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SOIL TREATMENT FOR BUILDINGS UNDER CONSTRUCTION FOR PROTECTION AGAINST SUBTERRANEAN TERMITES

STANDARDS ASSOCIATION OF AUSTRALIA
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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Agricultural and Veterinary Chemicals Association of Australia

Australian Chemical Industry Council

Australian Institute of Agricultural Science

Australian Institute of Petroleum Limited

Australian Veterinary Association

Council of Australian Pest and Weed Control Associations

CSIRO, Division of Applied Organic Chemistry

Department of Agriculture, New South Wales

Department of Agriculture, South Australia

Department of Agriculture, Victoria

Department of Health

Department of Primary Industries, Queensland

Department of Primary Industry

Health Commission of New South Wales

Health Services Department, Tasmania

National Farmers Federation

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AUSTRALIAN STANDARD

SOIL TREATMENT FOR BUILDINGS UNDER CONSTRUCTION FOR PROTECTION AGAINST SUBTERRANEAN TERMITES

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PREFACE

This edition of this standard was prepared by the Association's Committee on Pesticides under the direction of the Chemical Standards Board to supersede the 1977 edition.

Apart from general up-dating and editorial changes, this edition incorporates two technical modifications, viz the deletion of benzene hexachloride from the list of suitable chemicals and the addition of a chlordane/heptachlor mixture to this listing.

The intention of this standard is to provide for treatment of the foundations of buildings under construction but it may also provide some guidance for the protection of existing buildings. Treatment for existing buildings is covered in AS 2178, Code of Practice for the Treatment of Subterranean Termite Infestation in Existing Buildings.

It must be recognized that the requirements of statutory authorities take precedence over standards (which may not have been brought into legislation), and may specify the use of additional measures or impose limitations on the applications of chemical techniques. In this regard, the relevant State regulations should be consulted before work is commenced.

This standard makes reference to the following standards:

AS 1216	Classification, Hazard Identification and Information Systems for Dangerous Goods Part 1—Classification and Class Labels for Dangerous Goods
AS 1694	Code of Practice for Physical Barriers Used in the Protection of Buildings Against Subterranean Termites
AS 1715	Code of Practice for Respiratory Protection
AS 1716	Respiratory Protective Devices
AS 2161	Industrial Safety Gloves and Mittens (Excluding Electrical and Medical Gloves).
AS 2178	Code of Practice for the Treatment of Subterranean Termite Infestation in Existing Buildings
AS 2210	Safety Footwear

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
SOIL TREATMENT FOR BUILDINGS UNDER CONSTRUCTION FOR PROTECTION AGAINST SUBTERRANEAN TERMITES

FOREWORD

A. *NOTES ON TERMITES.* Some 300 species of termites have been described from the Australasian region, but less than a dozen achieve economic importance as pests of timber in service. With the exception of the dry-wood termites, all the species of economic importance in Australia are soil-dwelling and have more or less similar habits. Several of them have a wide geographic distribution.

'Subterranean termites' are responsible for most of the termite damage of economic importance to seasoned timber in Australia. Typically, they form nests or colonies underground in the soil, near ground level in a stump or other suitable piece of timber or in the trunk of a living tree. Sometimes the nest takes the form of a conical or dome-shaped mound. The colony may persist for many years and, as it matures, could contain a population running into millions. All attack by subterranean termites originates from the nest. Timber lying on or buried in the ground may be reached by underground foraging galleries but attack may occur well above ground level either inside the wood or by way of mud-walled shelter-tubes 'plastered' on the outside. Timber resting on foundations which termites cannot penetrate may be reached by means of these shelter-tubes or else by the erection of an independent, free-standing structure.* Both the building and its contents achieve protection by means of a chemical barrier, which prevents termites from reaching the superstructure.

'Dry-wood termites' are of economic importance only in restricted coastal, tropical and sub-tropical parts of Australia and, unlike subterranean termites, do not require contact with the soil. They form their nest or colony inside the wood upon which they feed and hence attack may take place in any piece of susceptible timber, regardless of its position in a building. The evidence of attack by these species is the presence of dry granular faecal pellets which may be stored in disused galleries or ejected through small openings in the surface of the wood, and the complete absence of galleries or tunnels connecting the infested timber with the soil.

B. *GEOGRAPHIC DISTRIBUTION OF HAZARD.* The practices recommended in this standard are intended for use in any part of Australia where subterranean termites are a hazard. Tasmania is the only State in the Commonwealth where this hazard is negligible. The hazard must be regarded as high in most parts of mainland Australia, with parts of Victoria and some other limited areas being relatively free from termites. In all areas, experience is to be regarded as the best guide to the degree of the local hazard.

C. *PERSISTENCE OF CHEMICALS IN SOIL.* The oldest of the chemicals recommended in this standard have been available commercially for only about 35 years so that records of their performance over longer periods than this do not exist. The earliest tests of chemically treated soil barriers were in the United States of America, where the most effective of the chemicals tested have given complete protection against termite attack since 1947. In Australia similar tests have been in existence for about 25 years but with comparable results. The rates of chemical application recommended in this standard are higher than those used in either the American or Australian field trials, and it is considered that this allows an adequate margin to compensate for the slow deterioration of the chemical, which may take place over an extended period of time.

Chemical barriers will not give protection against attack by dry-wood termites, which may also occur in the same regions as subterranean termites.

D. *WHEN TO TREAT.* The formation of a barrier of chemically-treated soil is readily accomplished while a building is under construction, but becomes more difficult or even impossible when the building has been completed because of restricted access under the floor and the possibility that voids, wall cavities and other inaccessible areas may escape treatment altogether. In this standard it is therefore assumed that

*Ant-capping in accordance with AS 1694 is not always sufficient protection.

treatment will be carried out at a stage during construction when the whole of the subfloor area is readily accessible. It is preferable that the whole of the barrier system be formed completely at one time. On sites where extensive filling is required or other special conditions prevail, treatment may have to be made progressively. In these circumstances special care must be exercised to ensure that the barrier system is complete and that each stage of treatment is well integrated with that previously applied so that no unprotected avenues of entry are left open to the termites.

E. *BUILDING SITE PRACTICE.* The removal of trees, stumps, logs or roots from a building site reduces the hazard from subterranean termites. Similarly, the subfloor area should be kept free from all debris in which new colonies of termites might become established.

All practices which affect the foundations or subfloor portions of a building are relevant to the prevention of termite attack in that building. A basic knowledge of the habits of subterranean termites coupled with sound building practice and attention to detail, will assist the architect and the builder in avoiding many of the pitfalls which may detract from the reliability of the treated soil barriers. Some of the many facets of construction which can affect the integrity of the barrier system are as follows:

(a) *Appendages.* Carports, annexes, trellises, etc attached to the outside of a building provide an indirect route past the chemically-treated soil barrier system. Unless the appendage is separated from the protected building by a clear gap of at least 50 mm, thus making it accessible for easy inspection, the foundations of the attachment should be provided with an effective termite barrier.

(b) *Subfloor ventilation and clearance.* The conditions of high humidity produced by poor subfloor ventilation are favoured by termites and may also be conducive to decay. Good subfloor ventilation provides for a free flow of air and should be sufficient to allow easy access for maintenance and inspection. Reliable termite protection cannot be assured unless foundations are free from voids, cavities and other inaccessible areas which cannot be reached for treatment or inspection.

(c) *Foundation walls, retaining walls.* These should be of solid (not hollow) brick or masonry, with all joints fully mortared to the equivalent of two courses above final grade level. Where cavity walls, hollow blocks or perforated bricks are used in foundation walls and retaining walls, all joints should be fully mortared and the cavities progressively filled so as to form a solid mass, free from voids to the equivalent of two courses above final grade or the filled level, whichever is the higher. Unless special arrangements can be made to treat the enclosed area before any filling is placed, all joints in brick or masonry retaining walls should be fully bedded with cement mortar in order to prevent the termites from using the fill and gaps in the mortaring as a means of bypassing the barriers external to the retaining walls.

(d) *Concrete raft (slab-on-ground) construction.* Unless the slab is well above final grade level, it is advisable to set the walls back 150 mm to 200 mm from the edge of the slab and to step and batter the exposed edge of the slab so that it sheds water away from the building. The exposed edge also provides a useful barrier which is easily inspected.

(e) *Termite proofing of concrete.* Termites cannot tunnel through ordinary dense concrete but are able to do so in the relatively porous 'no-fines' concrete, and chemical treatment of this concrete is therefore advantageous. Technical advice on this specialized use should be obtained with respect to each particular application (see F.*COORDINATION*).

F. *COORDINATION.* Where treated soil barriers are to be formed by contract and there is any doubt about their application to a particular site, consultation between the architect, the builder and the treatment contractor is recommended before building commences. The treatment contractor may then be able to indicate where effective barriers would be difficult to form, to point out possible weaknesses in the barrier system, or to suggest alternatives* or modifications which would either reduce costs or increase reliability.

G. *TECHNICAL ADVICE.* In special circumstances or difficult cases, technical advice on the most suitable procedures to be followed may be sought from the departments of agriculture or forestry and the CSIRO divisions of building research and entomology. Pest control associations are also competent to give this advice.

*See AS 1694.

SPECIFICATION

1 SCOPE. This standard sets out a practice for the chemical treatment of soil for the protection of buildings from attack by subterranean termites ('soil-dwelling white ants') (see Foreword). It includes reference to the chemicals to be used, lays down minimum rates of application for usage, and outlines procedures to be followed while the building is under construction. It is also suitable for use as a guide for the protective treatment of completed buildings and of additions and alterations to existing buildings, or in other circumstances where an existing barrier is disturbed, e.g. installation of underground telephone cable. (See AS 2178 for application of soil barriers in termite eradication.)

2 SITE PREPARATION.

2.1 General. In order to ensure uniform distribution of the treating emulsion and to permit percolation into the soil to a sufficient depth to prevent termite penetration of the barrier some site preparation may be necessary. The following information is offered for the guidance of operators, who must exercise some discretion in preparing a building site for treatment after ascertaining that the site has been cleared as recommended in Paragraph E of the Foreword.

2.2 Heavy Soils, Sloping Sites. On clays and other heavy soils where penetration is likely to be slow and on sloping sites where run-off of the treating solution is likely to occur, the surface of the soil should be scarified to a depth of 50 mm to 80 mm to retain emulsion where it is applied.

2.3 Sandy or Porous Soils. On loose, sandy or porous soils where loss of treating emulsion through 'piping' or excessive percolation is likely to occur, preliminary moistening with water to fill the capillary spaces in the soil is recommended.

2.4 Levelling, Excavations and Filling. All subfloor levelling and grading should be completed; all cuttings, trenches and excavations should be completed with backfilling in place; borrowed fill must be free from organic debris and should be well compacted. If this is not done supplementary treatment must be made after its removal.

2.5 Concrete Formwork, etc. All concrete formwork, levelling pegs, timber offcuts and other builder's debris must be removed from the area to be treated. If formwork is left in place at the time of the initial treatment, a supplementary treatment must be given after its removal.

3 CHEMICALS AND RATE OF APPLICATION.

Any one of the following chemical emulsions is effective when applied uniformly over the area to be treated at a rate of not less than 5 L of emulsion per square metre of soil surface. In order to compensate for unusual site conditions, dilutions different from those prescribed may be used, but the rate of application must then be varied to allow for this factor in order to ensure that the whole of the area is adequately treated and that each part receives not less than recommended dosage of active chemical.

Chemical	*Dilution*
Aldrin	An aqueous emulsion containing not less than 5 g/L (0.5 percent *m/V*) of aldrin
Chlordane	An aqueous emulsion containing not less than 10 g/L (1.0 percent *m/V*) of technical chlordane
Dieldrin	An aqueous emulsion containing not less than 5 g/L (0.5 percent *m/V*) of dieldrin
Heptachlor	An aqueous emulsion containing not less than 5 g /L (0.5 percent *m/V*) of heptachlor
Chlordane/ Heptachlor	An aqueous emulsion containing not less than 5 g/L (0.5 percent *m/V*) of technical chlordane and 2.5 g/L (0.25 percent *m/V*) of heptachlor (see Notes 2 and 3).

NOTES:

1. The chemicals described in this standard are organochlorine compounds with a persistent action. These chemicals are POISONOUS and are hazardous when swallowed, absorbed through the skin, or inhaled as vapours or spray-mist.

   Persons carrying out chemical soil treatments in accordance with this standard shall familiarize themselves with the precautions set out in Appendix A and exericise due care when handling the chemicals either as concentrates or in diluted form.

   The use of these chemicals should be avoided where there is any risk of wells or other water supplies becoming contaminated.
2. It is not intended that this emulsion be prepared by mixing the chemicals. A suitable commercial concentrate can be purchased ready for dilution.
3. The above specification of application rate may not be expressed in an identical manner in State regulations. In such cases, the user must assure himself of the equivalence of expression of the rates of application.
4. The figures given above have been established as being the required treatment, under practical conditions, to effectively prevent termite infestation.

4 THE TREATED SOIL BARRIER.

4.1 Conditions of Formation. The barrier of treated soil must be complete and continuous under the whole of the structure to be protected, and when any cavity extends down to the footings the barrier must also reach the footings on BOTH sides of the cavity wall (see Appendix B, Fig. B1).

All foundations, with the possible exception of the outside of solid external walls (see Note) must be fully surrounded by, and in contact with the barrier of treated soil.

NOTE: *External barriers.* Barriers of chemically treated soil around the outside of a building should be used to supplement the subfloor treatment. Care should be taken that this barrier is not broken during landscaping or gardening operations. In concrete raft (slab-on-ground) construction, external barriers will be the only form of retreatment possible without drilling the slab.

Each part of the area treated must receive the prescribed dosage of the emulsion, viz 5 L/m^2 of soil surface for the ground level portion of the barrier and 150 L/m^3 where the barrier is in the vertical plane. Vertical barriers must provide a continuous cover 50 mm to 80 mm deep against the wall to be protected and either join up with the horizontal barriers at their upper and lower limits or be separated from them by brickwork, masonry or concrete impervious to termites (see Appendix B, Fig. B2).