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Trajnost lesa in lesnih proizvodov - Merila za uporabo vročega zraka za zaščito proti organizmom, škodljivim lesu

Durability of wood and wood-based products - Criteria for hot air processes for curative uses against wood destroying organisms

Dauerhaftigkeit von Holz und Holzprodukten - Kriterien für Heißluftverfahren zur Bekämpfung von holzerstörenden Organismen

Durabilité du bois et des matériaux dérivés du bois - Critères s'appliquant aux procédés à air chaud à usages curatifs contre les organismes lignivores

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Heißluftverfahren zur Bekämpfung von holzerstörenden
Organismen

This draft Technical Report is submitted to CEN members for Technical Committee Approval. It has been drawn up by the Technical Committee CEN/TC 38.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (FprCEN/TR 15003:2012) has been prepared by Technical Committee CEN/TC 38 “Durability of wood and derived materials”, the secretariat of which is held by AFNOR.

This document is currently submitted to the Technical Committee Approval.

This document will supersede CEN/TS 15003:2005.

This Technical Report gives the criteria for hot air treatment for curative uses against wood destroying organisms. European Standard EN 14128 concerns the criteria for curative wood preservatives as determined by biological tests.

Introduction

This document should be used in conjunction with EN 14128 which describes the performance requirements for curative wood preservatives as determined by biological tests.

The need for hot air treatment for curative use against wood destroying organisms depends upon a careful diagnosis by expert, qualified specialists to determine the precise causes of the damage to be rectified. This should include the type of wood attacking organisms involved and in the case of beetles whether they are considered to be active, the environmental circumstances, the type of wood involved, the nature of the building or construction, and the structural and physical significance of the timber which is damaged or at risk of being damaged.

In particular the need for hot air treatment for curative use against the true dry rot fungus (*Serpula lacrymans*) should include the precise identification of the dry rot fungus, the environmental circumstances, especially the source and nature of any wetting, and the nature of the building or construction, including the masonry in which the dry rot fungus is present.

NOTE So far, no reliable methods exist to determine whether the true dry rot fungus in a building construction is dead or still alive, including dormant stage.

Hot air treatment for curative use should be used in an integrated way as part of a carefully prescribed strategy involving a series of actions appropriate to the particular circumstances of each case. Associated physical measures involving appropriate building works to remedy ingress of moisture and to dry out any dampness can be an essential prerequisite for the use of any process for curative use. Expert diagnosis should take into account all regional, practical, environmental, economical, safety and any other factors which may be relevant to the prescriptive decisions to be taken.

If properly done hot air treatment does not influence the mechanical properties of the timber involved. However, the temperature usually applied can influence materials other than wood.

It is not the purpose of this document to provide a specification, or even guidance in developing specifications for remedial work to eradicate wood destroying organisms. It is intended to guide specifiers, users and others in selecting and specifying hot air treatment on the basis of its effectiveness as demonstrated in accordance with the criteria given.

1 Scope

This Technical Report specifies the minimum performance requirements for hot air treatment intended for application against specific classes of wood attacking organism. It specifies the minimum performance criteria to be achieved by hot air treatment.

NOTE Until now sufficient practical experience and results of scientific tests are available only for heat treatments using hot air as a medium to increase the temperature inside building components up to a threshold lethal to wood destroying organisms. Therefore, this document is restricted to hot air treatments although other measures like, for example, radio waves or electric blankets may be useful means for limited and special applications.

This document is applicable only to hot air treatment, in so far as it is intended to cure attack by wood destroying beetles and the dry rot fungus (*Serpula lacrymans*).

This Technical Report is not applicable to eradicate an attack by termites or by fungi other than the dry rot fungus (*Serpula lacrymans*).

Hot air treatment as described in this document does not provide subsequent preventive protection against attack by wood-destroying organisms.

This document does not define the equipment, techniques or precise operation procedures required to achieve the parameters given in Clause 5 for any set of practical circumstances. Specifications for particular practical circumstances have to be developed on a case by case basis by expert advisers/consultants.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1

eradication

treatment of infested timber and/or masonry in order to kill the wood destroying insects and the dry rot fungus.

Note 1 to entry: An eradication not necessarily includes an preventive effect against a subsequent attack. This especially concerns hot air treatment as specified in this Technical Report and which does not include any preventive effect.

2.2

lethal dose

total amount of heat as a combination of a particular temperature for a particular period of time necessary to kill all stages of the wood destroying organisms in question

3 Wood destroying organisms

3.1 Beetles

The wood attacking beetles to which hot air treatment can be applied are:

- *Hylotrupes bajulus* (housetlonghorn beetle) in the sapwood of softwoods;
- *Anobium punctatum* (common furniture beetle) in softwoods and hardwoods;
- *Xestobium rufovillosum* (deathwatch beetle) in hardwoods and softwoods, mainly in oak wood;
- *Lyctus brunneus* (powderpost beetle) in the starch containing sapwood of hardwoods;

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— *Hesperophanes cinnereus* in the sapwood of hardwoods (occurs only in Mediterranean countries).

3.2 Dry rot fungus

The dry rot fungus (*Serpula lacrymans* = true dry rot fungus) occurs in buildings, causing brown rot in timber. The fungus can develop at relatively low wood moisture contents and is able to penetrate damp masonry over long distances in order to infect further timber or to develop its fruit-bodies. Typical is its capability to survive in a so-called dormant stage where it is not active but still alive.

Serpula lacrymans is very sensitive to changes in environmental conditions and can be eradicated effectively by hot air treatment.

4 Performance requirements for curative hot air treatment

4.1 General

Experience indicates that the application of heat to a particular temperature for a particular period of time under particular environment conditions, can successfully kill wood attacking organisms. This includes the various stages of beetles inside wood, that is eggs, larvae, pupae and imagos, and the hyphae of the dry rot fungus (*Serpula lacrymans*) inside wood or masonry.

NOTE In principle any form of increased temperature can be used, providing it meets the minimum requirements given in 5.3 and 5.4. However, in practice, due to technical reasons, it is not currently possible to apply high temperature sources, such as micro waves, to large components and especially not to masonry, to reach a sufficient dose of heat (temperature x time) within reasonable time by these techniques. Therefore, generally only hot air will be suitable to provide the temperatures required in the infested material.

Structural timber will generally require treatment in situ. This will generally include masonry in the case of eradication of an attack by the dry rot fungus. Suitable precautions are necessary to keep the heat close to the infested timber or masonry respectively. If necessary the components shall be covered by suitable materials, such as tents or similar equipment. In the case of the dry rot fungus provisions shall be made as to transfer the heat to the attacked building constructions as a whole which means from all sides, to confirm that the required temperature will be met and kept evenly in the entire construction. For small components or objects of non-structural timber it can be more appropriate to transport them to special treating chambers, containers etc.

4.2 Health and safety considerations

Hot air treatment carries with it significant risks of damage for example to animals and human beings, of heat sensitive materials or indeed ignition of vulnerable materials and structures. There is normally no risk of ignition of materials by the heat itself. Local fire authorities shall be consulted before setting up heat units.

NOTE It may be necessary to notify the insurers of the building to be treated and agree procedures with them as well as with the Fire Brigade.

The risk of damage depends upon the nature of the building, structure or commodity to be treated, the method of applying the hot air, the duration of the heating period and the specific material or materials associated with, or the target of the treatment.

To avoid damaging buildings and other building elements, a measuring and data collection system shall be employed which responds to the temperature and relative humidity control devices.

Contractors, specifiers, users and clients shall take all necessary measures to obtain the appropriate assurances that precautions to protect against risks have been taken and are appropriate to protect their respective interests. All relevant specific national regulations shall be followed.

Before applying curative hot air treatment in the surroundings of infested timber, it is necessary to check whether there are any animals including bird's eggs in the surroundings, which either shall be removed or the treatment shall be postponed until the animals have gone before proceeding. This refers especially to protected animals (e.g. bats).

Where heat source combustion gases are used directly to heat the structure, care shall be taken to ensure that toxic gases or oxygen depletion are not a problem.

When operators enter a heated building the effects of the hot air on them shall be considered. Personnel can need insulated protection when entering the heated zones. Operators entering a heated zone shall be monitored by others who shall be able to evacuate an incapacitated individual if necessary.

4.3 Application against beetles

The minimum temperature requirement for eradication of beetle infestation is 55 °C for not less than 60 min in the centre of each timber component. After completion of hot air treatment no ventilation shall be provided but only normal cooling down according to the natural surrounding conditions.

Hot air treatment provides no residual preventive effect. If a preventive effect is required, additional measures shall be used.

NOTE 1 Experience from practice has shown that timber of an age of more than 60 years which has been treated with hot air will normally not become attacked again by *Hylotrupes bajulus*. This observation is not valid for *Anobiidae* (*Anobium* and *Xestobium*).

NOTE 2 Prevention against new infestation of timber without using chemicals may be only achieved by complete covering of all wooden components if it is possible.

4.4 Application against the dry rot fungus (*Serpula lacrymans*)

4.4.1 General

The lethal dose which will be achieved by the combination of a particular temperature for a particular period of time shall be applied to the whole extent of attack, including masonry in which the dry rot fungus normally is present.

It is important to consider all stages of the fungus, including the dormant stage, when defining the lethal dose required. The dormant but still alive stage of the fungal attack is the least sensitive to hot air.

Hot air treatment does not include any preventive effect against subsequent new attack by the dry rot fungus or any other wood destroying organism. All dry rot treatments require application of additional measures to rectify sources of moisture ingress into the building and to promote rapid drying of the structure. If such measures are not expected to be fully successful, application of wood preservatives can be required.

Hot air treatment is applicable only at locations higher than 1 m above ground level.

4.4.2 Building investigation

Prior to conducting a hot air treatment the building structure shall be the subject of a thorough survey by a qualified surveyor. The survey report shall include:

- Description of the method of investigation;
- Results of laboratory identification of samples taken to confirm the species of the wood destroying organisms;
- Horizontal and vertical drawings with descriptions of the extent of the attack; alternatively annotated photographs can be used as a record;