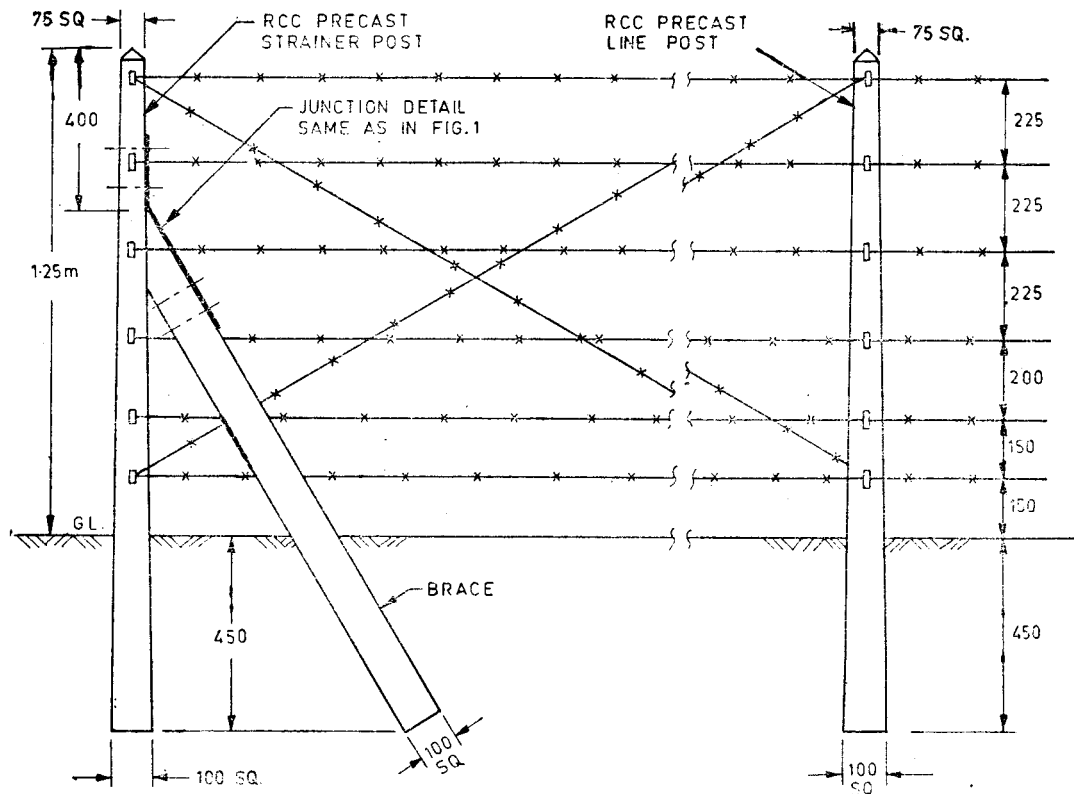
NOTE — When higher grades of steel are used as reinforcement, calculated reduction in size of reinforcement may be allowed.

*Specification for mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement: Part 1 Mild steel and medium tensile steel bars (*third revision*).



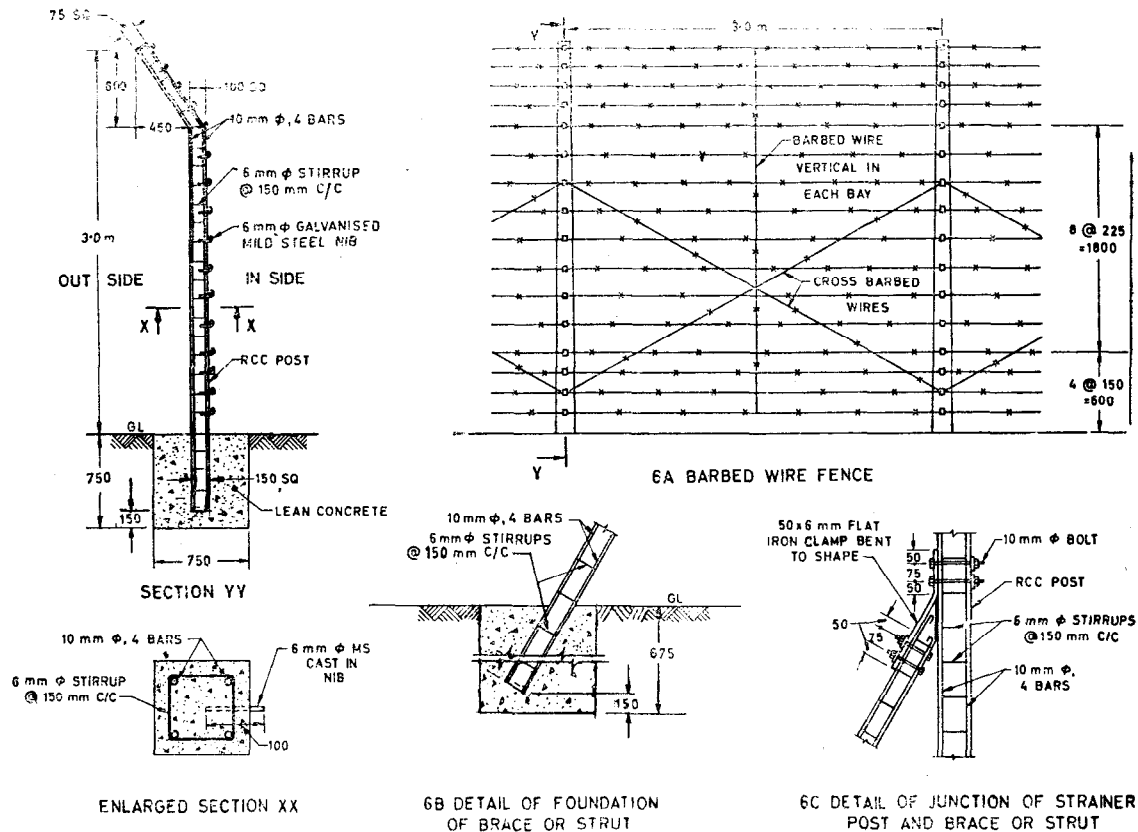
All dimensions in millimetres unless otherwise mentioned.

FIG. 4 TYPICAL DETAILS AND DIMENSIONS OF LINE POST, STRAINER POST AND BRACE FOR FENCING INTENDED FOR FARMS AND GARDENS



All dimensions in millimetres unless otherwise mentioned.

FIG. 5 TYPICAL DETAILS AND DIMENSIONS OF RCC LINE POST, STRAINER POST WITH BRACE FOR PERMANENT BARBED OR PLAIN WIRE CATTLE FENCE



All dimensions in millimetres unless otherwise mentioned.

FIG. 6 TYPICAL DETAILS OF GOOSE NECK FENCING POST FOR SECURITY FENCING

APPENDIX C

(Clauses 7.1 and 7.2)

METHOD OF STRENGTH TEST FOR REINFORCED CONCRETE FENCE POSTS

C-1. IMPACT TESTING OF POSTS AND STRUTS

C-1.1 The specimen shall be laid horizontally on two round bar supports not less than 25 mm in diameter so arranged as to be at right-angles to the length of the specimen and at a distance of 75 mm from the ends. The specimen shall have its greater cross-sectional dimension vertical. The bar supports shall themselves rest on a flat rigid floor (see Fig. 7).

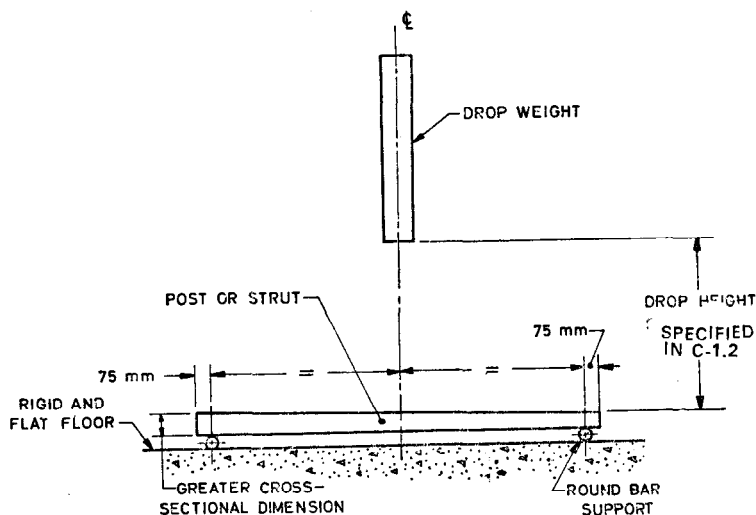


FIG. 7 TYPICAL ARRANGEMENT FOR IMPACT TEST

C-1.2 A mass of 20 ± 1 kg, in the form of a metal rod with a minimum cross-sectional area of 25 cm^2 , shall then be dropped from the height specified below appropriate to the type of post or strut, on to the centre of the specimen. The specimen shall then be examined in a good light for permanent cracking:

<i>Type of Post or Strut</i>	<i>Height of Drop</i> mm
Line posts	115
Strainer posts or corner posts	500
Struts or brace	90

C-2 METHOD FOR STATIC-LOAD TESTING OF POSTS AND STRUTS

C-2.1 The specimen shall be arranged horizontally with the greater cross-sectional dimension vertical (*see* Fig. 8). The round bars used for the fixed points of support and for the application of the load, shall be not less than 25 mm in diameter and shall be located in the position shown in Fig. 8.

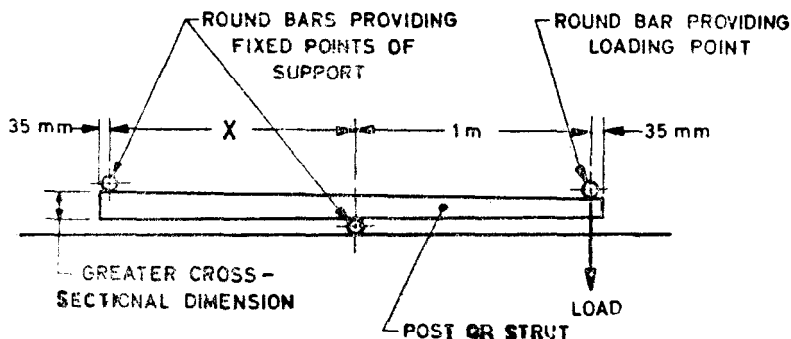


FIG. 8 TYPICAL ARRANGEMENT FOR STATIC LOAD TEST

C-2.2 The load shall be increased gradually until the first visible crack is observed in a specimen. The applied load then shall be recorded as the test load. Careful observation in a good light is necessary to detect the first crack.

C-2.3 The load at any step should not be maintained for longer than the time necessary to check for the first visible crack.

A P P E N D I X D

(Clause 8.1)

RECOMMENDATIONS FOR ERECTION OF FENCE POSTS

D-1. GENERAL

D-1.1 In addition to the quality of the fence posts, the life and appearance of the post-and-wire fence depends upon the proper erection of fence posts and placing of fence wire. For good results, the recommendations in D-2 to D-4 may be followed.

D-2. SPACING OF POSTS

D-2.1 Line posts may normally be spaced 3 m apart and strainer posts 30 m apart.

D-3. ERECTION OF FENCE POSTS

D-3.1 The lower end of the fence post shall be inserted in the hole dug in the ground for the purpose and ground repacked very carefully maintaining the plumbness of the posts. The earth shall be watered and rammed back thoroughly around the foot of the post layer by layer. Rocks and large stones buried against the face of the post will give it additional support. Where the soil is so poor, that even these precautions do not work, the posts shall be set in lean concrete. Posts with rectangular sections shall be set with their larger face perpendicular to the line of the fencing.

D-3.2 Proper functioning and appearance of the post-and-wire fence depends upon the stability of the posts as well as the tightness and tautness of the wires. This, in turn, depends upon the firmness and stability of end, corner and strainer posts. These should be provided with braces and set in a block of concrete unless the posts themselves are made very massive, strongly reinforced and set deep in the ground. The use of braces is generally the most economical (see Fig. 1, 4, 5 and 6).

D-3.2.1 The brace shall be placed in line with the fence so that it will bear at a point not more than two-thirds of the distance from the ground level to the top of the post. The foot of the brace may bear against the adjacent line post provided this is set at a distance closer than the normal, alternatively it may be set in a block of concrete below ground level.

D-4. ATTACHMENT OF LINE WIRES

D-4.1 For attachment of line wires, the neatest arrangement is to pass the wires through the holes in the post. This method is, however, not suitable when barbed wire is to be used.

D-4.2 In case of barbed wires, the wires may be tied to the posts with short pieces of light wire according to the arrangements indicated in 6.

D-4.3 For tightening the fence wire, the device shown in Fig. 9 is useful. One end of each wire shall be attached to a length of 5 mm diameter mild steel bar having a hook at one end and threaded at the other. The threaded end shall be passed through the holes in the strainer post, and a washer and nut shall then be put on. The nut shall be turned on with a spanner until the wire is sufficiently taut. Alternatively, turn buckle straining screw arrangement shown in Fig. 10 may be used.

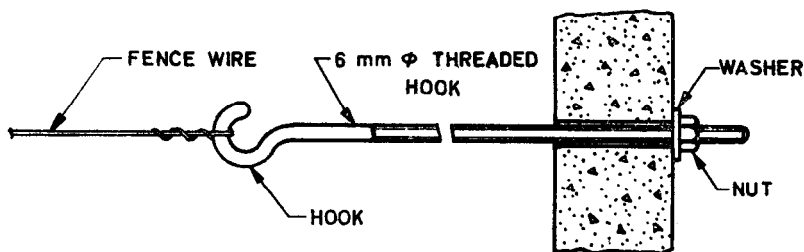


FIG. 9 DEVICE FOR TIGHTENING FENCE WIRE

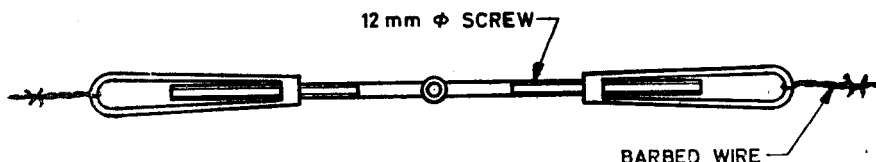


FIG. 10 STRAINING SCREW FOR TIGHTENING FENCE WIRE

APPENDIX E

(Clause 9.1)

SAMPLING AND INSPECTION

E-1. SCALE OF SAMPLING

E-1.1 Lot — In any batch, all fence posts of the same class and same dimensions shall be grouped together to constitute a lot.

E-1.1.1 Sub-Lot — If the number of fence posts in a lot exceed 500, the lot shall be divided into a suitable number of sub-lots such that the number of posts in any sub-lot shall not exceed 500. The acceptance or otherwise of a sub-lot shall be determined on the basis of sample selected from it.

E-1.1.2 The number of fence posts to be selected from a lot or a sub-lot shall depend upon its size and shall be in accordance with col 1 and 2 of Table 3.

E-1.1.3 These fence posts shall be selected at random. In order to ensure randomness, all the fence posts in the lot or the sub-lot may be arranged in a serial order and starting from any random post, every r th post may be included in the sample, r being the integral part of N/n , where N is the size of the lot or the sub-lot and n the sample size.

E-2. NUMBER OF TESTS

E-2.1 All the fence posts as selected in **E-1.1.2** shall be tested for overall length, cross-section and uprightness (*see* 5.2).

E-2.2 The number of posts to be tested for strength test (*see* 7.1 and 7.2) shall be in accordance with col 4 and 5 of Table 3. These posts may be selected from those already tested in **E-2.1**.

E-3. CRITERION FOR CONFORMITY

E-3.1 A lot or a sub-lot shall be considered as conforming to this specification if the conditions under **E-3.2** and **E-3.3** are satisfied.

E-3.2 The number of fence posts which do not satisfy the requirements of overall length, cross-section and uprightness shall not exceed the corresponding number given in col 3 of Table 3. If the number of such fence posts exceed the corresponding number, all fence posts in the lot or sub-lot shall be tested for these requirements and those not satisfying the requirements shall be rejected.

E-3.3 All the fence posts tested for strength test shall satisfy the requirements of the test. If one or more fence posts fail, twice the number of fence posts originally tested shall be selected from those already selected and subjected to the test. If there is no failure among these fence posts, the lot or the sub-lot shall be considered to have satisfied the requirements of this test.

TABLE 3 SAMPLE SIZE AND CRITERION FOR CONFORMITY(*Clauses E-1.1.2, E-2.2 and E-3.2*)

SIZE OF LOT OR SUB-LOT	DIMENSIONAL REQUIREMENTS		No. OF FENCE POSTS FOR STRENGTH TEST	
	Sample Size	Permissible No. of Defectives	Impact Test	Static Load Test
(1)	(2)	(3)	(4)	(5)
Up to 100	10	1	1	1
101 to 200	15	1	1	2
201 to 300	20	2	2	2
301 to 500	30	3	3	3

A P P E N D I X F(*Table 1*)**TITLES OF INDIAN STANDARDS**

IS : 269-1976	Ordinary, and low heat Portland cement (<i>third revision</i>)
IS : 383-1970	Coarse and fine aggregates from natural sources for concrete (<i>second revision</i>)
IS : 432 (Part 1)-1982	Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement: Part 1 Mild steel and medium tensile steel bars (<i>third revision</i>)
IS : 432 (Part 2)-1982	Mild steel and medium tensile steel bars and hard-drawn steel wire for concrete reinforcement : Part 2 Hard-drawn steel wire (<i>third revision</i>)
IS : 455-1976	Portland slag cement (<i>third revision</i>)
IS : 456-1978	Code of practice for plain and reinforced concrete (<i>third revision</i>)
IS : 516-1959	Methods of test for strength of concrete
IS : 1139-1966	Hot rolled mild steel, medium, tensile steel and high yield strength steel deformed bars for concrete reinforcements (<i>revised</i>)
IS : 1199-1959	Methods of sampling and analysis of concrete
IS : 1489-1976	Portland pozzolana cement (<i>second revision</i>)
IS : 1786-1979	Cold-worked steel high strength deformed bars for concrete reinforcement (<i>second revision</i>)
IS : 8041-1970	Rapid hardening Portland cement (<i>first revision</i>)
IS : 8043-1978	Hydrophobic Portland cement (<i>first revision</i>)

(Continued from page 2)

Precast Concrete Products Subcommittee, BDC 2 : 9

Covenner

SHRI G. K. MAJUMDAR

Representing

Hindustan Prefab Ltd, New Delhi

Members

DEPUTY DIRECTOR, STANDARDS (B & S)	Research Designs & Standards Organization (Ministry of Railways), Lucknow
ASSISTANT DIRECTOR, STANDARDS (B & S)-II (Alternate I)	
SHRI C. G. VITHAL RAO (Alternate II)	
DIRECTOR	Central Soil and Materials Research Station, New Delhi
DEPUTY DIRECTOR (Alternate)	
SHRI Z. GEORGE	Structural Engineering Research Centre (CSIR), Madras
DR A. G. MADHAVA RAO (Alternate)	
SHRI V. G. GOKHALE	Bombay Chemicals Pvt Ltd, Bombay
SHRI B. K. JINDAL	Central Building Research Institute (CSIR), Roorkee
DR S. S. REHSI (Alternate)	
SHRI L. C. LAI	In personal capacity (B/17 West End, New Delhi)
SHRI S. NAHARAY	Engineering Construction Corporation Ltd, Madras
SHRI A. RAMAKRISHNA (Alternate)	
SHRI D. B. NAIK	Engineer-in-Chief's Branch Army Headquarters, New Delhi
SHRI SUCHA SINGH (Alternate)	
SHRI K. K. NAMBIAR	In personal capacity ('Ramanalaya', 11 First Crescent Park Road, Gandhinagar, Adyar, Madras)
SHRI B. V. B. PAI	The Concrete Association of India, Bombay
SHRI P. SRINIVASAN (Alternate)	
SHRI H. S. PASRICHA	Hindustan Prefab Ltd, New Delhi
DR N. RAGHAVENDRA	Cement Research Institute of India, New Delhi
SHRI V. RAMALINGAM	Neyveli Lignite Corporation Ltd, Neyveli
SHRI K. A. RAMABHADRAN (Alternate)	
DR A. V. R. RAO	National Buildings Organization, New Delhi
SHRI J. SEN GUPTA (Alternate)	
SHRI B. G. SHIRKE	B. G. Shirke & Co Ltd, Pune
SHRI R. T. PAWAR (Alternate)	
SHRI C. N. SRINIVASAN	C. R. Narayana Rao, Madras
SHRI C. N. RAGHAVENDRAN (Alternate)	
SUPERINTENDING ENGINEER (P & S)	Tamil Nadu Housing Board, Madras
PROJECT OFFICER (Alternate)	
SUPERINTENDING SURVEYOR OF WORKS (NZ)	Central Public Works Department, New Delhi
SURVEYOR OF WORKS (NZ) (Alternate)	



INDIAN STANDARDS INSTITUTION

Headquarters :

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

Telephones : 26 60 21, 27 01 31

Telegrams : Manaksanstha
(Common to all Offices)

Regional Offices:

Telephone

*Western : Manakalaya, E9 MIDC, Marol, Andheri (East), BOMBAY 400093 6 32 92 95

†Eastern : 1/14 C. I. T. Scheme VII M, V. I. P. Road, Maniktola
CALCUTTA 700054 36 24 99

Southern : C. I. T. Campus, MADRAS 600113 41 24 42

Northern : B69 Phase VII, Industrial Focal Point,
S. A. S. NAGAR 160051 (Punjab) 8 73 28

Branch Offices :

*'Pushpak', Nurmohamed Shaikh Marg, Khanpur, AHMADABAD 380001 { 2 63 48
2 63 49

*'F' Block, Unity Bldg, Narasimharaja Square, BANGALORE 560002 22 48 05

Gangotri Complex, Bhadbhada Road, T. T. Nagar, BHOPAL 462003 6 27 16

22E Kalpana Area, BHUBANESHWAR 751014 5 36 27

5-8-56C L. N. Gupta Marg, HYDERABAD 500001 22 10 83

R14 Yudhister Marg, C Scheme, JAIPUR 302005 6 98 32

117/418 B Sarvodaya Nagar, KANPUR 208005 4 72 92

Patliputra Industrial Estate, PATNA 800013 6 23 05

Hantex Bldg (2nd Floor), Rly Station Road, TRIVANDRUM 695001 32 27

Inspection Office (With Sale Point) :

Institution of Engineers (India) Building, 1332 Shivaji Nagar, PUNE 410005 6 24 35

*Sales Office in Bombay is at Novelty Chambers, Grant Road,
Bombay 400007 89 65 28

†Sales Office in Calcutta is at 5 Chowringhee Approach, P. O.
Prinsep Street, Calcutta 700072 27 68 00