Health Council of the Netherlands

Wood dust

Executive summary

NEG THE NORDIC EXPERT GROUP

Wood dust is released during wood processing such as sawing, sanding and milling. The particles can be inhaled via the airways and can cause health complaints. The Nordic Expert Group for Criteria Documentation of Health Risk from Chemicals (NEG) and the Dutch Expert Committee on Occupational Safety (DECOS) have evaluated the health hazard for occupational exposure to wood dust. Subsequently, health-based calculated occupational cancer risk values (HBC-OCRVs) have been derived. The HBC-OCRVs form the basis for the legal limits to be established by the Nordic regulatory authorities and the Dutch government to protect workers from harmful health effects from exposure to wood dust.

This advice was at the request of the Nordic authorities and the Dutch ministry of Social Affairs and Employment. More information on the task of the committees can be found at nordicexpertgroup.org and healthcouncil.nl.

Occupational exposure during wood processing

An estimated 3-4 million workers is occupationally exposed to wood dust in the European Union (EU). This represents about 2% of the EU workforce. The estimated numbers were highest represented in construction (1.2 million), furniture industry (700,000), builders' carpentry industry (300,000), and sawmilling (200,000). Occupational exposure also occurs in industries such as the forest industry and chemical and mechanical wood processing industries such as the pulp and paper industry.

The emission of wood dust and the inhaled concentration of the dust during work activities depend on various factors, e.g., woodworking processes and machining parameters, cleaning methods, types of wood materials, and dampness of wood. Sanding generally produces smaller particles than sawing and milling, sweeping the work area creates a higher concentration of wood dust in the air than vacuuming, and working with treated wood types such as MDF generates more wood dust than working with untreated wood types.

For wood dust, the main health effects occur in the upper respiratory tract. Therefore it is important to measure all particles that can be inhaled, i.e. the inhalable dust.

Evidence for a relation with cancer and nasal and respiratory symptoms

Exposure to wood dust is associated with various health effects and especially strong evidence exists for a relation between wood dust exposure and cancer and nasal and respiratory symptoms. The committees concluded from epidemiological research that there is strong evidence for an exposure-response relation between wood dust exposure and nasal adenocarcinoma. Both direct and indirect genotoxic mechanisms have been reported as underlying mechanisms to wood dust carcinogenicity. For direct-acting carcinogens, it is assumed that each level of exposure poses some risk of cancer (non-threshold effect). The relative contribution of direct and indirect mechanisms of action to the carcinogenic effects of wood dust cannot be determined. Since a direct genotoxic mechanism of action seems to be involved, the committees decided to apply a risk-based approach and calculate HBC-OCRVs based on nasal adenocarcinoma.

The committees also concluded that there is evidence for an exposure-response relation between wood dust exposure and nasal and respiratory symptoms, such as coughing, throat symptoms, and sneezing, and with asthma development. However, the evidence for these respiratory effects does not allow the derivation of a reliable health-based recommended OEL.

Estimated HBC-OCRVs based on nasal adenocarcinoma

Only two studies were available that quantitatively express a relation between wood dust and cancer risk. The committees concluded that the study by Siew et al. (2017) is most suitable to calculate HBC-OCRVs. In this study, men were followed working in various wood-processing occupations in four Nordic countries. The subjects were exposed to both hardwood and softwood dust, but the exposure to softwood predominated. In this study, the wood dust exposure was estimated for 393 subjects with nasal adenocarcinoma and was compared to the estimated exposure of 1,965 subjects without nasal adenocarcinoma. Based on this comparison the committees determined an exposure-response relationship and calculated the following HBC-OCRVs:

- 4 additional cases of nasal adenocarcinoma per 100,000 workers (4×10^{-5}), for 40 years of occupational exposure, equal to 0.1 mg/m^3 (target risk level or low risk level).
- 4 additional cases of nasal adenocarcinoma per 10,000 workers (4×10^{-4}), for 40 years of occupational exposure, equal to 0.8 mg/m^3.
- 4 additional cases of nasal adenocarcinoma per 1,000 workers (4×10^{-3}), for 40 years of occupational exposure, equal to 2.9 mg/m^3 (prohibition risk level or high risk level).

The concentrations refer to the inhalable fraction, measured as the time-weighted average over an 8-hour working day. The committees note that respiratory symptoms can occur at exposure levels in the range of the HBC-OCRVs.

Recommendations apply to wood dust in general

Based on the available data on carcinogenic and genotoxic properties in both hardwood and softwood dust, the committees recommend to consider both wood dust in general as carcinogenic. The committees note that in practice, exposure often occurs to both hardwood dust and softwood dust, and the applied exposure measurement methods do not distinguish between hardwood and softwood dust. Therefore, the committees' recommendations apply to wood dust in general.

This publication can be downloaded from healthcouncil.nl.

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