



[1]

Draft Heat treatment of wood using dielectric heating (2007-114)

[2]

Status box	
<i>This is not an official part of the standard and it will be modified by the IPPC Secretariat after adoption.</i>	
Date of this document	2015-01-22
Document category	Draft Annex to ISPM 28
Current document stage	To 2015-07 member consultation
Major stages	<p>2006-04 CPM-1 (2006) added topic <i>Revision of ISPM 15 (Regulation of wood packaging material in international trade)</i> (2006-011)</p> <p>2006-12 Treatment submitted in response to 2006-08 call for treatments</p> <p>2007-07 Revised text considered by TPFQ</p> <p>2007-12 Further revised text submitted to TPPT</p> <p>2009-07 Amended text considered by TPFQ</p> <p>2009-10 Additional information submitted to TPPT</p> <p>2010-07 Text updated</p> <p>2010-11 SC added topic <i>Microwave irradiation of wood packaging material</i> (2007-114)</p> <p>2011-03 Text submitted to SC e-discussion forum and revised based on SC comments; text submitted to SC e-discussion poll</p> <p>2011-05 SC approved for member consultation</p> <p>2011-07 member consultation</p> <p>2011-10 TPPT Response to comments to SC</p> <p>2013-07 TPPT at its meeting changed the title to <i>Heat treatment of wood using dielectric heating</i> and deferred treatment review pending publication of important research then underway</p> <p>2014-06 TPPT recommended draft treatment to SC for MC</p> <p>2014-08 Draft treatment submitted to SC e-discussion forum; SC returned draft treatment to TPPT with comments</p> <p>2014-09 TPPT revised draft treatment in response to SC comments</p> <p>2014-10 SC approved for member consultation via online poll</p>
Treatment Lead	Mr Mike ORMSBY (NZ)
Secretariat notes	<p>2011-05 Formatted and revised according to changes made to draft annex 1 to ISPM 15</p> <p>2013-12 Secretariat updated the <i>List of topics for IPPC standards</i> before CPM-9 (2014) based on TPPT decision to change the title</p>

	2015-01 Edited
--	----------------

[3] **Scope of the treatment**

- [4] 1. This treatment comprises the dielectric¹ heating of wood to reduce the likelihood of introduction and spread of *Bursaphelenchus xylophilus* and those pest insects and fungi likely to be associated with wood in international trade².

[5] **Treatment description**

- [6] 2. **Name of treatment** Heat treatment of wood using dielectric heating

- [7] 4. **Active ingredient** N/A

- [8] 5. **Treatment type** Physical (heat)

- [9] 6. **Target pests** Wood-borne life stages of insects, fungi and *Bursaphelenchus xylophilus* (Steiner & Buhner) Nickle (Nematoda: Aphelenchoididae)

- [10] 7. **Target regulated articles** Wood

[11] **Treatment schedule**

- [12] 7. Where the application of heat is undertaken using dielectric heating (e.g. microwaves or radio waves), wood must be heated to achieve a minimum temperature of 60 °C for the duration of 1 minute throughout the profile of the wood.

- [13] 9. This treatment schedule achieves no less than a 99.99683% level of mortality for all life stages of *B. xylophilus* at the 95% confidence level, and it is effective against those pest insects and fungi likely to be associated with wood in international trade.

[14] **Other relevant information**

- [15] 9. The Technical Panel on Phytosanitary Treatments based its evaluation of this treatment for *B. xylophilus* on the research reported by Hoover *et al.* (2010) and Janowiak *et al.* (2014). As insects have been found to be generally more susceptible to heat than pine wood nematodes are, the level of efficacy for insects will be equivalent to or higher than that for nematodes.

- [16] 11. The effectiveness of this treatment against other pest insects and fungi has been supported by Fleming *et al.* (2003, 2004), Henin *et al.* (2008), NAPPO (2013), Soma *et al.* (2002, 2003), Tomminen and Nuorteva (1992) and Tomminen *et al.* (1991).

- [17] 12. Because some sources of dielectric heating will result in limited initial heat penetration, further time may be required to allow heat diffusion through the wood after exposure to dielectric heating in order to achieve the treatment schedule throughout the profile of the wood.

[18] **References**

- [19] **Fleming, M., Hoover, K., Janowiak, J., Fang, Y., Wang, X., Liu, W., Wang, Y., Hang, X., Agrawal, D., Mastro, V. & Roy, R.** 2003. Microwave irradiation of solid wood packing material (pallet and crate lumber): An effective technique to destroy the Asian longhorned beetle (*Anoplophora glabripennis*) hitchhiking to the United States. *Forest Products Journal*, 52: 1–7.
- [20] **Fleming, M.R., Janowiak, J.J., Kearns, J., Shield, J.E., Roy, R., Agrawal, D.K., Bauer, L.S., Miller, D.L. & Hoover, K.** 2004. Parameters for scale-up of microwave treatment to eradicate cerambycid larvae infesting solid wood packing materials. *Forest Products Journal*, 54(7/8): 80–84.
- [21] **Henin, J.-M., Charron, S., Luypaert, P.J., Jourez, B. & Hebert, J.** 2008. Strategy to control the effectiveness of microwave treatment of wood in the framework of the implementation of ISPM 15. *Forest Products Journal*, 58: 75–81.
- [22] **Hoover, K., Uzunovic, A., Gething, B., Dale, A., Leung, K., Ostiguy, N. & Janowiak, J.J.** 2010. Lethal temperature for pinewood nematode, *Bursaphelenchus xylophilus*, in infested wood using microwave energy. *Journal of Nematology*, 42: 101–110.
- [23] **Janowiak, J., Dubey, M., Hoover, K., Mack, R., Elder, P.** 2014. Comparative study of radio frequency (RF) and microwave (MW) heating of wood in compliance with ISPM 15 phytosanitary treatment. *Presentation to the 2014 meeting of the International Forest Quarantine Research Group. Rome, 2014.* 35 pp.
- [24] **NAPPO (North American Plant Protection Organization).** 2013. *Review of heat treatment of wood and wood packaging.* ST 03. Ottawa, NAPPO Forestry Panel.
- [25] **Soma, Y., Goto, M., Naito, H., Ogawa, N., Kawakami, F., Hirata, K., Komatsu, H. & Matsumoto, Y.** 2003. Effects of some fumigants on mortality of pine wood nematode, *Bursaphelenchus xylophilus* infecting wooden packages. 3. Mortality and fumigation standards for pine wood nematode by methyl bromide. *Research Bulletin of the Plant Protection Service Japan*, 39: 7–14.
- [26] **Soma, Y., Naito, H., Misumi, T., Tsuchiya, Y., Mizobuchi, M., Matsuoka, I., Kawakami, F., Hirata, K. & Komatsu, H.** 2002. Effects of some fumigants on pine wood nematode, *Bursaphelenchus xylophilus* infecting wooden packages. 2. Mortality of pine wood nematode by methyl bromide tent fumigation. *Research Bulletin of the Plant Protection Service Japan*, 38: 13–19.
- [27] **Tomminen, J., Halik, S. & Bergdahl, D.R.** 1991. Incubation temperature and time effects on life stages of *Bursaphelenchus xylophilus* in wood chips. *Journal of Nematology*, 23: 477–484.
- [28] **Tomminen, J. & Nuorteva, M.** 1992. Pinewood nematode, *Bursaphelenchus xylophilus* in commercial sawn wood and its control by kiln-heating. *Scandinavian Journal of Forest Research*, 7: 113–120.
- [29] **Footnote 1:** Dielectric heating is based on the alternating electrical field of the electromagnetic wave emitted by the dielectric radiation source (e.g. microwave or radio wave). Chemical compounds with asymmetric charge distribution, so called dipole characters (e.g. water), tend to orientate along this electrical field and oscillate with the electrical field (e.g. 2.45 MHz causes 2.45 million oscillations per second). The friction generated through this process converts electrical energy into heat energy.
- [30] **Footnote 2:** The scope of phytosanitary treatments does not include issues related to pesticide registration or other domestic requirements for approval of treatments. Treatments also do not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures prior to approval of a treatment. In addition, potential effects of treatments on product quality are considered for some host commodities before their international adoption. However, evaluation of any effects of a treatment on the quality of commodities may require additional consideration. There is no obligation for a contracting party to approve, register or adopt the treatments for use in its territory.