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DRAFT IN WIDE CIRCULATION

DOCUMENT DESPATCH ADVICE

Reference	Date
CED 13/T-65 & 66	31 October 2011

TECHNICAL COMMITTEE: Building Construction Practices Sectional Committee, CED 13

ADDRESSED TO:

1. All Members of Civil Engineering Division Council, CEDC
2. All Members of Building Construction Practices Sectional Committee, CED 13
3. All others interests

Dear Sir(s),

Please find enclosed the following drafts:

Doc. No.	Title
CED 13(7828)	Draft Indian Standard Code of Practice for Anti-Termite Measures in Buildings: Part 2 Pre-Constructional Chemical Treatment Measures [Third Revision of IS 6313(Part 2)]
CED 13(7829)	Draft Indian Standard Code of Practice for Anti-Termite Measures in Buildings: Part 3 Treatment for Existing Buildings [Third Revision of IS 6313(Part 3)]

Kindly examine the drafts and forward your views stating any difficulties which you are likely to experience in your business or profession if these are finally adopted as National Standards.

Last Date for comments: **31 January 2012.**

Comments if any, may please be made in the format as attached, and mailed to the undersigned at the above address. You are requested to send your comments preferably through e-mail to **sak@bis.org.in**.

In case no comments are received or comments received are of editorial nature, you may kindly permit us to presume your approval for the above documents as finalized. However, in case of comments of technical nature are received then it may be finalized either in consultation with the Chairman, Sectional Committee or referred to the Sectional Committee for further necessary action if so desired by the Chairman, Sectional Committee.

These documents are also hosted on BIS website **www.bis.org.in**.

Thanking you,

Yours faithfully,

-sd-

(A.K. Saini)
Sc 'F' and Head (Civil Engg)
Fax: 011 23235529

Encl: as above

FORMAT FOR SENDING COMMENTS ON BIS DOCUMENT

[Please use A4 size sheet of paper only and type within fields indicated. Information in column (3) should include reasons for comments, technical references and suggestions for modified wording of the clause when the existing text is found not acceptable. **Comments through e-mail (ced@bis.org.in & copy to sak@bis.org.in) shall be appreciated**.]

Name of the Commentator/ Organization: _____

BIS Document No.:__CED 13(7828)WC____
Title:___ *Code Of Pracice For Anti –Termite Measures In Buildings*
Part 2 : Pre-Constructional Chemical Treatment Measures ____

BIS Letter Reference No.___CED 13/T-65_____**Dated**___31 October 2011___

Clause/ Table No.	**Comments/ Modified Wordings**	**Justification of Proposed Change**
(1)	**(2)**	**(3)**

BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY
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Draft **INDIAN STANDARD**

CODE OF PRACICE FOR ANTI –TERMITE MEASURES IN BUILDINGS
PART 2 : PRE-CONSTRUCTIONAL CHEMICAL TREATMENT MEASURES

[*Third Revision* of IS 6313 (Part 2)]

Building Construction Practices Sectional Committee, CED 13

Last Date for Receipt of Comments is 31 January 2012

FOREWORD

(*Formal clause of the foreword will be added later*)

This standard (Part 2) was first published in 1971 and subsequently revised in 1981 and in 2001. In view of the developments since the last revision and based on the further knowledge that has become available, the Committee responsible for formulation of this standard decided to take up its revision. Considerable assistance has been provided by Central Building Research Institute (CSIR), Roorkee in this revision of the standard. Part 1 of this standard deals with constructional measures and Part 3 deals with treatment for existing buildings. Information with respect to 'Banning of lindane' has also been included for specific views from the various stakeholders.

In this revision, the following changes have been made:

i) Imidacloprid has been added to the existing chemicals namely Chlorpyrifos and Lindane recommending its use as anti-termite treatment.
ii) Use of watering cans for disposal of chemical emulsion has been dispensed.
iii) New and detailed provisions on 'treatment to RCC basement buildings' has been included.
iv) Informative Annex on 'short note on termites' has been updated.
v) References included to all the available latest Indian Standards.

Termite control in buildings is very important as the damage likely to be caused by the termites is huge. Wood is one of the cellulosic materials which termites damage, cellulose forming their basic nutrient. They also damage materials of organic origin with a cellulosic base, household articles like furniture, furnishings, clothings, stationery, etc. Termites are also known to damage non-cellulosic substances in their search for food. Rubber, leather, plastics, neoprene as well as lead coating used for covering of underground cables are damaged by termites. The widespread

damage by termites, high constructional cost of buildings have necessitated evolving suitable measures for preventing access of termites to buildings.

On the basis of their habitat, termites are divided into two types, namely (a) Subterranean or ground nesting termites, and (b) Non-subterranean or wood nesting termites having no contact with soil (see Annex A). The subterranean termites are most destructive and are mainly responsible for the damage caused in buildings. Typically, they form nests or colonies underground in the soil, near ground level in a stump or in other suitable piece of timber, and some species may construct a conical or dome shaped mound. These colonies may persist for many years and, as they mature, contain a population running into millions. All attacks by subterranean termites originate from the nest but timber either lying on or buried in the ground maybe reached by means of shelter tubes constructed within, or over such materials or else by the erection of an independent, free standing mud structure. Chemical barriers which prevent the termites from reaching the super-structure of the building will protect the building and its contents. Treating the soil beneath the building and around the foundations with a soil insecticide is a good preventing measure which is attracting attention throughout the world. The purpose of this treatment is to create a chemical barrier between the ground from where the termites come and woodwork, cellulosic materials and other contents of the buildings which may form food for the termites. Timber which is seasoned and is naturally durable in heartwood may be used in the building structure. However, non-durable timbers and sapwood of all timbers should be treated to withstand the attack of drywood termites (*see* IS 401 and IS 1141).

The provisions of this Standard are without prejudice to the various Acts, Rules and Regulations including the Insectides Act, 1968 and the Rules framed thereunder.

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.

BUREAU OF INDIAN STANDARDS

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Draft **INDIAN STANDARD**

CODE OF PRACICE FOR ANTI –TERMITE MEASURES IN BUILDINGS
PART 2 : PRE-CONSTRUCTIONAL CHEMICAL TREATMENT MEASURES

[*Third Revision* of IS 6313 (Part 2)]

1. SCOPE

This standard (part 2) gives recommendations for the chemical treatment of soils for the protection of building from attack by subterranean termites. It includes reference to the chemicals to be used, lays down minimum rates of application for usage, and outlines procedure to be followed while the building is under construction.

2. REFERENCES

The Indian Standard given in Annex B contain provisions, which through reference in this text, consitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex B.

3. TERMINOLOGY

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

3.1 Chemical Barrier

The layer of chemically trated soil in immediate contact with the foundation and floor structure of a building which kills or repels termites thus forming a barrier which is impervious to termite entry.

3.2 Soil Treatement

The application of chemicals (toxicants) to the soil adjacent to and under a building to form a chemical barrier which is lethal or repellent to termites.

3.3 Pre-Construction Soil Treatment

This is a process in which soil chemical treatment is applied to a building during the early stage of its construction .

4 SITE PRERATION

The removal of trees, stumps, logs or roots from a building site reduces the hazards from subterranean termites. Similary, the sub floor area should be kept free form all

debris in which new colonies of termites might be established. In order to ensure uniform distribution of the treating solution and to assist penetration, some site preparation, may be necessary. The information given **4.1.1** to **4.1.4** is for guidance in preparing a building site for chemical treatment.

4.1.1 Heavy Soils and Sloping Sites

On clay and other heavy soils where penetration is likely to be slow and on sloping site where run off of the trating solution is likely to occur, the surface of the soil should be scarified to a depth of at least of 75 mm.

4.1.2 Sandy or Porous Soils

On loose, sandy or porous soils where loss of treating solution through piping or excessive percolation is likely to occur, preliminary moistening to fill the capillary spaces in the soil is recommended.

4.1.3 Levelling, Excavations and Filling

All sub floor levelling and grading should be completed; all cuttings, trenches and excavations should be completed with backfilling in place, borrowed fill must be free from organic debris and should be well compacted. If this is not done, supplementary treatement should be made to complete the barrier.

4.1.4 Concrete Formwork

All concrete formwork, levelling pegs, timber off-cuts and other builder's debris should be removed from the area to be treated.

5 CHEMICALS AND RATE OF APPLICATION

5.1 Basic Principle

Chemicals toxic to subterranean termites may be used effectively to check termite infestation in the soil. These are useful in the treatment of new building sites and may also be used to eradicate existing infestation in buildings and to prevent reinfestation. The effectiveness and/or residual activity depend upon the choice of the chemicals, the dosages adopted and the thoroghness of application. The chemical solutions or emulsions are required to be dispersed uniformly in the soil and of the required strength so as to form an effective chemical barrier which is lethal and repellent to termites.

5.2 Mound Treatment

If termite mounds are found within the plinth area of the buildings these should be destroyed by means of insecticides in the form of water suspension or emulsion which should be poured into the mounds at serveral places after breaking open the earthen structure and making holes with crow-bars. The quantity to be used will depend upon the size of mound. For a mound volume of about $1m^3$, 4 litres of water based chemical emulsion shall be used.

5.3 Chemicals to be Used for Soil Treatment

Treating the soil beneath the building and around the foundations with a soil insecticide is a preventive measure. The purpose of the treatment is to create a continious chemical barrier between the ground from where termites come and woodwork or other cellulosic materials in the buildings.

The following chemicals conforming to relevant Indian standards (as may be available) in water emulsion are effective when applied uniformly over the area to be treated.

S.No.	Chemical	Relevant Indian Standard	Concentration by weight, percent (active ingredient)	Dosage
1.	Chlorpyriphos 20% EC	IS 8944	1.0	250 ml in 5 litre water
2.	Imidacloprid 30.50% SC	**	0.075	10.5 ml in 5 litre water
3.	Lindane 20% EC ††	IS 632	1.0	250 ml in 5 litre water

†† - Lindane (Banned vide Gazette Notification No S.O. 637(E) Dated 25/03/2011)-Banned for Manufacture,Import or Formulate w.e.f. 25th March,2011 and banned for use w.e.f. 25th March,2013.

** *FAD 1(1999) - Draft Indian Standard Specification for Imidacloprid suspension concentrate (SC) [to be printed]*

NOTE:

1. The above mentioned chemicals are registerd (as on date) chemicals with the Central Insecticides Board – Registration Committee (CIB RC). Efforts will be made to update (add/delete) the list of chemicals (Termiticides) as obtained time to time from the CIB RC for incorporation in the above table appropriately. However, the chemicals from the above table as available in the CIB RC's approved list at any point of time, shall only be used.

2.The chemicals described in this standard are insecticides with a persistent action and are regarded highly poisonous. These chemical can have an adverse effect upon health when absorbed through the skin, inhaled as vapours or spray mist or swallowed. Detailed precautions for the safe handling of these chemicals are given in Annex C. Persons carrying out chemical soil treatment in accordance with this code should familiarize themselves for these precautions and exercise due care when handling the chemical whether in concentrate or in diluted form. The use of the chemical should be avoided where there is any risk of wells or other water supplies becoming contaminated.

6. ESSENTIAL REQUIREMENTS FOR BARRIER AND METHOD OF APPLICATION

6.1 Conditions of Formation

Barrier shall be complete and continuous under the whole of the structure to be

protected. All foundations shall be fully surrounded by and in close contact with the barrier or treated soil. Each part of the area treated shall receive the prescribed dosage of chemical.

6.2 Time of Application

Soil treatment should start when foundation trenches and pits (in case of Load Bearing Structure and Basements) are ready to take mass concrete in foundations. Laying of mass concrete should start when the chemial emulsion has been absorbed by the soil and the surface is quite dry. Treatment should not be carried out when it is raining or when the soil is wet with rain or sub-soil water. The foregoing requirements applies also in the case of treatement to the filled earth surface within the plinth area before laying the sub-grade for the floor.

6.3 Disturbance

Once formed, treated soil barriers shall not be disturbed. If, by chance, treated soil barriers are disturbed, immediate step shall be taken to restore the continuity and completeness of the barrier system.

7. TREATMENT

7.1 Soil Treatment

The chemical emulsions described in **5.3** shall be applied uniformly at the prescribed rate in all the stages of the treatment. Hand operated pressure pump or an electrically operated pump shall be used for uniform spraying of the chemical from graduated containers. Proper check shall be kept so that the specified quantity of chemical is used for the required area during the operation.

7.1.1 In the event of waterlogging of foundation, the water shall be pumped out and the chemical emulsion applied when the soil is absorbent .

7.2 Treatment for Masonry Foundations and Basements (Load Bearing Structures)

7.2.1 Treatment to trenches made for foundation of Masonary walls or Basement

The bottom surface and the sides (upto a height of about 300 mm) of the excavations made from masonry foundations and basements shall be treated with the chemical at the rate of 5 l/m^2 surface area (see Fig.1).

7.2.2 Treatment to Vertical Backfilled Soil along masonary Foundation/ retaining wall

After the masonry foudations and the retaining wall of the basements come up, the backfill in immediate contact with the foundation structure shall be treated at the rate of 7.5 l/m^2 of the vertical surface of the sub-structure for each side. If water is used for ramming the earth fill, the chemical treatment shall be carried out after the

ramming operation is done by rodding the earth at 150 mm centres close to parallel to the wall surface and spraying the chemical emulsion at the above dosage. After the treatement, the soil should be tamped in place. The earth is usually returned in layers and the treatement shall be carried out in similar stages. The chemical emulsion shall be directed towards the masonry surfaces so that the earth in contact with these surfaces is well treated with the chemical (*see* Fig. 2 and Fig. 3).

7.2.3 Treatment of top Surface of Plinth Filling

The top surface of the consolidated earth within plinth walls shall be treated with chemical emulsion at the rate of 5 l/m^2 of the surface before the sand bed or sub-grade is laid. This traetment shall also be carried out on DPC provided on plinth wall. If the filled earth has been well rammed and the surface does not allow the emulsion to seep through, holes up to 50 to 75 mm deep at 150 mm centres both ways may be made with 12 mm dimeter mild steel rod on the surface to faciliatate saturation of the soil with the chemical emulsion .

7.2.4 Treatment at Junction of the wall and the floor

Special care shall be taken to establish continuity of the vertical chemical barrier on inner wall surface from ground level (where it had stopped with the treatment described in **7.2.2**) up to level of the filled earth surface. To achieve this, a small channel 30 mm x 30 mm shall be made at all the junction of wall and columns with the floor (before laying the sub-grade) the rod holes made in the channel up to the ground level 150 mm apart and the iorn rod moved backward and forward to break up the earth and chemical emulsion poured along the wall at the rate of 7.5 l/m^2 of vertical wall or column surface so as to soak the soil right to the bottom. The soil should be tamped back into place after the operation .

7.2.5 Treatment of Soil Along External Perimeter of Building

7.2.5.1 After the building is complete, the earth along the external perimeter of the builiding should be rodded at intervals of 150 mm and to a depth of 300 mm. The rods should be moved backword and forward parallel to the wall to break up the earth and chemical emulsion poured along the wall at the rate of 7.5 l/m^2 of the vertical surface. After the treatment the earth should be tamped back into place. Should the earth outside the building be graded on completion of building, this treatment should be carried out on completion of such grading.

7.2.5.2 In the event of filling being more than 300 mm, the external perimeter treatment shall extend to the full depth of filling upto the ground level so as to ensure continuity of the chemical barrier.

7.3 Treatment For RCC Foundations (Buildings without Basements)

In the case of RCC foundations, the treatment shall start at a depth of 500 mm below the ground level except when such ground level is raised or lowered by filling or cutting after the foundations have been cast. In such cases, the depth of 500 mm shall be determined from the new soil level resulting from the filling or cutting mentioned above, and soil in immediate contact with the vertical surfaces of RCC.

Foundations shall be treated at the rate of 7.5 l/m^2 (*see* Fig.4).

7.3.1 Treatment of top Surface of Plinth Filling

The top surface of the consolidated earth within plinth walls shall be treated with chemical emulsion at the rate of 5 l/m^2 of the surface before the sand bed or sub-grade is laid. If the filled earth has been well rammed and the surface does not allowe the emulsion to seep through, holes up to 50 to 75 mm deep at 150 mm centres both ways may be made with 12 mm dimeter mild steel rod on the surface to faciliatate saturation of the soil with the chemical emulsion.

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Special care shall be taken to establish continuity of the vertical chemical barrier on inner wall surface from ground level (where it had stopped with the treatment described in **7.2.2**) up to level of the filled earth surface. To achieve this, a small channel 30 mm x 30 mm shall be made at all the junction of wall and columns with the floor (before laying the sub-grade) the rod holes made in the channel up to the ground level 150 mm apart and the iorn rod moved backward and forward to break up the earth and chemical emulsion poured along the wall at the rate of 7.5 l/m^2 of vertical wall or column surface so as to soak the soil right to the bottom. The soil should be tamped back into place after the operation.

7.3.3 Treatment of Soil Along External Perimeter of Building :

After the building is complete, the earth along the external perimeter of the builiding should be rodded at intervals of 150 mm and to a depth of 300 mm. The rods should be moved backword and forward parallel to the wall to break up the earth and chemical emulsion poured along the wall at the rate of 7.5 l/m^2 of the vertical surface. After the treatment the earth should be tamped back into place. Should the earth outside the building be graded on completion of building, this treatment should be carried out on completion of such grading.

7.3.3.1 In the event of filling being more than 300 mm, the external perimeter treatment shall extend to the full depth of filling upto the ground level so as to ensure continuity of the chemical barrier.

7.3.4 Treatment of Soil Surrounding Pipes, Wastes and Conduits

When pipes, wastes and conduits enter the soil inside area of the foundations, soil surrounding the point of entry shall be loosened around each such pipe, waste or conduit for a distance of 150 mm and to a depth of 75 mm before treatment is commenced. When they enter the soil external to the foundation, they shall be similarly treated at a distance of over 300 mm unless they stand clear of the walls of the building by about 75 mm.

7.3.5 Treatment for Expansion Joints

Expansion joints at ground floor level are one of the biggest hazards for the termite infestation. The soil beneath these joints should receive special attention when the

treatment under **7.3.1** is carried out. This treatment should be supplemented by treating through the expansion joints after the sub-grade has been laid, at the rate of 2 litre per linear metre.

7.4 Treatment to RCC Basement Buildings: (Please refer fig 5 for details of treatment)

The treatment starts after the excavation for basement is complete and before laying soling and PCC. The treatment shall be carried out in the following stages.

7.4.1 Treatment to soil below raft

Before laying the rubble soling and PCC, the compacted and levelled soil shall be treated at 5 l/m^2 .

7.4.2 Treatment to soil along the retaining wall

The soil retained by the walls (soil coming in contcat with retaining wall) shall be treated at the rate of 7.5 l/m^2 of the vertical surface so as to effect a continuous outer chemical barrier, in continuation with that of the one formed under **7.4.1**. The treatment shall follow the backfilling as backfilling is done in stages of 30 cms but not to exceed a depth of 1 metre. Rodding may be carried out to facilitate the treatment.

7.4.3 Treatment of Soil Along External Perimeter of Building

After the building is complete, the earth along the external perimeter of the builiding should be rodded at intervals of 150 mm and to a depth of 300 mm. The rods should be moved backward and forward parallel to the wall to break up the earth and chemical emulsion poured along the wall at the rate of 7.5 l/m^2 of the vertical surface. After the treatment, the earth should be tamped back into place. Should the earth outside the building be graded on completion of building, this treatment should be carried out on completion of such grading .

7.4.4 Treatment of Soil Surrounding Pipes, Wastes and Conduits

When pipes, wastes and conduits enter the soil, the inside area of the foundations, soil surrounding the point of entry shall be loosened around each such pipe, waste or conduit for a distance of 150 mm and to a depth of 75 mm before treatment is commenced. When they enter the soil external to the foundation, they shall be similarly treated at a distance of over 300 mm unless they stand clear of the walls of the building by about 75 mm.

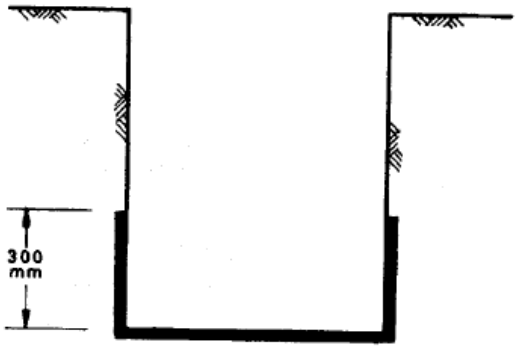
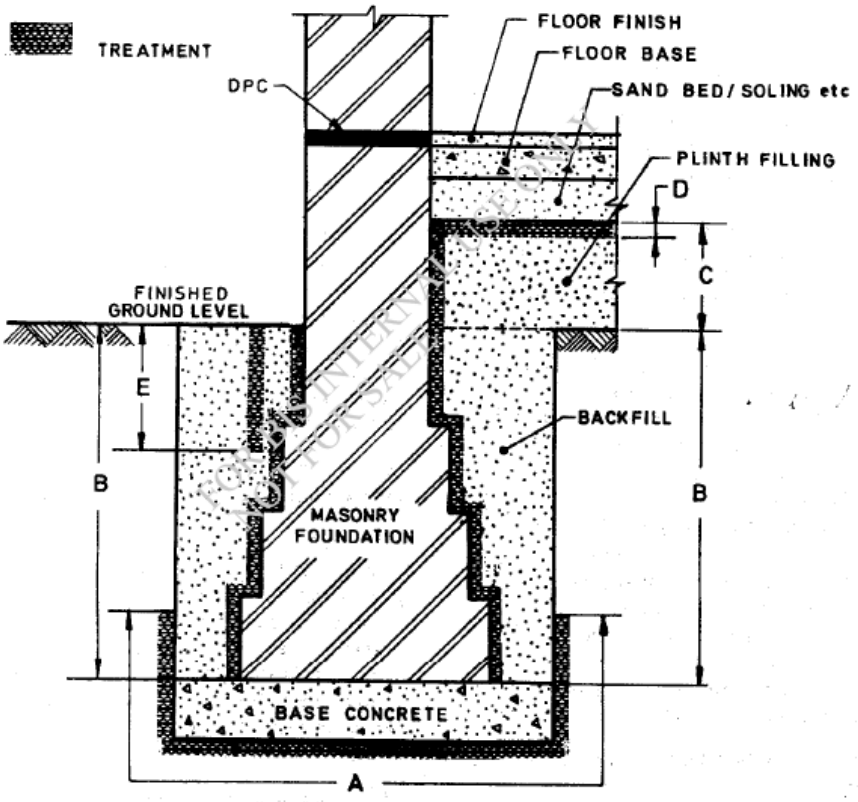


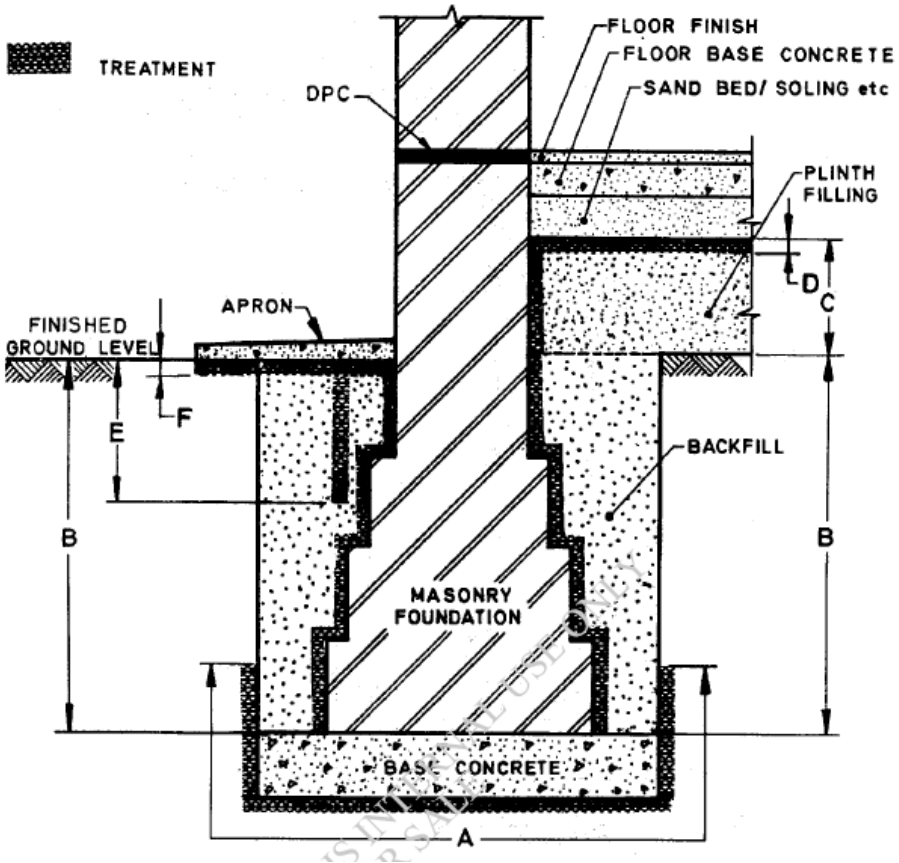
FIG. 1 TREATMENT OF TRENCH BOTTOM AND SIDES



Stage of Treatement

A - Bottom and side of Trenches (see 7.2.1)
B - Backfill in Immediate Contact with Foundation (see 7.2.2.)
C - Junction of Wall and Floor (see 7.5)
D - Top Surface of Plinth Filling (see 7.4)
E - External Perimeter of Building (see 7.6)

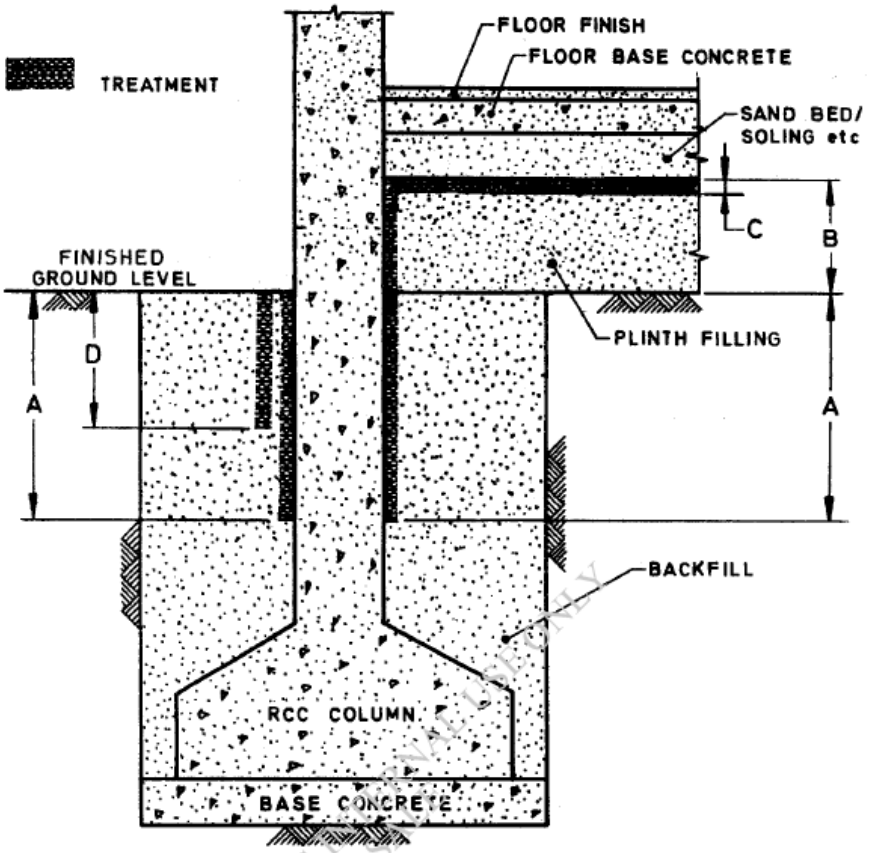
Fig 2: Treatment for Masonry Foundation without Apron



Stage of Treatment

A - Bottom and sides of Trenches (see 7.2.2.1)
B - Backfill in Immediate Contact with Foundation walls (see 7.2.2)
C - Junction of Wall and floor (see 7.5)
D - Top Surface of Plinth Filling (see 7.4)
E - External Perimeter of Building (see 7.6)
F - Soil Below Apron (see 7.6)

Fig.3 Treatment for Masonry Foundations With Apron Along External Perimeter



Stage of Treatment

A - Backfill in Immediate Contact with Foundation Structure (See 7.2.3)
B - Juntion of Wall and Floor (see 7.5)
C - Top Surface of Plinth Filling(see 7.4)
D - External of Building (see 7.6)

Fig.4 Treatment for RCC Foundations

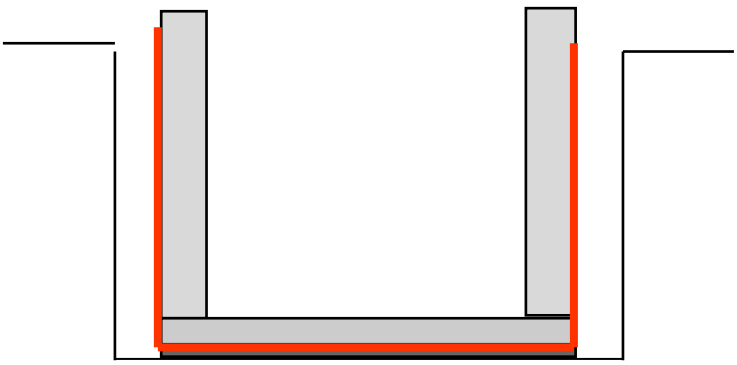


Fig 5 – Treatment for RCC Basement Building

ANNEX A
[*Foreword*]

A SHORT NOTE ON TERMITES

A-1. CLASSIFICATION

A-1.1 Termites constitute a separate order of insects called 'Isoptera' [*isos* is 'equal ' and *pteron* means 'wing' in Greek). Although, they are commonly called white ants, they are not related to ants who have a thin waist in contrast to the thick waist of the termites. Furthermore, the front pair of wings of the ants are longer than their hindpair whereas in termites, both pairs are equal. There are over 2300 species of termites out of which about 220 are found in India. All these species are not considered to be serious pests.

A-1.2 According to their habits, termites can be divided into two well defined groups:

a) Subterranean termites which build nests and live in the soil, and
b) Non-subterranean termites which live in wood and do not require contact with the soil.

A-1.3 Subterranean termites require moisture to sustain their life. They need access to ground at all times. They build tunnels between their nest and source of food through earth and earth-like covered run-ways around obstructions. These covered tunnels provide humidity conditions and darkness necessary for their movement and for maintaining contact with earth. The subterranean termites enter a building from ground level, under the foundation, working their way upwards through floors, destroying all before them. So little is seen of these termite operations that sometimes the structural member attacked is found to be merely a shell with the inside completely riddled and eaten away.

A-1.4 The drywood termites on the contrary are able to live even in fairly dry wood and without contact with ground. These frequently construct nests within the roofs and other parts of houses, which they destroy, if not speedily exterminated. However, they are not as prevalent and common as subterranean termites, and are generally confined to coastal regions.

A-1.5 A subterranean termite colony consists of a pair of reproductives, the so-called king and queen and a large number of sterile workers and soldiers. If however, the queen is lost or destroyed, her place is taken by number of supplementary reproductives, thus even by removing the queen, the colony will not be destroyed. All the work of the colony is carried out by the workers. Guarding the colony is the work of the soldier. The adult workers and soldiers are wingless. The workers are gernerally greyish white in colour. The soldiers are generally darker than the workers and have a large head and longer mandibles. There are, however, other types of soldiers whose mandibles are small, degenerated and functionless; instead, the frontal part of the head is prolonged to form a long nasus; they dispel the enemy by squirting out of white poisonous fluid through the nasus. The reprodutives, that is, the flying adults, have brown or black bodies and are provided with two pairs of long wings of equal size in contrast to the reproductives of ants which have two pairs of wings of unequal size.

A-1.6 The food of the termite is cellulosic material like timber, grass, stumps of dead trees, droppings of herbivorous animals, paper, etc. Once termites have found a suitable foot-hold in or near a building, they start spreading slowly from a central nest through underground and overground galleries in the case of subterranean termites and galleries within the structural member, once they get direct access to them, in the case of drywood termites. In their search for wood they bypass any obstacle like concrete or resistant timber to get a suitable food many meters away.

A-1.7 In subterranean termite colony, the worker feed the reproductives, soldiers, winged adults and young nymphs. One of the habits of the termites which is of interest is the grooming of their own bodies and the bodies of their nest mates by licking. This grooming habit is associated with their eagerness to obtain the glandular secretions that are extruded over the body surface. During the course of grooming, any dust particle that may be adhering to the body surface are removed and ingested, so that this habit plays an important role in the poisoning of termites for control operations. If finely powdered toxic material is introduced into termite runways, particles of the powder will adhere to the body of the termite and will kill any termite that subsequently grooms the dusted one.

A-2 DEVELOPMENT OF TERMITE COLONY

A-2.1 At certain periods of the year, particularly after a few warm days followed by rain, emergence of winged adults on colonising flights, frequently occurs. This swarming, also called the nuptial flight, may take place any time during the monsoon or the post monsoon period. The flight is short and most of the adults perish due to one reason or another. The surviving termites soon find their mates, shed their wings and establish a colony if circumstances are favourable. The female of the pair or queen produces a few eggs in the first year. The first batch of the brood comprises only of workers. The rate of reproduction, however, increases rapidly after 2-3 years. Although a colony may increase in size comparatively rapidly very little damage may occur in a period less than 8-10 years. Any serious damage that may occur in a short time is perhaps due to heavy infestation in the initial stage due to large population of termites existing in the soil before the building is constructed.

A-3 RECOGNING THE PRESENCE OF TERMITE INFESTATION IN BUILDINGS

A-3.1 Swarms of winged reproductives flying from the soil or wood are the first indication of termite infestation in a building. Often the actual flight may not be observed but the persence of wings discarded by them will be a positive indication of a well established termite colony nearby. Termite damage is not evident from the exterior in the case of subterranean termites, since they do not reduce wood to a powdery mass or push particles like some of the wood borers or drywood termites. These termites are also recognised by the presence of earth-like shelter tubes which afford them the runways between soil and their food .

A-3.2 Drywood termites on the contrary may be recognised by their pellets of excreta. Non-subterranean termites excrete pellets of partly digested wood. These may be found in tunnels or on the floor underneath the member which they have attacked. These termites may further be noticed by blisters on wood surfaces due to their forming chambers close to the surface by eating away the wood and leaving only a thin film of wood on the surface. Also the hollow sound on tapping structural timber will indicate their destructive activity inside .

ANNEX B
(*Clause* 2)

LIST OF REFERRED INDAN STANDARADS

IS No	*Title*
401:2001	Code of pracitce for preservation of timber (*Fourth Revision*)
632:1978	Gamma—BHC (Lindane) emulsifiable concentrates (*Fourth Revision*)
1141:1993	Seasoning of Timber –code of practice (*Second Revision*)
2568:1978	Malathion dusting powder (*Second Revision*)
4015 Part 1 : 1988	Guide for handling cases of pesticides poisoning. First aid measures (*First Revision*)
8944:2005	Chlorpyrisfos emulsifiable concentrate (*First Revision*)
FAD 1(1999)	*Draft Indian Standard Specification for Imidacloprid suspension concentrate (SC) [to be printed]*

ANNEX C
(*Clause* 5.3)

SAFETY PRECAUTIONS

C-1 PRECAUTIONS FOR HEALTH HAZARDS AND SAFETY MEASURES

C-1.1 All the chemical mentioned in **5.3** are poisonous and hazardous to health. These chemical can have an adverse affect upon health when absorbed through the skin, inhaled as vapours or spray mist or swallowed. Persons handling or using these chemical should be warned of these dangers and advised that absoroption through the skin is the most likly sources of accidental poisoning. They should be cautioned to observe carefully the safety precautions given in **C-1.2** to **C-1.5** particularly when handling these chemicals in the form of concentrates.

C-1.2 These chemicals are brought to the site in the form of emulsifible concentrates. The container should be clearly labelled and should be stored carefully so that children and pets cannot get at them.They should be kept securely closed.

C-1.3 Particular care should be taken to prevent skin contact with concetrates. Prolonged exposure to dilute emulsions should also be avoided. Workers should wear clean clothing and should wash thoroughly with soap and water specially before eating and smoking. In the event of severe contamination, clothing should be removed at once and the skin washed with soap and water. If chemicals splash into the eyes they shall be flushed with plenty of soap and water and immediate medical attenntion should be sought.

C-1.4 The concentrate are oil solutions and present a fire hazard owing to the use of petroleum solvents. Flames should not be allowed during mixing.

C-1.5 Care should be taken in the application of soil toxicants to see that they are not allowed to contaminate wells or springs which serve as sources of drinking water.

C-1.6 In case of poisoning, suitable measures shall be taken for protection in accrodace with IS 4015.