Silica dust reduction through hollow bit drill ventilation

Effect of hollow bit local exhaust ventilation on respirable quartz dust concentrations during concrete drilling

David Rempel, Alan Barr, and Michael R. Cooper. Journal of Occupational and Environmental Hygiene, 2019.

Overview

Commercial construction workers frequently drill 1–3 cm diameter holes into concrete for structural upgrades (e.g., dowel and rod drilling) and for inserting anchor bolts for hanging pipes, conduit, or equipment. Industrial construction projects may require drilling thousands of these holes, work that can generate concentrations of respirable silica dust well in excess of the ACGIH Threshold Limit Value (TLV®=0.025 mg/m^3). This study evaluated a new method of local exhaust ventilation (LEV) —using a drill with a hollow bit connected to a vacuum—and compared it to a standard shroud LEV system and to no local exhaust ventilation.

Key Findings

- Both a shroud and the hollow bit drill LEV removed respirable dust to the point that it was below the limit of detection, which was <0.007 mg/m^3 for respirable quartz dust, well below the ACGIH Threshold Limit Value (TLV®) of 0.025 mg/m^3 and OSHA Permissible Exposure Limit (PEL) of 0.05 mg/m^3. When no LEV was used, respirable quartz dust concentration (0.55 mg/m^3) was 22 times higher than the TLV®.
- While the effectiveness of a shroud system will be reduced if it is not sealed well against the concrete surface, the effectiveness of the hollow bit LEV system is not anticipated to be affected by concrete surface conditions or drilling angle.
- It is recommended that contractors use either LEV method for controlling respirable silica dust when drilling into concrete.

For more information, contact:
David Rempel: david.rempel@ucsf.edu

See abstract:
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 Production of this document was supported by cooperative agreement OH 009762 from the National Institute for Occupational Safety and Health (NIOSH). The contents are solely the responsibility of the authors and do not necessarily represent the official views of NIOSH.

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