# PROTECTING BUILDINGS FROM SUBTERRANEAN TERMITES

TIMBER | THE NATURAL CHOICE

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**Suspended timber floors – Protection is easily provided by ant caps and regular inspection**

**Slab-on-ground construction – Requires more permanent protection methods due to inaccessible areas such as under the slab**

**COVER PHOTO: A home is a big investment – It's worth protecting the whole building and its contents**


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# Introduction

Buildings are required to provide security, safety, protection and comfort for occupants and their possessions. During their life, buildings, building materials and building contents are subjected to a number of hazards which can result in problems such as corrosion of metal, spalling of concrete, fire and water damage and termite attack unless preventative action is taken.

In areas where a termite hazard exists, termites can be a threat to safety of the structure and amenity of the building for occupants and their possessions.

For many years consumers have enjoyed property protection against infestation because building regulations have required protection of the whole building or home through the use of simple physical barriers or low cost chemical barrier systems, such as soil treatment with organochlorines.

Recent changes in building regulations and the decision to phase out the use of organochlorines as chemical barriers in most States of Australia now mean that new home owners, builders and designers will need to choose between:-

i) the traditional approach of providing whole building protection against termite infestation or

ii) the partial solution of using termite resistant structural materials which will avoid structural damage, but not provide any barrier to termite infestation.

Building owners, regulators, lending authorities and insurers recognise the benefits of providing total protection to the whole building including the structural framework, joinery, fitments, furniture, carpets and the plastic coating to wiring etc.

For traditional Australian construction, i.e. using timber floors off the ground, protection is easily afforded by incorporating physical barriers into the building, followed by regular inspection of these barriers. Australia's rich heritage of timber buildings is testimony to the effectiveness of these measures.

The introduction of construction methods utilising "slab on ground" or subfloor masonry walls and/or piers, increased the risk of termite entry into the building, necessitating the use of chemical soil barriers or special construction techniques utilising physical barriers.

This datafile has been prepared to provide building and home owners, designers and builders with information relating to their choice of termite protection systems and to provide descriptive detail about the options available. For further details reference should be made to Australian Standard AS 3660 — Protection of Buildings from Subterranean Termites or Manufacturers literature.

# Termites

Termites have existed for approximately 50 million years. Although they are commonly called "white ants" in many parts of the world, they have only a superficial resemblance to ants. There are more than 300 species of termites in Australia, however only around fifteen species are of economic importance in respect of the damage they can cause.

There are two main types of termites which attack buildings: drywood termites, which do not have ground contact, and subterranean termites, which require contact with the ground or other moisture sources.

Drywood termites occur only in tropical northern coastal and adjacent tableland areas, whereas subterranean termites are distributed throughout most of Australia and are responsible for most of the termite damage of economic significance. As the name implies, subterranean termites are generally ground-dwelling and require contact with the soil or a constant source of moisture. This publication deals only with **subterranean termites.**

For information on drywood termites contact the Timber Research and Development Advisory Council of Queensland (contact details on the back of this publication).

### The Termite Colony

A termite mound is the most familiar form of termite nest, however, not all species live in this environment. Some prefer a completely underground existence, others build their nest within dead or living trees or construct no recognisable nest at all. Other species prefer to attach their nest to a tree but maintain soil connection via mud galleries running down the surface of the trunk.

Cellulose is the basic food requirement of all termites, however all types of organic material may be attacked. While some species of timber are naturally resistant to termites, none are entirely "termite proof". In the built environment, termites will often damage materials they cannot digest, e.g. plastics, rubber, metal or mortar. Primarily, this damage occurs when the indigestible items are encountered in the termites' random path of travel, while searching for food.

**Termites, a natural part of the environment, can be managed to reduce infestation risks (Photo supplied by CSIRO Division of Entomology)**

### Distribution

Figure 1 provides a guide as to the relative distribution of subterranean termites that are considered of economic importance with respect to building damage.

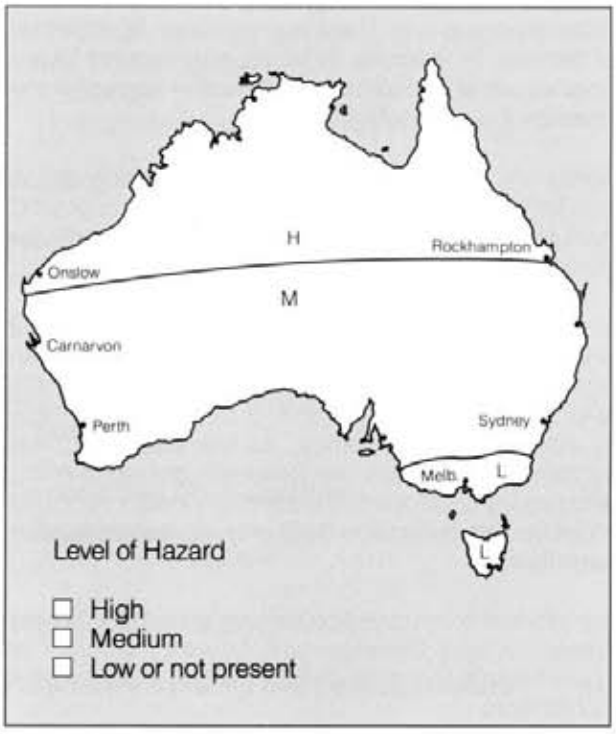


**FIGURE 1 TERMITE DISTRIBUTION**

Local advice on termite protection is useful and should be available from local government or the contacts listed on the back of this datafile.

In areas of high and medium levels of termite risk, protective measures are recommended for all buildings.

Where the termite hazard is "low or not present", local advice should be sought regarding the need for termite protection.

### How Termite Infestation Occurs in Buildings

Attack on buildings is usually initiated from a nest in the ground from which the termites build galleries over piers or walls to attack the cellulose in the building.

Usually, the nest is outside the building perimeter but occasionally a nest may be buried in the soil beneath the building. Brick and concrete construction by itself does not offer protection against termites which may gain access, via wall cavities and fine cracks in mortar or slabs. Termites inside the building must maintain contact with the soil (for moisture) and with the central nest (the communications centre).

In rare cases, a nest may be established inside the building as an offshoot from an existing colony. This can occur where a source of permanent moisture is available to the termites within the building (e.g. leaking plumbing) and in this situation there may be no contact between nest and soil. In general, entry into a building by winged termites does not result in colony establishment.

## Building Legislation

The Building Code of Australia (BCA) only requires protection for the structural elements of a building in areas where a termite hazard is present. Until recently the BCA required protection of the whole building against termite infestation.

To comply with the current BCA, two approaches are regarded as acceptable:-

i) Provision of barriers against termite infestation of the whole building (the traditional method) or

ii) Use of termite resistant materials for the structural frame.

**The latter solution is generally regarded as only a partial solution that could result in an unacceptable incidence of termite infestation of buildings. Consumer expectations are unlikely to be achieved using this approach.**

To comply with the BCA, protection should be provided in accordance with a relevant Australian Standard such as:

- AS 3660 — Protection of Buildings from Subterranean Termites — Prevention, Detection and Treatment of Infestation.

This standard describes protection systems that may utilise physical barriers, chemical barriers, termite resistant materials or all three singularly or in combination.

NOTE: AS 1694 and AS 2057 are currently called up by the Building Code of Australia, however these will be replaced in the near future by a revised version of AS 3660 as this standard contains the most recent and widest range of available protection options.

### Detection and Treatment of Termites

This Datafile deals primarily with new construction.

Advice on the detection and treatment of termites in existing buildings can be found in AS 3660.

NOTE: It is important that if an active infestation is discovered, the termite workings are not further disturbed until the control approach has been determined by a pest controller.

# Protection Against Termite Infestation

In areas where termites are active, total building protection against termite infestation is the only way to minimise the risk to the structure, non structural elements and contents.

Protection against infestation can be achieved by appropriate design, care during site preparation, adoption of appropriate construction practices and ongoing inspection and maintenance.

Refer AS 3660 for detailed information.

### Design — General

- In areas where subterranean termites are prevalent the level of risk of attack to buildings can be reduced by taking simple and inexpensive measures during construction to eliminate the presence or trapping of moisture and to provide adequate ventilation to enable timber to remain dry.
- Strip footings and slabs should be designed as integral components minimising construction breaks or construction joints as these provide avenues of termite entry.
- Services (pipes, plumbing, wiring etc.) should be designed and installed so that they do not penetrate through slabs or footings. Where this is not possible, a suitable protection system (physical or chemical barrier) should be installed.
- Cavity or hollow masonry should be avoided below ground level.
- Wherever possible, buildings should be designed with physical barriers to permit inspection and detection of termite presence. Refer to Figures 3 and 4 and AS 3660.
- All materials in ground contact must be termite resistant.

**Suspended timber floor detail – Ant capping on brick piers. Regular inspection is necessary**

### Suspended Timber Floors

The most traditional way of resisting termite infestation is the use of suspended timber floors with ant caps or termite shields combined with periodic inspections of the sub-floor space for signs of termite activity.

Other chemical and physical barriers can also be used alone or in combination with "ant caps" or termite shields to provide protection to buildings with suspended timber floors. These options include chemical barriers around posts, stumps and strip footings as well as crushed granite or stainless steel mesh. Refer to "Slab on Ground Construction" for a description of these methods.

Houses with suspended timber floors should be designed to ensure a physical barrier is easily installed between the lowest floor timber and the ground. This also applies to stairs, pergolas and decks that attach to the building (Refer Figure 2.).

Support posts and stumps should also be in materials that hinder the entry of termites. These include termite resistant or treated timber, steel stumps and brackets and continuous concrete stumps/footings (no cracks).

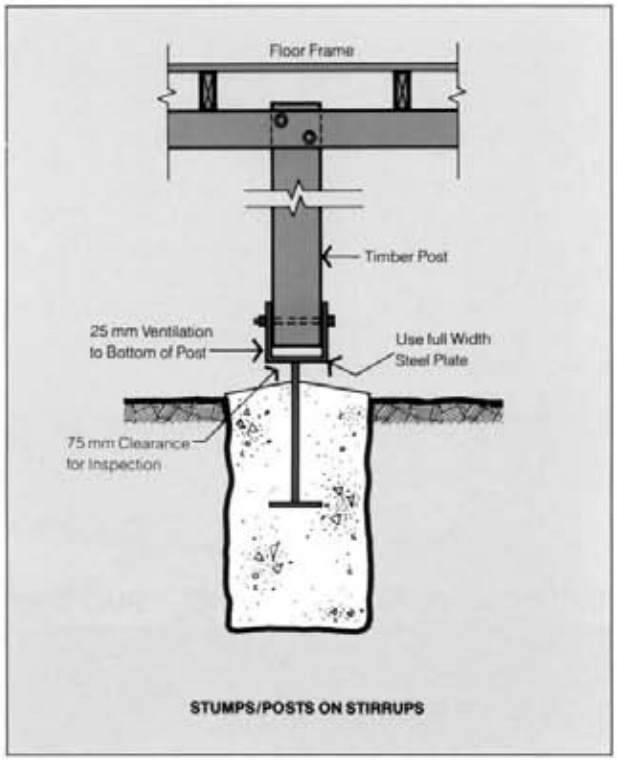


**FIGURE 2 DETAILS OF GOOD PRACTICE**

- **Ant Caps (Termite Shields)**

  These are physical systems that are inserted between the lower floor framing timbers and the supporting stumps, piers or masonry bases etc. They are usually formed from galvanised sheet metal and are designed to force the termites out into the open to allow physical inspection, detection and action. Activity is evidenced by mud termite tunnels over the shields.

  Termite shields can also be formed using stainless steel mesh.

- **Stumps, Posts and Poles in Ground Contact**

  These members should be either naturally termite resistant timbers, timbers treated to H5 level, or other termite resistant materials.

  A list of termite resistant timbers suitable for in-ground contact are given in Table 1.

- **Strip Footings**

  Buildings with strip footings can be protected at the ground by use of physical barriers such as crushed granite or stainless steel mesh, chemical barriers or a combination of these. For further details refer to "Slab on Ground Construction".

- **Floor Clearance**

  Sufficient under floor crawl space (400 mm clearance to the underside of bearer) should be provided to enable easy access and inspection of physical barriers.

## PROTECTION OPTIONS — Suspended Timber Floors

Table 2 provides a summary of the options available for protection of buildings with suspended timber floors.

**TABLE 1 TERMITE RESISTANT TIMBERS**

| Highly Resistant | Moderately Resistant | Notes |
|---|---|---|
| Caribbean pine *<br>cypress<br>forest red gum<br>grey coast box<br>grey box<br>Gympie messmate<br>hoop pine *<br>ironbark (all species)<br>radiata pine *<br>red bloodwood<br>slash pine *<br>tallowwood<br>turpentine<br>wandoo<br>white mahogany | blackbutt<br>brush box<br>grey satinash<br>jarrah<br>kwila<br>red mahogany<br>river red gum #<br>southern mahogany<br>spotted gum<br>white stringybark<br>yellow stringybark | 1. Highly Resistant species and those marked # are either durability class 1 (or 2) or can be preservative treated to 'H5' level in accordance with AS 1604, and are suitable for in-ground use.<br>2. The durability and termite resistance applies to heartwood only except for those species marked *.<br>3. Species marked * are suitable for in-ground use only when preservative treated to H5 level.<br>4. Further species resistant to termite attack are listed in AS 3660. |

**TABLE 2 PROTECTION OPTIONS — SUSPENDED TIMBER FLOORS**

| Options | Protection at Stumps | | | Protection at Perimeter Footings (Only one perimeter protection system is required) | | | Refer Figure |
|---|---|---|---|---|---|---|---|
| | Termite Shields/ Ant Caps | Organochlorine Treatment # | Organophosphate Treatment | Termite Shields/ Ant Caps | Organochlorine Treatment # | Organophosphate Treatment | |
| 1 | ✓ | – | – | ✓ | ✓ | ✓ | 3 |
| 2 | – | ✓ | – | ✓ | ✓ | ✓ | 3 |
| 3 | – | – | ✓ | ✓ | ✓ | ✓ | 3 |

# Organochlorine chemicals will not be available for use other than in the Northern Territory after 1st July 1995.

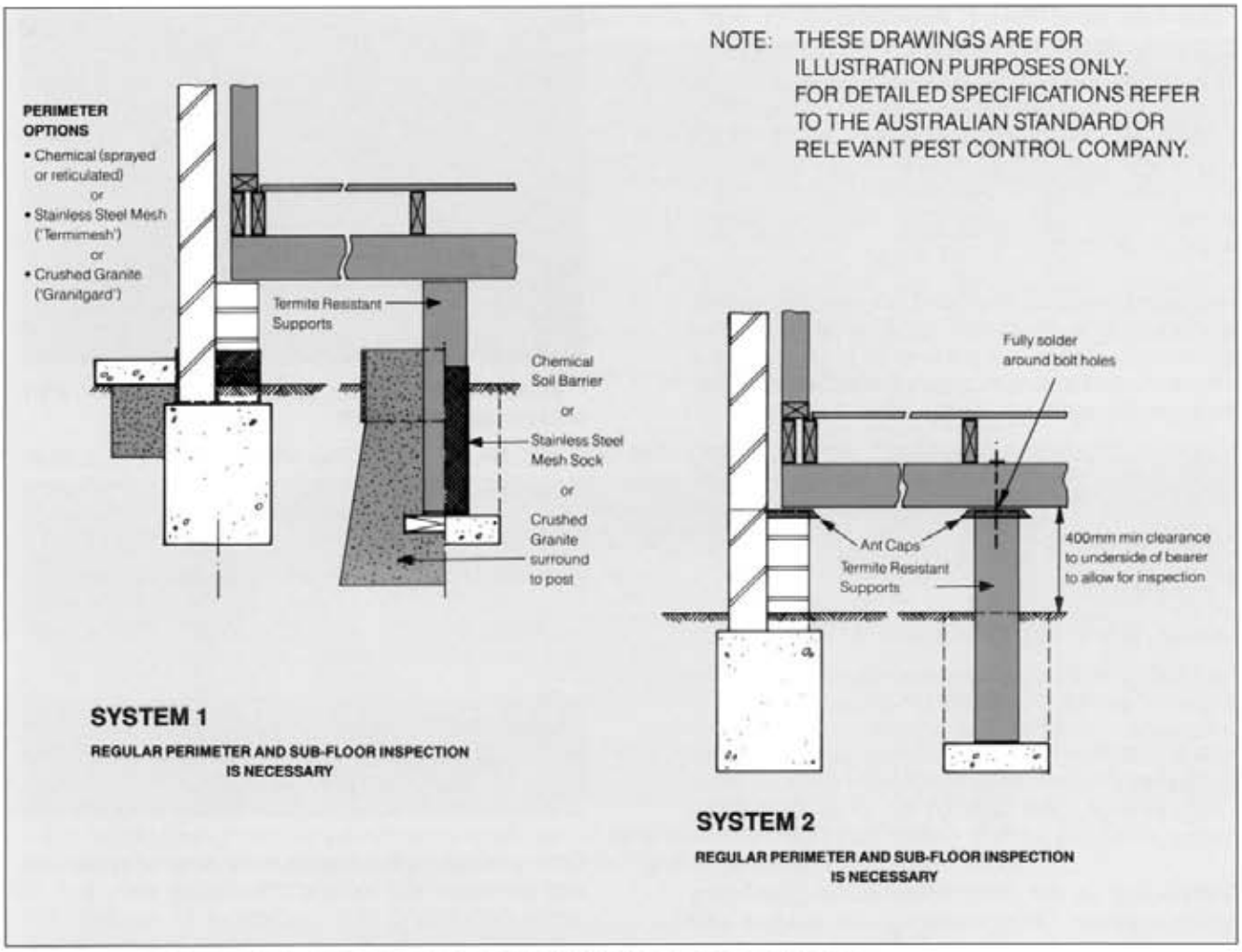


**FIGURE 3 PROTECTION SYSTEMS FOR SUSPENDED TIMBER FLOORS**

### Slab on Ground Construction

A range of chemical and physical barrier systems can be used to provide termite protection where slab on ground construction is selected. Most of these systems can also be employed to provide protection to stumps and strip footings for raised timber floors.

### Physical Barriers

- **Concrete Slab Barriers** (Monolothic Slabs)

These barriers rely upon a good quality monolithic slab (no cracks or construction joints) designed and constructed to AS 2870, to provide a physical barrier. Where construction or shrinkage joints and other service penetrations occur, other forms of physical or chemical barriers must be provided. The edges of these slabs that are permanently exposed to view can also provide for physical inspection and detection.

**Concrete slab – Special attention to service penetrations and joints is required**