BUILDING DIGEST

CENTRAL BUILDING RESEARCH INSTITUTE INDIA

TERMITE CONTROL MEASURES IN BUILDING CONSTRUCTION

Subterranean termites are responsible for most of the termite damage to buildings in India. They live underground where they find the unfailing source of moisture without which they would die. They build tunnels through earth, and covered runways around unpalatable material above ground to get at the wood or other cellulosic material they need for food. These runways provide them protection and access to ground moisture.

Subterranean termites establish themselves in buildings which they enter 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 extremely difficult if not impossible without extensive and costly structural alterations and hence protection against them should be provided during construction. It is estimated that termite proofing treatments cost no more than one to two percent of the total cost of building. The different steps that may be taken to make a building termite proof are briefly described below .

Preparation of building site

Site Clearance : The breeding of termites in the locality where a building is to be constructed should be discouraged by removing stumps, roots, waste wood and plant debris. 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 the use of insecticides. Contrary to popular belief, a colony of termites cannot be destroyed by removing or killing the queen since they possess the faculty of replacing the queen by a set of supplementary queens.

Insecticides should be poured into the mounds at several places after breaking open the earthen structure. The quantity to be used will depend on the size of the mound. For a mound volume of about 20 cubic feet, one of the following may be used :

(1) 2.5 lbs. of 10 per cent dust of D.D.T. ;

(2) 1 gallon of 2 to 3 per cent solution in water of sodium arsenite ;

(3) 4 gallons of 0.5 to 1 per cent suspension in water of gamma benzenehexachloride ;

(4) 0.5 gallon of 0.004 per cent emulsion of aldrin in water.

Soil Treatment : Treating the soil beneath the building and in the vicinity of both sides of the foundations will be helpful in localities where termites are plentiful.

A narrow trench about a foot wide is dug adjacent to and around the foundation walls and piers to a depth of about 18 inches and the soil poison is poured in. Additional amounts are poured in from time to time as the trench is being filled. A dosage of 1 gallon of one of the following per linear foot of trench is recommended :

(1) A mixture of 1 part of creosote to 2-3 parts of kerosene.

(2) 10 per cent solution of sodium arsenite in water.

(3) 5 per cent solution of pentachlorophenol in fuel oil.

(4) 5 per cent solution of D.D.T. in kerosene. The newer insecticides — aldrin, dieldrin and chlordane — may be used at the rate of 2 gallons of 0.5 per cent emulsion per 5 linear feet.

The area under the building should also be treated. A dosage of 1 gallon per 10 square feet is recommended. The best method of treatment is to spray the poison over the consolidated filling beneath the floor. After treatment care should be taken not to rupture the protective layer of poisoned soil.

Structural obstacles

General principles : 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 ground and the superstructure of the building will prevent their entry through the foundations and walls. Further, termites can cross the surface of the barrier only under cover of an easily-seen earthen runway. Buildings should, therefore, be so constructed that these surfaces should be easily accessible for inspection and treatment.

Foundations : The foundations should be of dense ncrete or other solid material through which termites nnot penetrate. With brick, stone, etc., cement mortar ould be used because termites can work through aker morters. Lime mortar is unsuitable but cement ortar having not more than 15 per cent by volume of drated lime may be used.

Concrete in which the mixing water is replaced by).5 per cent emulsion of dieldrin will prevent termite try. This idea is now being used in Australia, in dition to normal soil treatment, to prevent termites m entering buildings through concrete in foundans and flooring. The addition of 0.5 per cent ldrin does not affect the strength of the concrete.

rmite barriers : Termite barriers are of two kinds :

(1) Concrete barrier over plinth walls to force the termites out into the open, and

(2) metal shields to prevent the entry of termites through and over the surface of the walls.

A continuous concrete slab about 3 inches thick t over the plinth walls, and projecting 2—3 inches ernally and externally, will prevent penetration by mites up through the walls. The concrete should be nse and free from cracks. The barrier will not stop building of runways over the projection and up the face of the walls, but they will be exposed and can seen and destroyed. Regular inspection is essential.

Metal termite shields are used to supplement good nstructional methods of termite proofing. They nsist of sheets of corrosion resistant metal such as pper, zinc, galvanised iron, or aluminium placed over foundation walls and piers. They should extend -3 inches beyond the face of the wall and then bend wn at an angle of 45° for about another 2 inches. rmites are seldom able to negotiate the edge of the eld.

The metal should be about 1/32 inch in thickness. It should be continuous with all joints soldered or tightly crimped. All pipes, conduits or other facilities entering the building should also be provided with tight fitting collars similar to the shields. In order to be sure that the barriers remain in tact and maintain continuity of protection, regular inspection is necessary.

Bridging : Care must be taken to see that a bridge is not formed by special parts of the building above the termite barrier. Porches and steps should be effectively separated from the building or should start from a properly protected plinth.

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 2—3 inches 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 intended for use as a filler in movement joints should be impregnated with a chemical toxic to termites. Sealing the top one-half inch of the joint with coal-tar pitch also provides effective protection. Bitumen, although not impenetrable, discourages termites. A horizontal piece of strip metal inserted in the joint during construction will also provide an effective barrier.

Superstructure

Whenever possible, wood, boards and other susceptible material used in building 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.

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 fourteenth in the series.

repared at the Central Building Research Institute, Roorkee,
ecember, 1962.

Asia Press, Delhi-6

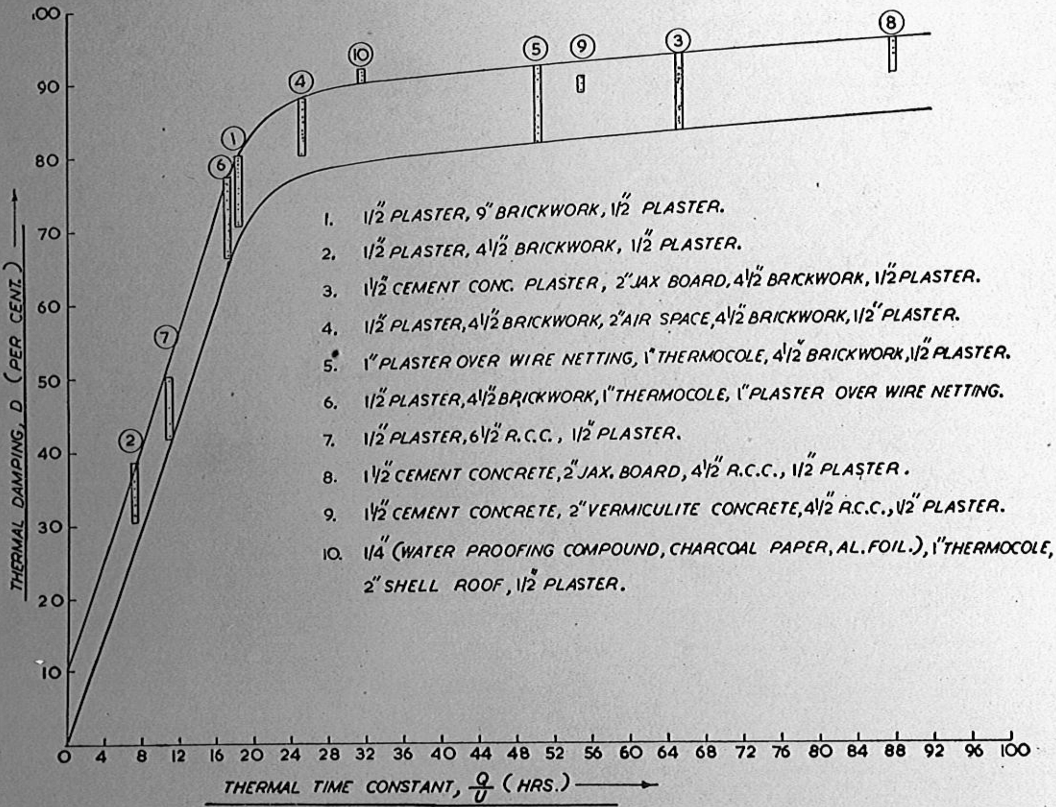

Fig. 3 Thermal Damping, D, caused by panels with different thermal time constants, Q/U.

ceiling surface temperature for insulated roofs also attained maxima during this time, while those for uninsulated roofs attained the maxima at 1700 hrs. Thus the attainment of the internal surface temperatures and indoor air temperature peaks in a room are interdependent on each other.

Salient Design Features

The indoor air temperatures of houses with composite construction of masonry on the inner side and insulating cladding on the outer side gives better performance than masonry with insulation on the inner side. But the former would present a practical problem of weather-proofing the insulating material which should not be lost sight of. Care should be taken to ensure a balanced design performance for all the exposed elements. In particular, the roof and the walls on the western side, if exposed, should receive special attention. As a general rule, the exposed elements should have thermal damping of not less than 75 per cent. The structures which would satisfy this requirement are (ii) brickwork 9 in. (ii) insulated roofs and walls (iii) Cavity walls 11 inches (Fig. 1) and (iv) R.C.C. roofs with mud and brick flats on top or RBC roofs with brick flats on top (Fig. 2)

With a composite construction having thermal damping 75-80 per cent, the interior surface temperatures may be in excess of 100°F. Such high temperatures cause low temperature radiation exchange and consequent discomfort. Instead of adopting structures with higher damping properties, it would be economical to reject or reflect back the incident solar heat at the exposed surfaces, say by white washing.

White Washing

Earlier experiments at this Institute have shown that white-washing a 5 in R.C.C. roof over a 9 in. solid brickwall in a full sized closed room diminishes the ceiling temperature maxima by 8 to 10°F. Treatment of the same roof by aluminium foil causes a corresponding decrease of 6.5 to 8.5°F only.

White washing of the exposed surfaces particularly the roofs is therefore strongly recommended before the onset of each summer. In no case the exposed roof surface should be dark in colour.

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