



REDUCING DUST AND SILICA EXPOSURES DURING CUTTING OF ROOFING TILES

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Respirable Silica Exposure Limits

- OSHA PEL – enforceable standard
 - General Industry Standard formula

% Silica	PEL
100%	0.1 mg/m ³
30%	0.3 mg/m ³
10%	0.8 mg/m ³

- NIOSH REL – 0.05 mg/m³

Respirable Silica Exposure Limits

- OSHA PEL – enforceable standard
 - Construction Standard formula

% Silica	PEL
100	2.4 mppcf
30	7.1 mppcf
10	16.7 mppcf

- NIOSH REL – 0.05 mg/m³

Background

HHE Site Evaluations

- results from first and second site visit (2003)
- results from third site visit (2004)

Western Site (2005)

- Skilsaw
- respirable and quartz results

California demonstration (2005)

- Hytile cutter
- powered saws

First Site Visit – April 2003

Roofing Tile HHE



- Crews consist of 3-5 workers
- Use of saws, leaf blowers, and other equipment
- Tile cutting on roof
- Mandatory use of hard hats, safety glasses, gloves

Second Site Visit – June 2003

- Four home sites selected for 2 consecutive days
- Respirable samples were collected for three crews

Respirable Silica Results

(Sites 1 and 2)

- 16 employees sampled for respirable silica exposure
- 12 of 16 exceeded the OSHA PEL
- 14 of 16 exceeded NIOSH REL
- Dry cutting uncontrolled on cement tiles generates large amounts of dust
- Respirable silica levels were exceeded for all job classifications
- Respirator use had been voluntary

Third Site Visit – June 2004



Hand held saw with control consisting of a custom made LEV connected to a shop vacuum

Dust Exposure Sampling

Third Site

Respirable dust & respirable silica sampling:

- 6 samples were collected with the control “on” the saw
- 15 samples were collected with the control “off”

Respirable Silica Results

Third Site

- With control: 3 of 6 exceeded the OSHA Construction PEL
- Without control: 7 of 15 exceeded the OSHA Construction PEL
- With control: 5 of 6 exceeded the NIOSH REL
- Without control: 15 of 15 exceeded the NIOSH REL

Site Three Conclusions

- The control on the saw was not effective at controlling employee exposures to respirable quartz
- Short-term respirable samples indicated respirable silica exposures were still above the OSHA PEL and NIOSH REL
- Engineering controls to reduce or eliminate dust exposure should continue to be pursued

Control Study in West



Skilsaw Mag 77 with Ventilation Control

Control Study in West



Worker using
leaf blower to
remove dust

Respirable Dust Results

Western site

Job	Number of Samples	Concentration (mg/m ³)
Tile Cutter #1	3	1.07
Tile Cutter #2	3	1.14
Tile Layer #1	3	0.86
Tile Layer #2	3	0.22
PEL (General)		0.43

Respirable Dust Results

Western site

Job	Number of Samples	Concentration (mppcf)
Tile Cutter #1	3	11
Tile Cutter #2	3	11
Tile Layer #1	3	8.6
Tile Layer #2	3	2.2
PEL (Construction)		9.5

Quartz Results

Western site

Job	Number of Samples	Concentration (mg/m ³)
Tile Cutter #1	3	0.38
Tile Cutter #2	3	0.37
Tile Layer #1	3	0.07
Tile Layer #2	3	0.08
REL		0.05

California Site Demonstration

- NIOSH conducted an evaluation of the Hytile cutter and powered saws including a Partner wet saw. Short-term exposure samples were collected while testing a Bosch saw with vacuum control, a Partner gasoline saw with no water, and the Hytile cutter.

Respirable Dust California Site

Tile Cutting Demonstration

SAW/CUTTER	Number of Samples	Concentration (mg/m ³)
Hytile (8/18/05)	2	<0.7
Bosch(8/18/05)	2	<1.1
Hytile (8/19/05)	6	<0.6
Partner Gasoline	5	3.5
PEL (General)		0.53

California Site Conclusions

- An experienced tile roofer could cut roofing tiles quickly and cleanly with the Hytile cutter
- The Wet Saw was deemed to be unusable in actual construction
- Based on limited data the Hytile cutter produced less respirable dust than the powered saws

Future Work

- Protocol and Peer Review
- Test Hytile cutter at a roofing site
- Identify additional engineering control methods for evaluation
- Conduct surveys at roofing sites to test control methods
- Conduct laboratory tests as needed

Potential Engineering Controls

- Commercially available LEV systems
- Commercially available or custom saws and cutters
- Cutting on ground with stationary masonry saws with local exhaust ventilation
- Other options
 - Substitute use of crystalline silica tiles
 - Maintaining a mandatory respirator program

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