

Study of emissions from linseed oil-based paints from Allbäck linseed oil products AB

I – Exposure during occupational use of the paint

Introduction

The study in hand was carried out as a step in the examination of Allbäck's linseed oil-based paints with the aim of establishing possible exposure and emission risks and resulting health hazards.

Assignment

The study began with an investigation of emissions during the renovation of windows in a residential apartment.

The measurements were made from the industrial hygiene viewpoint i.e. the measurements were designed to examine the craftsman's/painter's exposure to the linseed oil-based paint.

Subject

First floor apartment, Kung Oskars väg 5 B, Lund. An older-style apartment, comprising 1 room with a bedstead recess and a kitchen, in a property built in the 1930s. The apartment had two windows facing the courtyard. Ventilation in the form of natural draught.

Test methods

The investigation comprised control measurements (measured before painting work commenced) and two subsequent measurements during the painting work, representing impregnation/priming and painting of the windowsills and frames.

The measurements were carried out on three separate occasions in connection with the following stages of work:

1. Control measurement – stationary sampling in the centre of the living room.
2. Measurement during impregnation/priming with linseed oil (raw, cold pressed) of the lower part of the frames and the windowsills, coating the knots with shellac, painting the frames and windowsills with Allbäck's linseed oil paint – sampling equipment mounted on craftsman, in the respiration zone.
3. Measurement during painting of frames, casements and sills with Allbäck's linseed oil paint – sampling equipment mounted on craftsman, in the respiration zone.

Instruments / Sampling materials/ Analyses

Scantec air pump

Adsorption tube – Tenax for volatile organic substances

Adsorption tube – Silica for aldehyde

Results

<i>Sampling</i>	<i>VOC µg/m³ (~terpenes)</i>	<i>Aldehyde µg/m³</i>			
		<i>Formaldehyde</i>	<i>Acetaldehyde</i>	<i>Acetone/ Acrolein</i>	<i>Propanal</i>
1. Reference	154				
2. Impregnation/ priming.	774				
3. Painting Outdoors	330 91	12	16	42	66

(Analysis records see Appendices 1 and 2)

Evaluation

In the evaluation, the measurements were compared with the Swedish National Board of Occupational Safety and Health's (Arbetarskyddsstyrelsen) hygienic limits, which are as follows:

	<i>Time-weighted exposure value (exposure one working day) µg/m³</i>	<i>Short-term exposure value (exposure (av.) for 15 min.) µg/m³</i>	<i>Ceiling exposure value (highest level for 15 min.) µg/m³</i>
Terpenes (Pinene, Carene)	150 000	300 000	-
n-Butanol	45 000	-	90 000
Formaldehyde	600	-	1 200
Acetaldehyde	45 000	90 000	-
Acetone	600 000	1 200 000	-
Acrolein	200	700	-
Propanal	-	-	-

The measurements were only carried out during priming/impregnation and painting to investigate the maximum exposure in respect of the linseed oil-based products. Given these conditions, we were able to establish that the exposure was considerably below the established hygienic limits for all the substances that the craftsman/painter was exposed to, minimising the risk of both acute and chronic health problems.

Further, we were able to establish that a large part of the exposure to volatile organic compounds (VOC) did not emanate from the linseed oil-based products that were used for priming and painting of the window frames, but from the actual wood in these when removing old paint remains with a hot-air gun. Namely, when timber is warmed it releases terpenes, the natural solvents in the timber, which can clearly be seen in the analysis results from the measurements made during priming/impregnation.

Normally this type of work renovating old windows is varied, comprising both carpentry and painting in turns, which in practice means considerably lower exposure than was measured in this case.

It should be added that in spite of a minimum of air exchange (= natural draught ventilation) the limits were not exceeded.

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