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## HEEG opinion

### Defaults and appropriate models to assess human exposure for dipping processes (PT 8)

#### INTRODUCTION

The TNsG on Human exposure (2002) recommends using 1 dipping cycle per day, while national surveys from Germany have provided information that this default value would not be sufficient. It is realised that different values originate from different dipping processes, and most notably, it is necessary to differentiate between manual and automated dipping. These are very different processes with completely different human exposure patterns.

#### DEFINITIONS:

- 1. Manual dipping** is defined as manual dipping of wooden articles in open tanks (p. 26 of the User Guidance, 2002). In manual dipping operations, the operator lifts and places – by hand – the wooden article into the dipping tank. The operator then pushes, using a post, the wooden article under the wood preservative in the dipping tank and/or uses a broom to brush the wood preservative onto the wooden article (the article is still in the dipping tank as the preservative is brushed on the wood). The operator then lifts by his/her gloved hand the wooden article from the dipping tank and stacks the article to dry. The operator gets relatively highly contaminated by the wood preservative, as demonstrated by a video recording of this operation (UK HSE).
- 2. Automated dipping** includes the following operations: an operator using a fork-lift truck or similar equipment lowers the wood into the dipping tank or transfers the wood to a bathing tray. The wood stays in the wood preservative for a few minutes or for a few hours before being lifted out of the tank by the fork-lift truck (or similar). The wood is then transferred by the fork-lift truck (or similar) to a storage area where it is placed to dry.

#### EXPOSURE ASSESSMENT:

- 1. Manual dipping:** Since this is a very strenuous activity, it is reasonable to assume that operators would only spend a relatively short time dipping, i.e. 30 minutes dipping, once a day (User Guidance, version 1, June 2002, page 44). Manual dipping is undertaken by small companies making for example sheds, window frames and fencing. Such

companies only make a few items a day and then dip them in preservative. This means that manual dipping is undertaken during a very short time during the day.

For manual dipping the Dipping Model 1 data (p. 26 of User Guidance, 2002) is recommended as it covers manual dipping of wooden articles in open tanks. The model is appropriate to assess the dermal and inhalation exposure to aerosols.

The summary of the exposure assessment is presented in Table 1 below.

## 2. Automated dipping:

Information about the frequency of automated dipping is determined in a German survey (see attachment). As a reasonable default value a number of 4 cycles should be used for automated dipping (based on the median result, see attachment).

### Dermal exposure

For dipping using a fork-lift truck the operator exposure arises from handling the wet preservative-treated timber. A German study observed qualitatively that the dermal exposure pattern of automated dipping is comparable to that of vacuum pressure process. Based on this assumption the appropriate model to assess the automated dipping process is Handling model 1. This model is used to assess the professional intermittently handling water-wet or solvent-damp wood and associated equipment after vacuum pressure processes (p. 26 of User Guidance, 2002). The dermal exposure is assessed as mg of a.s. per cycle.

### Inhalation exposure

Measurements of a German BAuA study determined no inhalation exposure for water-based solution since no aerosol formation was observed. Therefore, for water-based in-use formulations, there should be negligible inhalation exposure.

The summary of the exposure assessment is presented in Table 1 below.

**Table 1.** Summary table for manual and automated dipping.

	<b>Duration</b>	<b>Frequency</b>	<b>Model</b>
<b>Manual dipping</b>	30 min. per day	Once a day	Dipping Model 1 for dermal and inhalation exposure to aerosols
<b>Automated dipping</b>	Several minutes – 60 min (not relevant for Handling Model 1 since the assessment is based on the number of cycles)	4 dipping cycles per day	Handling Model 1 for dermal exposure Negligible inhalation exposure to aerosols



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### Information from German national surveys: Number of cycles per working day

Germany has used 5 cycles per day as the number of impregnation cycles for wood preservative dipping processes. This is in contrast to the TNsG Human Exposure (2002) with a proposed default value of 1 cycle per day. The German proposal is based on information determined in two national studies. Based on this a number of 5 cycles per day seems to be more realistic than 1 cycle. A discussion about the number of cycles is appreciated to find an agreement within member states about this issue. Please find the following information as an input for the discussion.

#### 1) UBA Study

**Title: Expert Compilation of structural data on the industrial application of wood preservatives in Germany**

**German Title: Gutachten zur Erhebung struktureller Daten über industrielle und gewerbliche Anwender von Holzschutzmitteln in Deutschland**

A project of UBA (German environmental agency), carried out by Institute Fresenius (Langer W., Forst S.) February 2001

It has been the aim of the project to compile statistical data on the structure of industrial / professional wood preservative application. Data has been collected from enterprises / plants by questionnaire.

In Germany, there are about 2,500 to 3,000 dipping plants installed in sawmills, carpentry shops and wood window manufacturers.

Result of the questionnaire: Number of impregnations (dipping/immersion) carried out per working-day

Number of impregnations per day	Number of answers	Percentage [%]
1	8	25.0
> 1 – 2 (1.5 or 2)	9	28.1
> 2 – 3 (2.5 or 3)	7	21.9
> 3 – 5 (4)	3	9.4
> 5 - 10	2	6.3
> 10 - 15	1	3.1
> 15 – 20 (20)	2	6.3
> 20	0	0.0

**Total number of answers: 32**

**Median: 4.0**

**90<sup>th</sup> Percentile: 9.6**

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## 2) BAuA study

### Title: Occupational Exposure to Biocidal Products Part 4: Wood Preservatives

#### German Title: Arbeitsplatzbelastungen bei der Verwendung von bioziden Produkten Teil 4: Holzschutzmittel

Hebisch R., Holthenrich D., Karmann J., Riechert F., Berger M., Kersten N. (2009)

BAuA performed workplace measurements in 13 enterprises using different impregnation techniques: vacuum pressure impregnation and dipping.

Two of the visited enterprises perform automated dipping.

Result of the questionnaire: Number of impregnations (dipping/immersion) carried out per working-day

- Company 1 (number of workers: 2): **1 cycle per day**, 1 dipping vessel, 2 impregnations per week
- Company 2 (number of workers: 48 for dipping and sawmill): **16 cycles per day**, 1 dipping vessel, daily impregnations

Automated dipping (source: BAuA project F1809, company 1)

