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BUILDING RESEARCH NOTE

B.R.N. 50

TERMITE CONTROL IN BUILDINGS

Termites are well known pests in many parts of the world, where they attack every cellulose-based materials and some non-cellulosic materials. A great deal of effort and money is expended every year in an attempt to prevent their damaging homes, and public buildings. The natural food of termites is cellulose, wood products and timber. Natural beauty and physical characteristics of wood are such that it has always been used as a building materials, both in homes and commercial premises. About one third of the timber produced worldwide is lost due to various biodegrading agents, termites are one of them. The cost of their damage, including repairs, is steadily increasing due to inflation and controlling termites rather than discarding and replacing damaged timber being a less costly alternative. The people are becoming aware of the termite problem and the associated monetary losses due to improvements in living standards.

Wood destroying termites are widespread and present in large numbers. Total 2,761 species of termites are known comprising about 300 genera; mostly tropical and subtropical distribution generally between 48 degree North or South occupying 70% of the land. Nearly 350 species are found in India; out of which 110 are timber infesting species.

There are four types of termites found world wide - Drywood, Dampwood, Harvester termites and Subterranean termites. Subterranean termites are chiefly responsible for all kind of damage in buildings and homes. They must have soil contact in order to survive and by far the most destructive to buildings.

The mature termite colony consists three casts: soldiers, workers and reproductive castes - king and queen. The workers makes the largest segment of the colony, works day and night, feeding the colony and enlarging the nest. The workers are the termite caste, that actually do the damage to the timber with their powerful wood eating mandibles. The damage caused to furniture, furnishings, clothing, stationery, rubber plastic and leather materials and even lead coating of underground cables sometimes become so severe the owners become quite bewildered to see the great loses caused by the small termites without any prior notice. Termite strikes more American structures than fire. It costs Americans about $1.1 billion per year that is more than the combined damage done by all tornadoes, hurricanes hail, flooding and wind stromes is U.S. One in every five Australian homes is infested with termites.

It is always advisable to take protective measures for termite control during construction. The design and construction of termite proof buildings have to be dealt with in

the light of local conditions and materials used.

Termite control measures during Building construction

(i) Site Preparation

1. Site clearance is necessary in all construction sites. All dead wood, old three stumps, roots etc. within 7 meter of the foundation should be dug up and removed.

2. No waste material should be buried within the foundation of a building.

3. When construction is complete, special care should be taken to remove wooden shuttering completely.

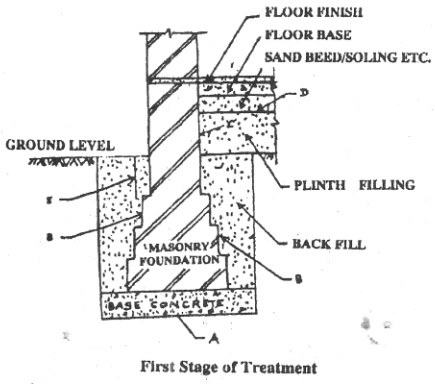
(ii) Mound Treatment

Destruction of the nest from which the attack originates is required in order to eradicate termite completely from any building. Any termite mound within a radius of 50 m. or so of the infested building should be opened up and one of the chemicals mentioned below poured in to destroy the nest inside. Quantity of the insecticide to be used would depend on the size of the mound or nest but for a mound volume of about 0.5 cu m., 2 liter of one of the following chemical emulsion in water should be used :
1.0 percent Chlorpyrifos 20 E.C. and Lindane 20 E.C.

(iii) Chemical Barrier

The application of chemicals to the soil adjacent to and under a building to form a chemical barrier which is lethal or repellent to termites. An effective chemical barrier may be built around the building using registered pesticides. The object of the soil treatment is to establish chemical barrier between the termites in the soil and the building to be protected. Water based emulsion of the chemicals shall be used in soil treatment and applied uniformly at the prescribed rates.

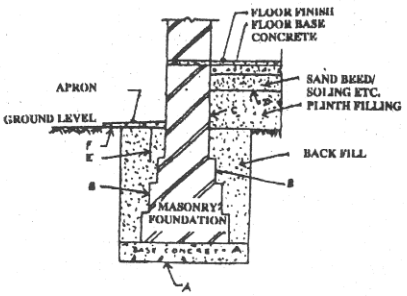
The soil in contact with the external wall of the building shall be treated with chemical emulsion at the rate of 7.5 l/m^2 of the vertical surface of the substructure of a depth of 300 mm. To facilitate this treatment a shallow channel shall be excavated along and close to the wall at 1.75 litres per running metre of the channel. Rodding with 12 mm diameter mild steel rods at 150 mm apart shall be done in the channel if necessary for uniform dispersal of the chemical to 300 mm depth from the ground level. The balance chemical of 0.5 litre per running metre shall then be used to treat the backfill earth as it is returned to the channel directing the spray towards the wall surface. In the case of RCC foundations, the soil in contact with the column sides and plinth beams along the external perimeter of the building shall be treated with chemical emulsion at the rate of 7.5 l/m^2 of the vertical surfaces of the structure. Fig. 1, 2, 3 show the perimeter along which the treatment should be given to masonry and RCC foundations.



First Stage of Treatment

A: Bottom and side of trenches, B: Backfill in immediate contact with masonry foundation, C: Junction of wall and floor, D: Top surface of plinth filling, E: External perimeter of building along which the treatment is to be given

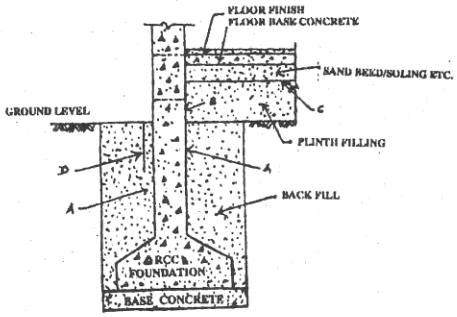
Fig. 1 : First Stage of Treatment



Second Stage of Treatment (Apron provided)

A: Bottom and side of trenches, B: Backfill in immediate contact with masonry foundation, C: Junction of wall and floor, D: Top surface of plinth filling, E: External perimeter of building, F: Soil below Apron

Fig. 2 : Second Stage of Treatment (Apron provided)



Treatment of RCC Foundations

A: Backfill in immediate contact with R.C.C. foundation, B: Junction of wall and floor, C: Top surface of plinth filling, D: External perimeter of building along which the treatment is to be given

Fig. 3 : Treatment of RCC Foundations

(iv) Treatment of soil under floors

The points where the termites are likely to seek entry through the floor are the cracks at the following locations :

- At the junction of the floor and walls as a result of shrinkage or the concrete;
- On the floor surface owing to construction defects;
- At construction joints in a concrete floor, cast in sections and
- Expansion joints in the floor. (Fig. 1-3)

(v) Design Consideration

In a conventional building, not protected by anti-termite measures, probability of attack by termites from plinth and foundations walls is very little, whereas the attack through floors and plinth filling is great. Indian Standard - 6313 (Part-I) - 2001 deals in detail with constructional measures for external and internal attack.

Brick floors are seldom termite proof. If a concrete floor is used, joints between floor slab and wall should be such that penetration of termites is not possible. Joint fillers containing cellulose should be impregnated with a chemical toxic to termites. If the joint is sealed up to 1.5 cm, depth with coaltar, it may also provide effective protection. Bitumen, although not impenetrable, 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 (Fig. 1-3).

All termites susceptible materials such as wood and boards etc. should be treated with preservatives as per IS : 401. Untreated wood or wood not naturally resistant to termites should not be placed in contact with or close to the soil.

Eradication of Termites from existing Buildings

A termite eradication scheme can be divided into three main operations which can be carried out simultaneously :

(i) Structural Repairs
(ii) Nest Treatment and
(iii) Creation of poisoned soil barriers.

(i) Structural Repairs

First step in controlling termites that have

already established themselves in a building is to locate the points of entry. Structural repairs or alterations may then be necessary to ensure that all direct contact between the soil and wood in the building is broken. Wooden door frames, staircases etc. set through flooring should be wet on the flooring. Where wood has been used in flooring, the floor should be separated from the soil. If structural members are of timber, they should be separated from the soil. If timber structural members have been damaged by the termites, there is no alternative but to replace them by new ones.

(ii) Nest Treatment

It should be carried out as discussed earlier.

(iii) Creation of poisoned soil barrier

These are useful in preventing termite attack in completed buildings, which are difficult to treat by other methods. Such barriers can be created around foundations and under the floor.

A. Barrier around foundation

It is created by digging a shallow trench along the foundation of the building. The chemicals described above are allowed to seep into the soil to a depth of 30 cm. to facilitate this, rodding may be done in the trench by a 12 mm dia. rod. About 1.75 liter of chemical solution should then be directed towards the walls per running meter of the wall length. The back fill of the trench should be treated at the rate of 0.5 liter per running meter.

B. Barrier beneath the floor

If the termite nest is concealed with in the earth-fill under concrete floors its destruction is more difficult to achieve. In such situations eradication of termites is achieved by poisoning the soil under the floor. This is usually carried out by drilling 12 mm dia. holes about 30 cm. apart vertically through the along a line close to the interior face of the wall and injecting any of the chemicals mentioned earlier. Alternately holes may be drilled through the foundation walls from outside and the chemicals pumped in just beneath the floor at the rate of 2.25 liter per linear meter. Chemicals should also be injected into cracks and expansion joints in the floor. After the treatment, the holes and cracks should be properly sealed with concrete.

Precautions

Following precautions should be taken :

1. All burried roots, pieces of wood and other cellulosic material should be removed from around the building.
2. Entry of moisture to the foundation should be checked by proper drainage and by providing apron.
3. All sub-floors should be of dense cement concrete (1:3:6) and should be continuous through the walls.
4. All masonry work is sub-structure should be in lime or cement mortar and free from cracks and dry joints. Any such cracks in masonry and gap around anchor bolts etc. should be sealed with tar or cement mortar.
5. The chemicals are toxic to human beings and animals and therefore should be handled carefully. Hand gloves, gum-boots and respirators should be used during their use. Precaution must be taken to avoid contamination with food and drinking water. Empty containers of the chemicals and surplus solutions should be disposed off by buying deep in ground.

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