

Methods of analysis of wood preservatives and treated timber —

Part 2: Quantitative analysis of wood preservative solutions and treated timber containing *n*-butyltin compounds — Determination of tributyltin, dibutyltin and monobutyltin

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Committees responsible for this Draft for Development

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- Association of Consulting Scientists
- British Wood Preserving and Damp-proofing Association
- Chemical Industries Association
- Creosote Council
- Department of Trade and Industry — represented by the Building Research Establishment
- Timber Trade Federation
- Co-opted members

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Foreword

This part of DD 257 has been prepared by Subcommittee B/515/2, under the direction of Technical Committee B/515.

DD 257 gives a variety of methods of analysis of wood preservatives and treated timber:

— DD 257-1 describes a titrimetric method and a colorimetric method for the determination of boron compounds as boric acid in preservative solutions (both aqueous solutions and solutions in hydrocarbon solvents) and in treated timber;

— DD 257-2 describes a polarographic method and a thin-layer chromatographic method for the determination of tributyltin, dibutyltin and monobutyltin compounds present in wood preservative solutions and in treated timber;

— DD 257-3 describes a high performance liquid chromatographic method and a gas chromatographic method for the separation and determination of the cis and trans isomers of permethrin in organic solvent-based solutions of wood preservatives;

— DD 257-4 describes a high performance liquid chromatographic method and a gas chromatographic method for the separation and determination of the cis and trans isomers of cypermethrin in organic solvent-based wood preservative solutions;

— DD 257-5 describes gas chromatographic methods for the qualitative identification of carboxylic acids in wood preservative solutions containing zinc and copper carboxylates.

WARNING. This part of DD 257 calls for the use of substances and/or procedures that may be injurious to health if adequate precautions are not taken. It refers only to technical suitability and does not absolve the user from legal obligations relating to health and safety at any stage.

Attention is drawn to the Health and Safety at Work etc. Act 1974 [1] and the Control of Substances Hazardous to Health Regulations 1994 (as amended) [2], and to the need for ensuring that the method of test specified in this standard is carried out with suitable precautions. See safety precautions mentioned in BS 5666-1:1987, Clause 3.

It has been assumed in the preparation of this part of DD 257 that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature because there is at present insufficient experience in the use of the test method. It should be applied on this provisional basis, so that information and experience of its practical application can be obtained. In particular, information on precision (repeatability and reproducibility) is sought.

A review of this Draft for Development will be carried out not later than 2 years after its publication. Notification of the start of the review period, with a request for the submission of comments from users of this Draft for Development, will be made in an announcement in the appropriate issue of *Update Standards*.

According to the replies received, the responsible BSI Committee will judge whether the Draft for Development can be converted into a British Standard or what other action should be taken.

Observations which it is felt should receive attention before the official call for comments will be welcomed.

These should be sent to the Secretary of BSI Technical Committee B/515 at British Standards House, 389 Chiswick High Road, London, W4 4AL.

Summary of pages

This document comprises a front cover, an inside front cover, pages ii to iv, pages 1 to 15 and a back cover.

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Introduction

This part of DD 257 describes two methods for the determination of tributyltin, dibutyltin and monobutyltin compounds present in wood preservative solutions and in treated timber:

- a) polarographic; and
- b) thin-layer chromatographic.

For freshly-prepared preservative solutions and newly-treated timber containing the fungicide bis(tri-*n*-butyltin) oxide (TnBTO) an assessment of the amounts of active ingredient present based upon a total tin determination is adequate (see BS 5666-7). However, it has been demonstrated that TnBTO is degraded under certain conditions to dibutyltin and monobutyltin derivatives, as well as to inorganic tin compounds. Since these degradation products have reduced fungicidal properties compared with the original TnBTO it is sometimes necessary to determine the proportions of these compounds present. This has particular relevance when studying the effectiveness of TnBTO preservative systems after natural or accelerated ageing. However, to date, no inorganic tin has been identified in timber treated with TnBTO-containing preservatives. Thus in terms of assessing the fungitoxicity it is not normally necessary to attempt a separation of the monobutyltin and inorganic tin compounds. Nevertheless, for the sake of completeness, a separate thin-layer chromatographic system capable of such a separation is included as an annex (see Annex A).

The two methods described in this part of DD 257 have been found suitable for the determination of these compounds in the presence of chloronaphthalenes, dieldrin (HEOD), γ -hexachlorocyclohexane (γ -HCH, lindane), pentachlorophenyl laurate, pentachlorophenol and other chlorophenols, 2-phenylphenol, and water repellent waxes and resins. Copper and zinc naphthenate interfere with the determination of monobutyltin in the polarographic method but do not interfere with the thin-layer chromatographic method. Although the various organotin compounds are determined as their chlorides, after calculation, they are expressed in terms of TnBTO since, in the normal situation, they will have been derived from TnBTO.

With aged samples of treated timber, it is occasionally difficult to extract all the organotins, particularly if iron or some other cations are present. The method described in 4.5.2.2 and 5.5.2 has been shown to ensure that, in all cases, the proportion of the organotins not extracted is unlikely to affect the validity of the determination.

The requirements specified for the size of the sample to be taken for analysis of preservative solutions assume that the TnBTO content is a mass fraction of approximately 1 %. For samples of other compositions adjustments might have to be made in the quantity taken for analysis.

Requirements are specified for the mass of the timber sample to be analysed, but it is important to note that for timber samples the predominant factor is the quantity of preservative within the timber rather than the mass of the timber itself. It might be necessary to make adjustments either to the mass of the treated timber sample taken for analysis or to the level of dilution of the solution resulting from extraction.

Furthermore, it should be noted that the range of concentrations suggested for the standard solutions might have to be adjusted to suit the sensitivity of the instrument being used.

The timber sample for analysis may be in the form of sawdust, wood flour or thin sections.

1 Scope

This part of DD 257 describes two methods (polarographic and thin-layer chromatographic) for the determination of tributyltin, dibutyltin and monobutyltin compounds present in wood preservative solutions and in treated timber.

NOTE A method for the differentiation of monobutyltin trichloride and inorganic tin chloride compounds is given in Annex A.