An Attempt to Termite-Proof Structures using Physical Barrier in the Philippines

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Abstract

Recently the termite market in the Philippines has seen the launch of a number of physical barriers such as marine grade aluminum, stainless steel mesh and special grades of cement and resin mixtures. These products are used to termite-proof construction gaps such as the edge of slabs, cracks and gaps in and around service penetrations when skillfully installed. This article presents an attempt to use the Novithor physical barrier consisting of a special grade of cement-resin mixture in termite-proofing a single residential structure.

Key words: *Physical barrier,* Novithor

Introduction

In countries where termites are common structural pests it is important that adequate intervention methods are used when undertaking construction. Even though a host of parameters might encourage termites in the vicinity of the structure, a house constructed with no or minimum points of entry can remain free from infestation for a long period. Fool proofing structures by sound engineering is thus the best method for preventing termite entry. Recently the Philippine market has seen the launch of a number of physical barriers such as marine grade aluminum; stainless steel mesh and special grades of cement and resin mixtures for termite proofing buildings. These products take care of construction gaps such as on the edges of slab on ground, cracks, gaps in and around service penetrations when skillfully installed and between footings, floor and wall.

Steel and concrete dominante s Philippine house design and construction. with. Wood is rarely used as the primary load bearing item in a structure, but is extensively used as secondary components like ceilings, wall partitions, wall cabinets and flooring. Walls are generally constructed with bricks or hollow blocks. Floors are constructed on sectional slabs. Rarely is the single slab on ground (monolithic) method used. This is the primary reason for gaps and cracks in a floor which makes termite entry easier. The house wall in this construction type rests on the footings rather than the floor (Fig 1). However most commercial construction makes use of a monolithic slab and the walls are constructed directly on the floor slab (Fig 2).

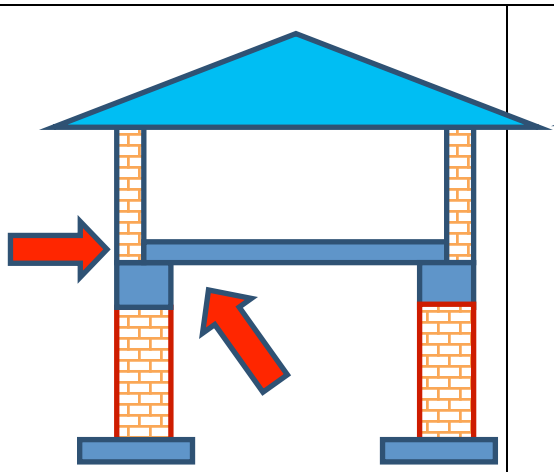


Fig 1: Non Commercial structures such as homes.

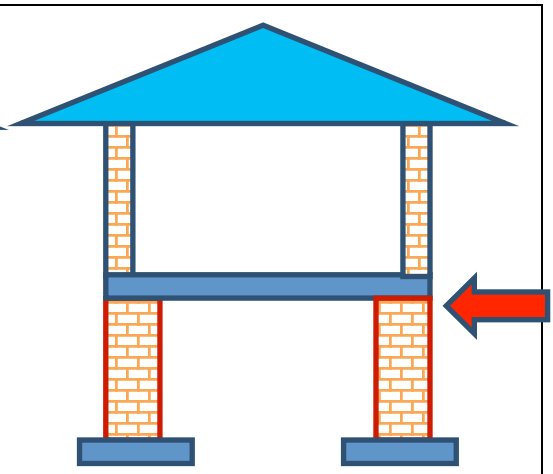


Fig 2: Commercial structures such as office buildings.

A survey by the author in the Philippines has shown evidence that termites gain entry into structures predominantly using concealed gap/s between footings and the floor in non-commercial constructions and between the floor slab and wall in commercial construction (Fig 3 & 4). Termites also gain entry to the structure directly through cracks in the floor slab and through service penetrations such as those made for water pipes and electrical wires. Above ground penetrations are also common but less observed.

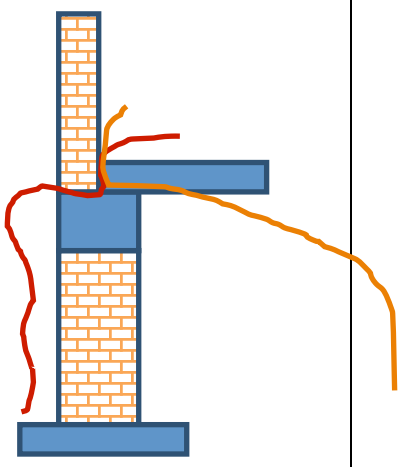


Fig 3: Showing possible routes of termite entry in non-commercial construction with sectional flooring.

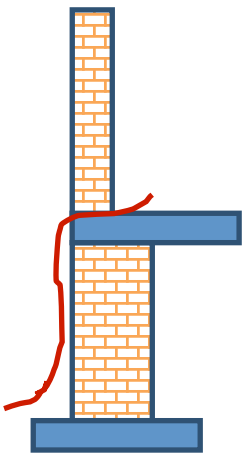


Fig 4: Showing possible routes of termite entry in commercial construction with single slab flooring.

Methods and Materials

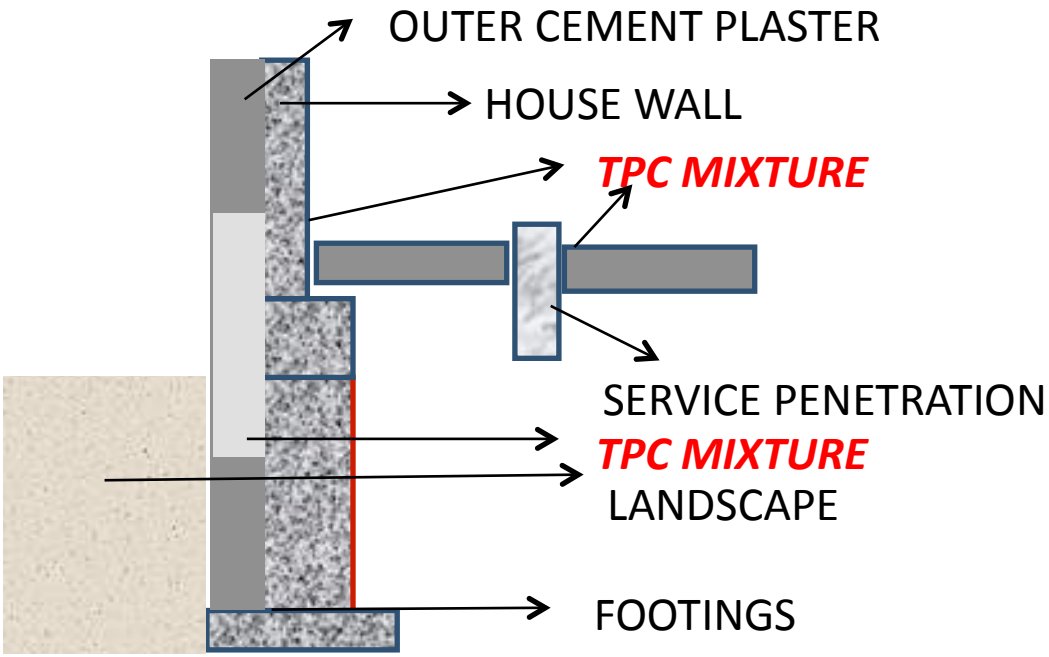
All materials including Novithor TPC powder and TPC resin were supplied by Ensystex Philippines Inc. Technicians from Greenbuilt Corp. provided the installation support.

A single pre-constructed residential structure was used for the application. The developers/builders and the owners were briefed on the product and the installation method to ensure access to all the areas required for proper application.

The product was prepared and applied as directed in the product manual (Ensystex, 2013). All areas which needed applications were cleared, cleaned, well roughened and pre-saturated with water. Twenty kg (20 kg) of TPC powder was mixed with 5 liter of TPC resin using a hand mixer. The TPC mixture was then applied on the expansion joints, junctions between footings and the floor slab as well as floor slab and walls, and all service penetrations through the slab such as pipes, conduits, wires etc. For construction which used sectional slabs for the floor, the TPC mixture was applied on all edges covering the corners of the slab in addition to all service penetrations passing through the slab.

A minimum of 4-mm thickness was maintained throughout the application while using a hard brush. The applied mixture was allowed to dry for 2 hours before further work was carried out. Each application took two to three (2-3) separate visits over a period of 30 days.

Fig 5: Application of TPC mixture in a sectional slab with service penetration.



Results

The TPC mixture was successfully applied on all the described areas in the construction as shown in Fig 5.

Discussion

There are a number of structural and non-structural parameters which play critical roles in making a building susceptible to termites. The retrospective analysis showed that those structures with surrounding landscape, owned by middle class and constructed by developers have significantly more infestation than the rest (Dhang, 2011). It is interesting to note that when all three parameters key to infestation namely socio-economic, construction and landscape are analyzed together, the significance of each parameter is evident. In middle class structures, construction method is a dominant determinant to infestation. In contrast among upper class structures, landscape is a dominant risk factor than construction method (2011).

The method of construction has been an area where improvement has been continually looked into to ensure termite protection. Forschler (2012) determined expansion joints provided 83% of the entry points into structures with gaps in stone foundation second at 11%, wood to ground contact at 4% was third and weep holes in brick veneer last with 2%. Concrete slabs as floor has been shown to be an effective barrier to termite penetration (Schafer and Guirguis, 2003). However to make it work as a complete barrier system, all penetrations and joints through the slab and slab edges must be sealed, as these are the remaining locations that could allow concealed entry of termites. All service penetrations through a slab-on-ground, must be provided with a suitable termite barrier such as the use of metal collars, mesh or cement mixtures. This is because the gap that can open up between a pipe (or other penetration) and the concrete slab may be sufficient to allow termite entry. Studies have shown that a 1.4 mm crack is enough for termite entry (Lenz, 2004).

Most construction in the Philippine takes place in the absence of any termite intervention except rudimentary and insufficient treatment of soil. This allows vast areas of improvement in construction methodology. The introduction of physical barriers is one such method which is undergoing tests in the market. Most of these products carry extensive field tests to prove durability in countries like Australia and USA. Also the popularity of using them is gaining momentum thanks to the realization of keeping chemical insecticides out of construction sites and building green.

In spite of the lack of sound evidence on how long a structure can be kept free from termite entry by use of physical barriers it is still considered a good possibility that this method could

delay onset of an infestation. In termite prone countries specifically Philippines the regular ground movement provides continuous stress to structures. It would be a test for physical barriers to succeed under such situation to prove its success and gain popularity among builders.

References

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