



[1] **DRAFT ANNEX TO ISPM 28: Heat treatment of wood using dielectric heating (2007-114)**

[2]

Status box	
<i>This is not an official part of the annex to the standard and it will be modified by the IPPC Secretariat after adoption.</i>	
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Document category	Draft annex to ISPM 28
Current document stage	To CPM for adoption
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 draft considered by TPFQ</p> <p>2007-12 Further revised draft submitted to TPPT</p> <p>2009-07 Amended draft considered by TPFQ</p> <p>2009-10 Additional information submitted to TPPT by Submitter</p> <p>2010-07 Draft updated</p> <p>2010-11 SC added topic <i>Microwave irradiation of wood packaging material</i> (2007-114)</p> <p>2011-03 Draft submitted to SC e-discussion forum and revised based on SC comments; draft 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 draft review pending publication of important research then underway</p> <p>2014-06 TPPT recommended draft to SC for first consultation</p> <p>2014-08 Draft submitted to SC e-discussion forum; SC returned draft to TPPT with comments</p> <p>2014-09 TPPT revised draft in response to SC comments</p> <p>2014-10 SC approved draft for member consultation via online poll</p> <p>2015-07 First consultation period</p> <p>2016-09 TPPT recommended to SC for adoption (scope changed)</p> <p>2016-11 SC recommended for adoption by CPM-12 via e-decision (2016_eSC_Nov_14)</p>
Treatment Lead	2006-12 Mr Mike ORMSBY (NZ)
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 based on TPPT decision to change the title</p> <p>2015-01 Edited</p> <p>2016-04 Edited</p> <p><i>This treatment will be formatted after adoption, ensuring that footnotes are on the same page as where the footnote cue appears.</i></p>

[3] **Scope of the treatment**

[4] This treatment describes the dielectric heating¹ of wood to reduce the likelihood of introduction and spread of *Bursaphelenchus xylophilus* and insect pests likely to be associated with wood in international trade².

[5] Treatment description

[6] Name of treatment Heat treatment of wood using dielectric heating

[7] Active ingredient N/A

[8] Treatment type Physical (heat)

[9] Target pests Wood-borne life stages of *Bursaphelenchus xylophilus* (Steiner & Buhner, 1934) Nickle, 1970 (Nematoda: Aphelenchoididae) and insects

[10] Target regulated articles Wood

[11] Treatment schedule

[12] 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 minimum duration of one minute throughout the profile of the wood (including the surface).

[13] There is 95% confidence that the treatment according to this schedule kills not less than 99.99683% of all life stages of *Bursaphelenchus xylophilus*.

[14] The level of efficacy for insect pests will be equivalent to or higher than that for *B. xylophilus*.

[15] Other relevant information

[16] The Technical Panel on Phytosanitary Treatments based its evaluation of this treatment for *B. xylophilus* on the research reported by Dubey *et al.* (2016) and Hoover *et al.* (2010). As wood-infesting insects have been found to be generally no more tolerant to heat than *B. xylophilus*, the level of efficacy for insects will be equivalent to or higher than that for *B. xylophilus*.

[17] The effectiveness of this treatment against insect and fungal pests has been demonstrated by Fleming *et al.* (2003, 2004), Henin *et al.* (2008), NAPPO (2013), Tomminen and Nuorteva (1992), Tomminen *et al.* (1991) and Tubajika *et al.* (2007).

[18] Because some sources of dielectric heating will result in limited or uneven initial heat penetration, sufficient time may be required after heating to allow heat diffusion throughout the profile of the wood (including the surface) in order to achieve the treatment schedule.

[19] References

The present annex to the standard may refer to international standards for phytosanitary measures (ISPMs). ISPMs are available on the International Phytosanitary Portal (IPP) at <https://www.ippc.int/core-activities/standards-setting/ispm>s.

[20] Dubey, M., Janowiak, J., Mack, R., Elder, P. & Hoover, K. 2016. Comparative study of radio frequency and microwave heating for phytosanitary treatment of wood. *European Journal of Wood and Wood Products*, doi:10.1007/s00107-016-1025-2.

[21] 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.

[22] 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.

[23] 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.

- [24] 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.
- [25] NAPPO (North American Plant Protection Organization). 2013. *Review of heat treatment of wood and wood packaging*. ST 03. Ottawa, NAPPO Forestry Panel.
- [26] 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.
- [27] 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.
- [28] Tubajika, K.M., Janowiak, J.J., Mack, R. & Hoover, K. 2007. Efficacy of radio frequency treatment and its potential for control of sapstain and wood decay fungi on red oak, poplar, and southern yellow pine wood species. *Journal of Wood Science*, 53: 258–263.
- [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 contracting parties' approval of treatments. Treatments adopted by the Commission on Phytosanitary Measures may not provide information on specific effects on human health or food safety, which should be addressed using domestic procedures before contracting parties approve 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.