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The effectiveness of DustBubbles on dust control in the process of concrete drilling

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Abstract

Construction dust is one of the most concerned pollutants presenting risks to human health. Dust generated from concrete drilling, particularly true for silica dust, have an adverse effect on the health of workers. There is a long-term concern about the overexposure of construction workers to respirable crystalline silica. The high exposure to silica, even over a short period, can lead to silicosis. In order to control the dust generated during the process of concrete drilling, a local Hong Kong contractor has implemented DustBubble during the concrete drilling works. In order to evaluate the effectiveness of this new dust control measure, an experimental study has been designed and conducted. The respirable dust and silica dust concentrations of the following two situations were compared: workers drilling concrete with and without the use of DustBubble. Personal respirable samples were collected and analysed based on NIOSH 0600 and 7500 methods. The results revealed that DustBubble could significantly reduce the respirable dust exposure by 63%. However, there was no evidence that the use of DustBubble could reduce the respirable quartz exposure.

Highlights

- One experimental study was conducted to evaluate the effectiveness of DustBubble.
- Two situations were designed: workers drilling concrete with and without the use of DustBubble.
- The respirable dust and silica dust concentrations of the above two situations were compared.
- DustBubble could significantly reduce the respirable dust exposure by 63%.
- There was no evidence that the use of DustBubble could reduce the respirable quartz exposure.

Keywords

DustBubble; Respirable dust; Respirable silica dust; Concrete drilling

Figures and tables from this article:


[Figure options](#)



Fig. 2. A worker wearing the sampling pump during the experimental study.

Figure options



Fig. 3. Electric hammer used in the study.

Figure options



Fig. 4. A support for holding concrete blocks.

Figure options

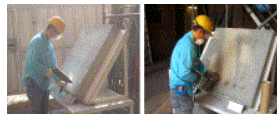


Fig. 5. Drilling without DustBubble (left) and Drilling with DustBubble (right).

Figure options



Fig. 6. Settled dust: without DustBubble (left) and with DustBubble (right).

Figure options

Table 1. US, UK and Hong Kong guidelines and limits for occupational exposure to crystalline silica.



Notes: CFR = Code of Federal Regulations; REL = recommended exposure limit; PEL = permissible exposure limit; TWA = time-weighted average; RDS = respirable dust standard; TLV = threshold limit value; MEL = maximum exposure limit.

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Table 2. Experimental study-respirable dust and respirable quartz exposure.



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