

BUILDING DIGEST

CENTRAL BUILDING RESEARCH INSTITUTE INDIA

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TERMITE CONTROL MEASURES IN BUILDING CONSTRUCTION*

Great damage is done to wood in buildings by termites or 'white ants' as they are popularly known. Termites use wood and other cellulosic materials for food. They also damage non-cellulosic materials like leather and plastics. In some parts of the world termite damage is estimated to be about 10 per cent of the capital outlay on buildings.

Damage to buildings may be caused by drywood termites as well as by subterranean termites. Drywood termites live in wood without maintaining soil connection and are a problem in humid coastal areas. The subterranean termites, however, cannot live without maintaining connection with soil which supplies the necessary moisture essential for their longevity. In India, subterranean termites occur in almost every part of the country, and are responsible for most of the damage to buildings. They live and establish their primary colonies in the ground and from this base make tunnels in the soil or earthen shelter tubes or galleries over other materials in their search for food which is mostly wood. They can also make secondary nests in the wood they eat. They need an adequate supply of moisture which they ordinarily obtain from the soil but may also obtain it from wet spots in the building or from other available sources.

Subterranean termites enter buildings through cracks or hollows in masonry walls, joints in floor blocks, tunnels excavated in lime mortar, fine cracks or fissures in concrete and through runways built over the surface of foundations, walls, pipes, conduits, etc.

The eradication of termites from buildings in which they have established themselves is both difficult and costly. It is, therefore, advisable to take protective measures during construction. The design and construction of 'termite-proof' buildings has to be dealt with in the light of local conditions and of materials used. The different steps that may be taken to make a building termite proof at the time of construction are briefly described below. An Indian Standard Code of Practice for termite control in buildings is under preparation. Termite proofing treatments do not cost more than 2-3 per cent of the total cost of a single storey building.

Preparation of Building Site

Site Clearance

Site clearance is a necessary preliminary to building

in all areas having subterranean termites, specially in dry areas where shortage of natural food drives the termites to seek out constructional wood work. It is worthwhile doing it before erecting temporary buildings also. All dead wood, old tree stumps, roots, etc., within 7 m of the foundations should be dug up and removed. On no account should stakes, slabs and waste wood be buried within the foundations of a building. When construction is completed special care should be taken to remove wooden shuttering completely.

Mound treatment

If termite mounds are discovered in the area, they should be destroyed by means of insecticides. Contrary to popular belief a colony of termites cannot be destroyed by killing or removing the queen. Insecticides in the form of water suspension or emulsion should be poured into the mounds at several places after breaking open the earthen structure and making holes with crowbars. The quantity to be used will depend on the size of the mound. For a mound volume of about one cu.m., four litres of an emulsion in water of one of the following may be used :

- (a) 5 per cent DDT
- (b) 0.5 per cent BHC
- (c) 0.25 per cent dieldrin
- (d) 0.25 per cent aldrin

Chemical Barrier

Soil Treatment

Treating the soil beneath the building and around the foundations with a soil insecticide is a very good preventive measure which is attracting attention throughout the world. The purpose of this treatment is to create a chemical barrier between the ground where termites come from and wood-work in the building. Any one of the following chemicals in oil solution or preferably water emulsion may be used :

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|----------------|---|--------------|
| (a) Dieldrin | — | 0.5 per cent |
| (b) Aldrin | — | 0.5 per cent |
| (c) Heptachlor | — | 0.5 per cent |
| (d) Chlordane | — | 1.0 per cent |

Other chemicals such as DDT, BHC and PCP may also be used but their effect is not expected to be equally long lasting under all conditions.

* Revision of Building Digest No. 14 "Termite Control Measures in Building Construction".

Dieldrin, heptachlor and chlordane have very low vapour pressure and they are not readily lost by evaporation. Though aldrin has a higher vapour pressure, it gets converted into dieldrin in soil and therefore, lasts equally long. All these insecticides are insoluble in water and are therefore not leached out by sub-soil water.

An effective chemical barrier may be built up in four steps.

- (1) Treat the bottom and sides of the foundation pit to a height of about 30 cm at the rate of five litres per square metre.
- (2) Treat the back fill earth in foundations and all around piers to a depth of about 45 cm and width 30 cm at the rate of five litres per linear metre.
- (3) Level the earth filling below the floor carefully and treat it with one of the chemicals at the rate of 5 litres per square metre. It is convenient to use a template and watering can to spray a small portion of the area at a time and to secure uniform distribution of the chemical over the whole area.
- (4) Special care should be taken to secure an intimate bond of poisoned soil at the junction of the wall and the floor. A small channel 2-3 cm wide and as much deep is made at all these junctions and it is filled with one of the chemicals which is allowed to soak into the soil before filling back with a mixture of chemical and soil.

After treating the soil every effort should be made not to rupture the protective membrane of soil and chemical.

Structural Barriers

General Principle

The best protection against termites is to adopt materials and methods of construction which will prevent their gaining access to the building. An impenetrable physical barrier placed between the ground and the superstructure of the building will prevent their entry through the foundations and walls.

Foundations

Termites cannot penetrate dense concrete or other solid foundation. Use of inferior sand or aggregate, use of inadequate proportions of cement to aggregate and bad workmanship leading to cracks and hollows will facilitate entry of termites into buildings. Cement mortar should be used for brick and stone masonry because termites can work through weaker mortars. Lime mortar is unsuitable but composite cement mortar having not more than 15 per cent by volume of hydrated lime may be used.

Concrete Barrier

A continuous concrete slab 5 to 7.5 cm thick cast

over the plinth walls, and projecting 5-7.5 cm internally and externally, will prevent penetration by termites up through the walls. The concrete should be dense and free from cracks. This barrier will not stop the construction of runways by termites over the outer projection and up the surface of walls, but they will be exposed and can be seen and destroyed. Regular inspection is therefore essential.

Metal Shields

Metal termite "guards" or "shields" are used to supplement good constructional methods of termite proofing. They consist of sheets of non-corrodable metal such as copper or galvanised iron about 0.8 mm thick placed over the foundation walls, piers, and footings of partition walls at the plinth level. The shield should extend out 5-7.5 cm beyond the face of the wall and bend down at an angle of 45° for about another 5 cm. The shield should be continuous with all joints carefully soldered or tightly crimped. All pipes, conduits or other services entering the building should also be provided with tight fitting collars similar to the shields. If properly constructed, most termites are seldom able to negotiate the edge of the shield. In order to be sure that the barrier remains in tact and maintains continuity of protection, regular inspection is necessary. Termite shields are particularly suitable for capping piers and walls of suspended floor structures, but are seldom, if ever, used with slab-on-ground type construction.

A serious handicap to the effectiveness of metal shielding is that certain species of mound building termites (**Heterotermes, Coptotermes**) are capable of building stalagmite like tubes by means of which they can bypass the metal barrier. Metal shields are also liable to be easily dented and damaged and made ineffective. Therefore, the effectiveness of metal guards depends largely on vigilance and the termite species involved.

Bridging

Care must be taken to see that a bridge is not formed by special parts of the building, such as porches and steps, above the termite barrier. Porches and steps should, therefore, be effectively separated from the building or should start from a properly protected plinth. Formation of bridges between untreated soil and the building by standing trees, scaffolding etc., should also be prevented.

Floors

Brick floors are seldom proof against termites. If a concrete floor is used, joints between floor slab and wall should be such that penetration by termites will be immediately noticed. If a concrete barrier is laid over the foundation walls, it should extend 5-7.5 cm internally and the concrete floor should be butted on to it. Alternatively the concrete floor may simply be carried over the foundation walls and projected externally. Joint fillers containing cellulose should be impregnated with a chemical toxic to termites. Sealing the top 1.5 cm of the joint with coal-tar pitch also provides effective protection. Bitumen, although not impene-

trable, discourages termites. Expansion joints in the floor may be filled with one of the chemical insecticides which should be allowed to drain away before the joints are filled. A horizontal piece of metal strip inserted in the joint during construction will also provide an effective barrier.

Superstructure

Whenever possible, wood, boards and other building materials susceptible to termite attack should be treated with preservatives. Untreated wood or wood not naturally resistant to termites should not be placed in contact with or close to the soil. Wooden door

frames, staircases, etc., should be set on flooring but not through flooring.

Mud-Wall Poisoning

In places of high termite hazard, wood-work of mud-wall houses or of houses in which mud-mortar is used, can be effectively protected by sterilisation of soil and use of chemically treated mud for building purposes. An emulsion of dieldrin or aldrin (0.5 per cent) or chlordane (1 per cent) should be thoroughly mixed with soil intended to be used for mud-wall or as mud mortar at the rate of 15 litres emulsion per cubic metre of soil. It may also be noted that all subsequent repairs will have to be done using only treated mud.

There is a demand for short notes summarising available information on selected building topics for the use of Engineers and Architects in India. To meet the need, this Institute is bringing out a series of Building Digests from time to time and the present one is the 55th in the series. Readers are requested to send to the Institute their experience of adopting the suggestion given in this Digest.

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