*[1]* **DRAFT ANNEX TO ISPM 28: SULPHURYL FLUORIDE FUMIGATION TREATMENT FOR INSECTS IN DEBARKED WOOD (2007-101A)**

*[2]*

| **Status box** | |
|---|---|
| *This is not an official part of the annex to the standard and it will be modified by the IPPC Secretariat after adoption.* | |
| **Date of this document** | 2016-11-28 |
| **Document category** | Draft annex to ISPM 28 |
| **Current document stage** | *To* CPM for adoption |
| **Major stages** | 2006-04 CPM-1 (2006) added topic *Revision of ISPM 15 (Regulation of wood packaging material in international trade)* (2006-011)<br>2006-09 Treatment submitted in response to 2006-08 call for treatments<br>2006-12 TPPT reviewed treatment<br>2007-07 Revised draft considered by TPFQ<br>2007-12 Further revised draft submitted to TPPT<br>2008-12 TPFQ discussion<br>2009-01 TPPT reviewed draft<br>2009-07 Amended draft considered by TPFQ<br>2010-07 Draft updated and recommended to SC<br>2010-09 TPFQ discussion<br>2011-04 SC e-decision<br>2011-05 SC via e-discussion returned to TPPT<br>2011-07 TPPT revised draft based on SC comments<br>2011-10 TPPT reviewed draft<br>2012-02 TPFQ discussion<br>2012-12 TPPT reviewed draft<br>2013-07 TPPT reviewed draft based on additional information from Submitter<br>2014-01 TPPT deferred draft review pending information from specialists<br>2014-06 TPPT reviewed draft based on information from specialists; TPPT recommended topic *Sulphuryl fluoride fumigation of wood packaging material* (2007-101) be split into two topics (one for insects and one for nematodes and insects); TPPT recommended drafts to SC for member consultation<br>2014-09 SC approved draft for member consultation via e-decision (2014_eSC_Nov_09)<br>2014-11 SC agreed to split *Sulphuryl fluoride fumigation of wood packaging material* (2007-101) into separate topics: *Sulphuryl fluoride fumigation of insects in debarked wood* (2007-101A) and *Sulphuryl fluoride fumigation of nematodes and insects in debarked wood* (2007-101B)<br>2015-07 First consultation<br>2016-09 TPPT recommended to SC for adoption<br>2016-11 SC recommended to CPM-12 for adoption vie e-decision (2016_eSC_Nov_15) |
| **Treatment Lead** | 2006-12 Mr Mike ORMSBY (NZ) |

| | |
|---|---|
| **Notes** | 2007-07 Letter to Submitter<br>2008-03 Letter to Submitter<br>2009-03 Letter to Submitter<br>2009-10 Additional information submitted to TPPT<br>2010-09 Letter to Submitter<br>2011-04 Formatted in template<br>2011-11 Letter to Submitter<br>2015-01 Edited<br>2016-04 Edited<br>2016-11 Edited<br>***This treatment will be formatted after adoption, ensuring that footnotes are on the same page as where the footnote cue appears.*** |

*[3]* **Scope of the treatment**

*[4]* This treatment describes the fumigation of debarked wood using sulphuryl fluoride to reduce the risk of introduction and spread of insect pests[1].

*[5]* **Treatment description**

*[6]* **Name of treatment** Sulphuryl fluoride fumigation treatment for insects in debarked wood

*[7]* **Active ingredient** Sulphuryl fluoride (also known as sulfuryl fluoride, sulphur dioxide difluoride, sulphuryl difluoride)

*[8]* **Treatment type** Fumigation

*[9]* **Target pests** Wood-borne life stages of insects, including *Anoplophora glabripennis* (Motschulsky, 1853) (Coleoptera: Cerambycidae), *Anobium punctatum* (De Geer, 1774) (Coleoptera: Anobiidae) and *Arhopalus tristis* (Fabricius, 1787) (Coleoptera: Cerambycidae)

*[10]* **Target regulated articles** Debarked wood not exceeding 20 cm in cross-section at its smallest dimension and 75% moisture content (dry basis)

*[11]* **Treatment schedule**

*[12]* Fumigation of debarked wood not exceeding 20 cm in cross-section at its smallest dimension and 75% moisture content (dry basis) in accordance with a schedule that achieves the minimum concentration-time product (CT) within a single 24 hour period at the temperature and final residual concentration specified in Table 1.

*[13]* **Table 1.** Minimum concentration-time product (CT) within a single 24 hour period for debarked wood fumigated with sulphuryl fluoride

*[14]*

| **Temperature** | **Minimum required CT ($g \cdot h/m^3$)** | **Minimum concentration ($g/m^3$)** |
|---|---|---|
| 15 °C or above | 3 200 | 93 |
| 20 °C or above | 2 300 | 67 |
| 25 °C or above | 1 500 | 44 |
| 30 °C or above | 1 400 | 41 |

*[15]* This treatment schedule is effective against all wood-borne life stages of insect pests. There is 95% confidence that the treatment according to this schedule achieves the following levels of mortality for the wood-borne life stages of the following insect pests:

*[16]*
- *Anoplophora glabripennis* (larvae and pupae) to not less than 99.99683%[2]

*[17]*
- *Anobium punctatum* (all life stages) to not less than 99.7462%

*[18]*
- *Arhopalus tristis* (all life stages) to not less than 99%.

*[19]* The measured temperature of the product (including at the wood core) or the ambient air (whichever is lower) is used to calculate the sulphuryl fluoride dose and must be at least 15 °C throughout the duration of the treatment.

*[20]* **Other relevant information**

*[21]* One example of a schedule that achieves the minimum required CT for debarked wood treated with sulphuryl fluoride is shown in Table 2.

*[22]* **Table 2.** Example of a treatment schedule that achieves the minimum required concentration-time product (CT) for debarked wood treated with sulphuryl fluoride (SF)

*[23]*

| Minimum temperature during treatment | Minimum required CT ($g \cdot h/m^3$) | SF dose† ($g/m^3$) | Minimum concentration ($g/m^3$) at hour: | | | | |
|---|---|---|---|---|---|---|---|
| | | | 0.5 | 2 | 4 | 12 | 24 |
| 15 °C or above | 3 200 | 183 | 188 | 176 | 163 | 131 | 93 |
| 20 °C or above | 2 300 | 131 | 136 | 128 | 118 | 95 | 67 |
| 25 °C or above | 1 500 | 88 | 94 | 83 | 78 | 62 | 44 |
| 30 °C or above | 1 400 | 82 | 87 | 78 | 73 | 58 | 41 |

*[24]*

† Initial doses may need to be higher in conditions of high sorption or leakage.

*[25]* The Technical Panel on Phytosanitary Treatments based its evaluation of this treatment for *A. glabripennis* on the research reported by Barak *et al*. (2006).

*[26]* The general effectiveness of this treatment against other pests has been supported by Barak *et al.* (2010), Binker *et al*. (1999), Ducom *et al.* (2003), La Fage *et al.* (1982), Mizobuchi *et al*. (1996), Osbrink *et al*. (1987), Soma *et al*. (1996, 1997), Williams and Sprenkel (1990) and Zhang (2006).

*[27]* If the CT is not achieved within a single 24 hour period (even if the minimum concentration is achieved), corrective action will need to be taken. The treatment may be extended for a maximum of two hours without adding more sulphuryl fluoride, or it may be restarted.

*[28]* **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/ispms.

*[29]* **Barak, A., Messenger, M., Neese, P., Thoms, E. & Fraser, I.** 2010. Sulfuryl fluoride treatment as a quarantine treatment for emerald ash borer (Coleoptera: Buprestidae) in ash logs. *Journal of Economic Entomology*, 103(3): 603–611.

*[30]* **Barak, A., Wang, Y., Zhan, G., Wu, Y., Xu, L. & Huang, Q.** 2006. Sulfuryl fluoride as a quarantine treatment for *Anoplophora glabripennis* (Coleoptera: Cerambycidae) in regulated wood packing material. *Journal of Economic Entomology*, 99(5): 1628–1635.

*[31]* **Binker, G., Binker, J., Fröba, G., Graf, E. & Lanz, B.** 1999. Laboratory study on *Anobium punctatum*, number 130377/A and 403972 (bioassay 11–15), unpublished, Binker Materialschutz, Germany. *In Inclusion of active substances in Annex I to Directive 98/8/EC*: Assessment report: Sulfuryl fluoride, PT8, Appendix IV (List of studies), p. 29, September 2006.

*[32]* **Ducom, P., Roussel, C. & Stefanini, V.** 2003. Efficacy of sulfuryl fluoride on European house borer eggs, *Hylotrupes bajulus* (L.) (Coleoptera: Cerambycidae), contract research project. Laboratoire National de la Protection des Végétaux, Station d`Etude des Techniques de fumigation et de Protection des Denrées Stockées, Chemin d`Artigues - 33150 Cenon, France. *In Inclusion of active substances in Annex I to Directive 98/8/EC*: Assessment report: Sulfuryl fluoride, PT8, Appendix IV (List of studies), p. 31, September 2006.

*[33]* **La Fage, J.P., Jones, M. & Lawrence, T.** 1982. A laboratory evaluation of the fumigant, sulfuryl fluoride (Vikane), against the Formosan termite *Coptotermes formosanus* Shiraki. International Research Group on Wood Protection (IRGWP) Thirteenth Annual Meeting. Stockholm, May 1982. Stockholm, IRGWP Secretariat.

*[34]* **Mizobuchi, M., Matsuoka, I., Soma, Y., Kishino, H., Yabuta, S., Imamura, M., Mizuno, T., Hirose, Y. & Kawakami, F.** 1996. Susceptibility of forest insect pests to sulfuryl fluoride. 2. Ambrosia beetles. *Research Bulletin of the Plant Protection Service Japan*, 32: 77–82.

*[35]* **Osbrink, W.L.A., Scheffrahn, R.H., Su, N-Y. & Rust, M.K.** 1987. Laboratory comparisons of sulfuryl fluoride toxicity and mean time of mortality among ten termite species (Isoptera: Hodotermitidae, Kalotermitidae, Rhinotermitidae). *Journal of Economic Entomology*, 80: 1044–1047.

*[36]* **Soma, Y., Mizobuchi, M., Oogita, T., Misumi, T., Kishono, H., Akagawa, T. & Kawakami, F.** 1997. Susceptibility of forest insect pests to sulfuryl fluoride. 3. Susceptibility to sulfuryl fluoride at 25 °C. *Research Bulletin of the Plant Protection Service Japan*, 33: 25–30.

*[37]* **Soma, Y., Yabuta, S., Mizoguti, M., Kishino, H., Matsuoka, I., Goto, M., Akagawa, T., Ikeda, T. & Kawakami, F.** 1996. Susceptibility of forest insect pests to sulfuryl fluoride. 1. Wood borers and bark beetles. *Research Bulletin of the Plant Protection Service Japan*, 32: 69–76.

*[38]* **Williams, L.H. & Sprenkel, R.J.** 1990. Ovicidal activity of sulfuryl fluoride to anobiid and lyctid beetle eggs of various ages. *Journal of Entomological Science*, 25(3): 366–375.

*[39]* **Zhang, Z.** 2006. Use of sulfuryl fluoride as an alternative fumigant to methyl bromide in export log fumigation. *New Zealand Plant Protection*, 59: 223–227.

*[40]* **Footnote 1:** 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.

*[41]* **Footnote 2:** The minimum level of mortality achieved by the treatment for this species has been estimated by extrapolation from a model fitted to the experimental data.