

CONTROL OF SILICA DUST IN CONSTRUCTION

Jackhammers or Handheld Powered Chipping Tools

The use of a jackhammer or handheld power chipping tools to break or demolish concrete, stone, masonry or other silica-containing materials can generate *respirable crystalline silica* dust. When inhaled over time, the small particles of silica can irreversibly damage the lungs. This fact sheet describes dust controls that can be used to minimize the amount of airborne dust when using jackhammers or handheld powered chipping tools as listed in Table 1 of the Respirable Crystalline Silica Standard for Construction, **29 CFR 1926.1153**.

Engineering Control Method: Water applied continuously to the impact point **OR** Shroud with Vacuum Dust Collection System

Two methods for controlling dust when using jackhammers or powered chipping tools are:
(1) continuously feed water to the point of impact;
or (2) use a shroud or cowl with a vacuum dust collection system.

Wet Methods

When jackhammering, wetting must occur with a continuous stream or spray of water at the point where the jackhammer's tip strikes the surface material. Employers may use manual spraying or water-spray systems. Under either approach, water must be applied at a flow rate sufficient to minimize the release of visible dust.

Manual Spraying. One option for applying water when jackhammering is to have one worker direct a stream or spray of water at the impact point while another worker operates the jackhammer or powered chipping tool. A portable sprayer with a nozzle can be used for this job.

Electrical Safety. Where water is used to control dust, electrical safety is a particular concern. Use ground-fault circuit interrupters (GFCIs) and watertight, sealable electrical connectors for electric tools and equipment on construction sites.



One worker applies water using a portable sprayer to suppress dust while the other jackhammers.

Only wetting the surface is not sufficient. Continuous water application either streamed or sprayed at the point where the jackhammer or handheld powered chipping tool breaks the surface is necessary because as the tool breaks through the surface, dry materials below are disturbed, which can produce dust.

Water-Spray Systems. Spray nozzles aimed at the tip of the tool on jackhammers and handheld powered chipping tools can lower silica exposures. Existing equipment can be retrofitted. The

National Institute for Occupational Safety and Health (NIOSH) has developed designs for a water-spray retrofit system for jackhammers. See NIOSH's design at: www.cdc.gov/niosh/docs/wp-solutions/2008-127/pdfs/2008-127.pdf.

Employers are responsible for keeping equipment in good working condition to minimize dust. Workers must receive training on how to use dust suppression equipment.

- **Dust and debris can clog spray nozzles.** Check the nozzle frequently. Observe the water spray to be sure it is directed at the point of impact. Clean or change if the nozzle is dripping or spurting.
- **Take steps to provide consistent water flow.** Make sure there is an adequate supply of water. Prevent kinked hoses, heavy equipment, or other vehicle traffic from running over hoses, and identify other potential blockages and impediments that could cause a drop in water pressure.
- **The spray angle is critical.** Check the water-spray angle frequently. Make sure the spray is focused on the breakpoint and the spray is wetting the dust before it spreads away from the tip of the hammer.



A worker chips concrete with a jackhammer using a water-spray attachment to control dust.

Clean up any slurry produced to prevent the slurry from drying and releasing silica dust into the air. Wet slurry can be cleaned up using, for example, shovels or a wet vacuum equipped with a HEPA filter.

Vacuum Dust Collection System (VDCS)

Employers may use commercially available VDCSs for jackhammers and handheld powered chipping tools to reduce silica exposure. A VDCS includes a:

- hood or shroud for the tool that is recommended by the manufacturer;
- vacuum meeting the specifications recommended by the tool manufacturer, with enough suction to capture dust at the cutting point;

- dust collector equipped with a filter efficiency of 99 percent or greater and a filter-cleaning mechanism; and
- vacuum exhaust hose capable of providing the airflow recommended by the tool manufacturer. A 1.5" to 2" diameter vacuum exhaust hose is typically adequate.



Jackhammer equipped with VDCS. Shroud around hammer connects to the vacuum on the right.

The tool and VDCS must be operated and maintained in accordance with manufacturers' instructions to minimize dust emissions. Focus on the following areas:

- **Keep** the vacuum hose clear and free of debris, kinks and tight bends.
- **Change** vacuum-collection bags as needed or at least as often as the manufacturer recommends. Do not over fill the bag.
- **Set** a regular schedule for maintenance and filter cleaning of the VDCS.
- **Avoid** exposure to dust when changing vacuum bags and cleaning or replacing air filters.

Indoors or in Enclosed Areas

When jackhammers or chipping tools are used indoors or in an enclosed area, wet methods or a VDCS may not reliably keep exposure low. Extra ventilation may be needed to reduce visible airborne dust. Extra ventilation can be supplied by using:

- Exhaust trunks
- Portable exhaust fans
- Air ducts
- Other means of mechanical ventilation

Ensure that air flow is not impeded by the movements of employees during work, or by the opening or closing of doors and windows.

Position the ventilation to move contaminated air away from the workers' breathing zones.

Use of Compressed Air. Unless there is a ventilation system that effectively captures the dust cloud, do not use compressed air or blowers to clean surfaces, clothing or filters because it can increase exposure to silica. Instead, clean with a HEPA filter-equipped vacuum or by wet methods.

Respiratory Protection

In addition to using wet methods or a VDCS, the use of respiratory protection with a minimum Assigned Protection Factor (**APF**) of **10** is required whenever jackhammers or handheld powered chipping tools are used **indoors or in an enclosed area**. APF 10 respirators are also required when jackhammers or handheld powered chipping tools are used outdoors for **more than 4 hours** per shift.

When respirators are required, employers must put in place a written respiratory protection program in accordance with OSHA's Respiratory Protection standard [29 CFR 1910.134](#).

Additional Information

For more information, visit www.osha.gov/silica and see the OSHA Fact Sheet on the [Crystalline Silica Rule for Construction](#), and the [Small Entity Compliance Guide for the Respirable Crystalline Silica Standard for Construction](#).

OSHA can provide compliance assistance through a variety of programs, including technical assistance about effective safety and health programs, workplace consultations, and training and education. OSHA's On-Site Consultation Program offers free, confidential occupational safety and health services to small and medium-sized businesses in all states and several territories across the country, with priority given to high-

hazard worksites. On-Site consultation services are separate from enforcement and do not result in penalties or citations. To locate the OSHA On-Site Consultation Program nearest you, visit www.osha.gov/consultation.

Workers' Rights

Workers have the right to:

- Working conditions that do not pose a risk of serious harm.
- Receive information and training (in a language and vocabulary the worker understands) about workplace hazards, methods to prevent them, and the OSHA standards that apply to their workplace.
- Review records of work-related injuries and illnesses.
- File a complaint asking OSHA to inspect their workplace if they believe there is a serious hazard or that their employer is not following OSHA's rules. OSHA will keep all identities confidential.
- Exercise their rights under the law without retaliation, including reporting an injury or raising health and safety concerns with their employer or OSHA. If a worker has been retaliated against for using their rights, they must file a complaint with OSHA as soon as possible, but no later than 30 days.

For additional information, see [OSHA's Workers page](#).

How to Contact OSHA

Under the Occupational Safety and Health Act of 1970, employers are responsible for providing safe and healthful workplaces for their employees. OSHA's role is to ensure these conditions for America's working men and women by setting and enforcing standards, and providing training, education and assistance. For more information, visit www.osha.gov or call OSHA at 1-800-321-OSHA (6742), TTY 1-877-889-5627.

This is one in a series of informational fact sheets highlighting OSHA programs, policies or standards. It does not impose any new compliance requirements. For a comprehensive list of compliance requirements of OSHA standards or regulations, refer to Title 29 of the Code of Federal Regulations. This information will be made available to sensory-impaired individuals upon request. The voice phone is (202) 693-1999; teletypewriter (TTY) number: (877) 889-5627.



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