Performance of short-time water misting to wash out dust from air in construction sites

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INTRODUCTION

Despite of effective dust controls, high dust levels are common at construction sites. The aim of this study was to reduce fine dust concentrations and limit the dust spreading at construction sites with short-time water misting after dusty work phases.

MATERIALS AND METHODS

The study included control and wet tests in the laboratory and at four renovation sites.

- Misting of 2-4 minutes by a portable misting device (av. water usage 0.5 L)
- Concentration decay of PM_{10} (DustTrak DRX, TSI)
- Inhalable dust (IOM Sampler, SKC)
- Relative humidity (HOBO U12-013)

RESULTS

In the laboratory, water misting was applied 0, 2 and 4 minutes. Effective dust removal lasted only few minutes after the misting was stopped (Fig. 1).

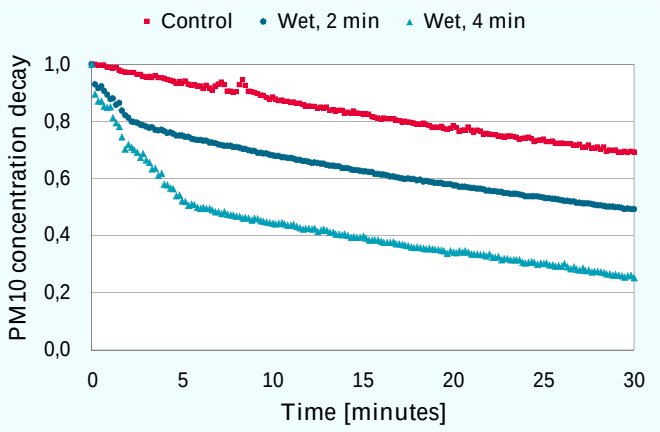

Figure 1. PM10 concentration decay in the laboratory tests.

Average of clean air delivery rate by water misting was 22 m^3/L of water in the laboratory and 56 m^3/L of water in the field. The variation was high at field conditions (Fig. 2). Misting decreased significantly PM_{10} concentrations both in laboratory and field tests but for inhalable dust the efficiency remained at moderate level (Fig. 3).

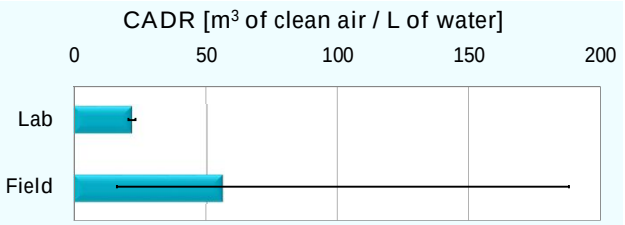

Figure 2. Clean air delivery rates in the laboratory and field.

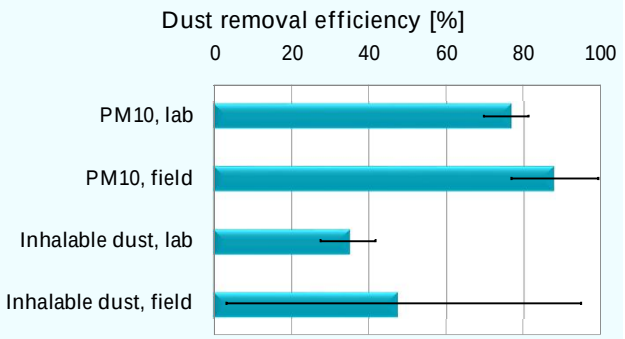

Figure 3. Mean dust removal efficiencies [%] in the laboratory and field tests.

During the misting, relative humidity increased 38–47% in the laboratory and 15–40% in the field. Surfaces did not wet.

CONCLUSIONS

- Short-time water misting is effective for particle clearance from the air.
- Water misting after dusty work tasks is suitable method to supplement other dust controls.

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