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SILICA

Control Plan



ALLIANCE MASONRY CORP.

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Attn: ALL EMPLOYEES

Re: ALLIANCE MASONRY SILICA CONTROL PLAN

On September 23rd of 2017 the Crystalline Silica Standard will start to be enforced on all construction projects in the United States. In accordance with this standard we have developed a plan to engineer out your exposure to silica dust while performing specific tasks. It is the responsibility of **every** employee to know and understand our Silica Control Plan and the procedures required to perform any of these tasks. These procedures must be followed.

Enforcement of this policy will be a three (3) step process as follows.

Step 1: The first offense for not following the Alliance Masonry Silica Control Plan will result in removal from the work task and retraining on proper task procedures.

Step 2: A second offense for not following the Alliance Masonry Silica Control Plan will result in dismissal from the work for the remainder of the day, without pay, and retraining on proper task procedures upon returning to work.

Step 3: A third offense for not following the Alliance Masonry Silica Control Plan will result in immediate dismissal of employment with Alliance Masonry Corp.

Attached to this letter is a copy of the **ALLIANCE MASONRY SILICA CONTROL PLAN**. This plan is being adopted to help protect you from the possible health risks associated with silica dust exposure. The plan outlines specific work tasks that are known to produce silica dust. The plan also provides the equipment needed and procedures that must be followed when performing one of the listed tasks. Following these procedures will effectively engineer out your exposure to silica dust. Some tasks of work have been determined to not produce an exposure to silica dust that is over the permissible levels. These tasks will not require any specific procedure to be followed.

Whenever you are asked to perform a task listed in the Silica Plan you must perform the work using the equipment and procedures required. It is the responsibility of your supervisor to provide the equipment required for each task and to instruct you in the proper use and procedures for the task you are performing. None of the tasks listed can be performed without following the procedures outlined in the Plan. Some of the tasks provide more than one option to engineer out your exposure. Any of the options listed can be used to perform the work.

The plan also provides information on the why silica is hazardous, the risks from exposure and who is at risk of exposure.

Please read this information carefully. All of the equipment necessary to perform the tasks listed has been provided to each supervisor and the Plan is now being implemented on all projects.

Please feel free to contact me if you have any questions regarding the Plan or if you have any questions about silica dust. By implementing this Plan successfully we can reduce your exposure to silica dust. Please make sure you follow the guidelines provided.

As always, your safety is our most important responsibility.

Sincerely,



Brett Sherman, President
Alliance Masonry Corp.

Work Safely with Silica

A ONE-STOP SOURCE OF INFORMATION ON
HOW TO PREVENT A SILICA HAZARD AND PROTECT WORKERS

What's the Risk?

A worker's chance of becoming ill from exposure to silica dust depends on the tasks performed, the amount of dust they are exposed to, and the frequency of the exposures. Each exposure to silica adds into the total load of silica in the lungs – in other words, each exposure adds to the lung damage.

Health professionals express the total silica dose one person accumulates over time as "mg/m³ years," usually calculated as an average exposure each year in mg/m³ multiplied by the number of years with that exposure, or by an estimated average for each year. As the total dose increases, so does the likelihood, **or the risk**, for developing silicosis, lung cancer, or chronic obstructive pulmonary disease (COPD). Some workers become ill after many years of low exposure levels, while other workers who perform less frequent but high exposure tasks can become ill with a lower cumulative exposure. Why? Because a high exposure to silica dust overwhelms the lungs' defenses and most of the dust settles deep into the lungs where it does the most damage.

Researchers have developed estimates of the total dose likely to cause disease. For example:

- Among granite workers in the U.S. the rate of death from silicosis doubled at a cumulative exposure of less than 1 mg/m³.
- A recent study of pottery workers found high rates of silicosis, up to 20%, among workers with an average exposure of 0.2 mg/m³ over many years.
- The likelihood of getting lung cancer from silica exposure follows a similar pattern, with a significant risk at levels around 0.2 mg/m³ over many years, or higher exposures in a shorter period of time.
- There is less information available to estimate the risk for COPD, but there is documentation showing that about 25% of cement masons, bricklayers, and plasterers have COPD after many years of work in the trade.

These very general estimates do not take into account individual susceptibility or other exposures at work that add onto the injury caused by silica and lead to disease at an earlier age.

It is important to remember that repeated exposures to silica add up to a total dose that can cause serious lung disease. The kinds of exposures we see in high exposure tasks, such as sandblasting and tuckpointing, over time can give a worker enough exposure to put him or her at serious risk for a silica-related illness.

To learn more about the risk....

- [Surveillance for Silicosis Deaths Among Persons Aged 15-44 Years - United States, 1999-2015](#); Jacek M. Mazurek, MD, PhD, John M. Wood, MS; Patricia Schleiff, MS; David N. Weissman, MD (2017)
- [A Case-Control Study of Airways Obstruction Among Construction Workers](#); John Dement, PhD; Laura Welch, MD; Knut Ringen, Dr.PH; Patricia Quinn, BA; Anna Chen, BS and Scott Haas, MJ (2015)
- [Update: Silicosis Mortality - United States, 1999-2013](#); Jacek M. Mazurek, MD; Patricia L. Schleiff, MS; John M. Wood, MS; Scott A. Hendricks, MS; Ainsley Weston, PhD (2015)
- [Silica: A Lung Carcinogen](#); Kyle Steenland, PhD; Elizabeth Ward, PhD (2014)
- [Exposure-Response Analysis and Risk Assessment for Lung Cancer in Relationship to Silica Exposure: A 44-Year Cohort Study of 34,018 Workers](#); Yuewei Liu; Kyle Steenland; Yi Rong; Eva Hnizdo; Xiji Huang; Hai Zhang; Tingming Shi; Yi Sun; Tangchun Wu; Weihong Chen (2013)
- [Determinants of Respirable Crystalline Silica Exposure Among Stoneworkers Involved in Stone Restoration Work](#); Catherine B. Healy, Marie A. Coggins, Martie Van Tongeren, Laura Mac Calman and Padraic McGowan (2013)
- [Long-Term Exposure to Silica Dust and Risk of Total and Cause-Specific Mortality in Chinese Workers: A Cohort Study](#); Chen W, Liu Y, Wang H, Hnizdo E, Sun Y, et al. (2012)
- [Chronic obstructive pulmonary disease and longitudinal changes in pulmonary function due to occupational exposure to respirable quartz](#); Mohner, M., Kersten, N., Gellissen, J. (2012)
- [Chronic Obstructive Pulmonary Disease and Occupational Exposure to Silica](#); Rushton, L. (2007)
- **The Campaign to End Silicosis (video clips) -- OSHA-NIOSH-American Lung Association 1996 Conference**
 - [Robert Reich](#) [former U.S. Secretary of Labor]
 - [Alfred Munzer](#) [former President, American Lung Association]

Who's At Risk?

Approximately 2.3 million workers in the U.S. are exposed to silica. Each year, hundreds of workers die from illnesses caused by breathing in silica and thousands more become ill.

Any construction worker who performs one or more of the following tasks **with** any of the materials listed below is at risk of being exposed to hazardous levels silica dust. If you work close by someone generating silica dust you may be at risk.

TASK	CONSTRUCTION MATERIAL
Abrasive blasting	Asphalt (for paving)
Bushhammering	Brick
Cutting/sawing	Cement
Demolishing/disturbing	Concrete
Drilling	Concrete Block
Earthmoving	Drywall
Grinding	Fiber Cement products
Jackhammering	Grout
Milling	Gunite/Shotcrete
Mixing	Mortar
Polishing	Paints containing silica
Roofing	Plaster
Sacking/patching	Refractory Mortar/Castables
Sanding	Refractory Units
Scabbling	Rock
Scarifying	Roofing tiles & pavers
Scraping	Sand
Sweeping/cleaning up	Soil (fill dirt and top soil)
	Stone (including: granite, limestone, quartzite, sandstone, shale, slate, cultured, etc.)
	Stucco/EIFS
	Terrazzo
	Tile (clay, ceramic, concrete, etc.)

NOTE: The "[Create-A-Plan](#)" section of this website provides options for controlling silica exposures by material and task.

To learn more about who's at risk...

- [Silica Dust Levels](#), University of Washington
- [CALOSHA Hazards of Silica in Construction etool](#)
- [OSHA Silica eTool – Determining Silica Exposure](#)
- [OSHA Fact Sheet: Crystalline Silica Exposure Health Hazard Information](#)
- [CAREX Canada - Workers Exposed to Crystalline Silica](#)

Control Plan: Alliance Masonry

See attached HILTI Solutions verification sheet for each type of equipment used with this Silica Control Plan. Note <4 hour work activity requirements. Note outdoor task requirement.

Company:
Alliance Masonry Corp

Description of Work:
Masonry and concrete flatwork operations.

Competent Person
Brett Sherman, President

Material	Task
Brick	Bushhammering

Equipment and Control(s)
1) Hammer Drill with Vacuum 2) Wetting of Surface

Task/Control Description
Bush hammering brick with vacuum or water.

Use TE-A36 Hammer Drill with dustless connection and Hilti VC 40-UE Vacuum.
Use water from hose or pump system to wet surface with enough water to eliminate dust.

Material	Task
Brick	Cutting/sawing

Equipment and Control(s)
1) Hand-Held Masonry Saw with Water, 2) Stationary Masonry Saw with Water

Task/Control Description
Hand held or stationary saw cutting equipment used to cut brick with water.

Use hand-held saw with wetting system provided by manufacturer. Water can be provided by hose, pump system or gravity fed. Provide sufficient water supply to eliminate dust.
Use stationary saw with wetting system provided by manufacturer. Water can be provided by hose, pump system or gravity fed. Provide sufficient water supply to eliminate dust.

Material	Task
Brick	Drilling/coring

Equipment and Control(s)
1) Hand-Held Drill with Dust Extraction, 2) Hand-Held Drill with Vacuum, 3) Hand-Held Drill with Water

Task/Control Description
Drilling or coring of brick with dustless drill bits, dustless vacuum or water.

Use Hilti TE-A36 Hammer Drill with Hilti dustless drill bit.
Use TE-A36 Hammer drill with dustless attachment and VC 40 Vacuum.
Apply water through hose or pump system to saturate material to be cored/drilled.

Material	Task
Brick	Grinding

Equipment and Control(s)
1) Hilti AG 450 angle grinder with Vacuum 2) Apply Water

Task/Control Description

Grinding of brick surface with dustless vacuum or water.

Use Hilti AG 450 grinder with dustless attachment and VC 40 vacuum.

Apply water through hose or pump system to saturate area to eliminate dust.

Material Task

Brick Sweeping/cleaning up

Equipment and Control(s)

1) Sweeping Compound , 2) Water - Wet Surface

Task/Control Description

Sweeping areas of brick work with water or sweeping compound.

Dampen area of clean up with water by hose or pump spray bottle to prevent dust.

Use sweeping compound on surface to be cleaned to eliminate dust.

Material Task

Cement Mixing/pouring

Equipment and Control(s)

Silo Mortar Dispensing System

Task/Control Description

Dispense mortar cement or grout from Silo system into mixer.

Material Task

Cement Sweeping/cleaning up

Equipment and Control(s)

1) Sweeping Compound , 2) Water - Wet Surface

Task/Control Description

Sweeping areas of cement work with water or sweeping compound.

Dampen area of clean up with water by hose or pump spray bottle to prevent dust.

Use sweeping compound on surface to be cleaned to eliminate dust.

Material Task

Concrete Cutting/sawing

Equipment and Control(s)

1) Hand-Held Angle Grinder with Vacuum, 2) Hand-Held Masonry Saw with Vacuum, 3) Hand-Held Masonry Saw with Water, 4) Walk-Behind Saw with Water

Task/Control Description

Hand held grinder or saw or stationary saw cutting equipment used to cut concrete with vacuum or water.

Use Hilti AG 450 grinder and Hilti dustless vacuum system.

Use Hilti hand-held saw with Hilti dustless vacuum system.

Use hand-held saw with wetting system provided by manufacturer. Water can be provided by hose, pump system or gravity fed. Provide sufficient water supply to eliminate dust.

Use walk-behind saw with wetting system provided by manufacturer. Water can be provided by hose, pump system or gravity fed. Provide sufficient water supply to eliminate dust.

Material Task
 Concrete Drilling/coring

Equipment and Control(s)

- 1) Hand-Held Drill with Vacuum, 2) Hand-Held Drill with Water

Task/Control Description

Drilling or coring of concrete with vacuum, dustless drill bits or water.

Use Hilti TE A36 hammer drill with dustless sytem and VC 40 vacuum.

Use Hilti TE A36 hammer drill with Hilti dustless drill bits to drill dowel and anchor holes.

Use water through hose or pump system to provide water at point of drilling.

Material Task
 Concrete Sweeping/cleaning up

Equipment and Control(s)

- 1) Sweeping Compound , 2) Water - Wet Surface

Task/Control Description

Sweeping areas of concrete work with water or sweeping compound.

Dampen area of clean up with water by hose or pump spray bottle to prevent dust.

Use sweeping compound on surface to be cleaned to eliminate dust.

Material Task
 Concrete Block Cutting/sawing

Equipment and Control(s)

- 1) Hand-Held Masonry Saw with Water, 2) Stationary Masonry Saw with Water

Task/Control Description

Saw cutting of CMU products with hand-held saw or stationary saw with water.

Use hand-held saw with wetting system provided by manufacturer. Water can be provided by hose, pump system or gravity fed. Provide sufficient water supply to eliminate dust.

Use stationary saw with wetting system provided by manufacturer. Water can be provided by hose, pump system or gravity fed. Provide sufficient water supply to eliminate dust.

Material Task
 Concrete Block Drilling/coring

Equipment and Control(s)

- 1) Hand-Held Drill with Dust Extraction, 2) Hand-Held Drill with Vacuum, 3) Hand-Held Drill with Water

Task/Control Description

Drilling or coring of CMU with dustless drill bits, vacuum system or water to drill dowel and anchor holes.

Use Hilti TE A36 hammer drill with Hilti dustless drill bits to drill dowel and anchor holes.

Use Hilti TE A36 hammer drill with dustless sytem and VC 40 vacuum.

Use water through hose or pump system to provide water at point of drilling.

Material Task
 Concrete Block Sweeping/cleaning up

Equipment and Control(s)

- 1) Sweeping Compound , 2) Water - Wet Surface

Task/Control Description

Sweeping areas of ongoing CMU work with water or sweeping compound.

Dampen area of clean up with water by hose or pump spray bottle to prevent dust.

Use sweeping compound on surface to be cleaned to eliminate dust.

Material Task

Grout Mixing/pouring

Equipment and Control(s)

Silo Mortar Dispensing System

Task/Control Description

Dispense mortar cement or grout from Silo system into mixer.

Material Task

Mortar Mixing/pouring

Equipment and Control(s)

Silo Mortar Dispensing System

Task/Control Description

Dispense mortar cement or grout from Silo system into mixer.

Material Task

Mortar Sweeping/cleaning up

Equipment and Control(s)

1) Sweeping Compound , 2) Water - Wet Surface

Task/Control Description

Sweeping areas of mortar mixing with water or sweeping compound.

Dampen area of clean up with water by hose or pump spray bottle to prevent dust.

Use sweeping compound on surface to be cleaned to eliminate dust.

Safety of Others:

Access will be restricted to areas through use of barricades or warning tape and signs.

Worker Training

We shall ensure that each employee covered by this section can demonstrate knowledge and understanding of at least the following:

- (A) The health hazards associated with exposure to respirable crystalline silica;
- (B) Specific tasks in the workplace that could result in exposure to respirable crystalline silica;
- (C) Specific measures we have implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, work practices, and respirators to be used;
- (D) The identity of the competent person on each project.
- (E) Make a copy of this section readily available without cost to each employee covered by this section.

Other training to consider:

- Personal hygiene: the need to avoid shaking off dust that has accumulated on clothing and hair, to wash up at the end of a shift, avoid smoking, and to avoid eating and drinking in areas where silica dust is present

- How to identify when a control is not working

- The importance of using all controls and personal protective equipment provided by the employer.

All workers will be trained in the recognition of hazards and work related activities that create an exposure to silica dust and then trained in the company procedures to mitigate the exposures based on specific activities of work.

Housekeeping:

1) We do not allow dry sweeping or dry brushing where such activity could contribute to employee exposure to respirable crystalline silica unless wet sweeping, HEPA-filtered vacuuming or other methods that minimize the likelihood of exposure are not feasible.

(2) We do not allow compressed air to be used to clean clothing or surfaces where such activity could contribute to employee exposure to respirable crystalline silica unless:

(i) The compressed air is used in conjunction with a ventilation system that effectively captures the dust cloud created by the compressed air; or

(ii) No alternative method is feasible."

Medical Surveillance:

NA

Other Considerations:

Vacuum controls must be located as close to the dust generation as possible to be effective. A shroud may be needed to contain the dust so the vacuum can capture it. The shroud must be kept as close to the work surface as is practical to provide adequate dust capture. The shroud should be connected to the vacuum with 2-inch, or greater, diameter tubing with a relatively smooth interior.

- For dust containing silica, it is important to use as high efficiency filters as practical. The best available are called HEPA (High Efficiency Particle Air) filters because they capture 99.97% of the most penetrating particles. But HEPA filters also create a greater pressure drop and decrease in air flow rate because it is more difficult to pull air through these denser filters so capture velocity may be reduced. HEPAs require routine cleaning or disposal of prefilters, which can cause exposures to those performing the filter maintenance.

- For operations that generate large amounts of dust, cyclonic collection units may be a good option. These units spin the particles and drop them into cheap bags that do not need to be replaced as frequently as other types of vacuum bags because the vacuum pressure does not drop as the bags fill up.

- Vacuum performance must be monitored on a regular basis to ensure the control's effectiveness. A vacuum with a pressure gauge allows for frequent and easy monitoring of air flow.

- Vacuums require an adequate power source -- large electric vacuums commonly require 20 amp electrical circuits in addition to the power required for the tool.

Other issues:

- Avoid using gasoline-powered equipment in areas without adequate ventilation or confined spaces to prevent carbon monoxide poisoning. When using gas-powered equipment, small, inexpensive personal monitors can be worn by the operator to warn of unacceptable exposures.
- Monitor noise levels and ensure workers use hearing protection. Equipment-control combinations may generate sound levels that are greater than 90 decibels, the OSHA Permissible Exposure Limit (PEL). The NIOSH "Buy-Quiet" website provides helpful information on available tools and noise levels.

HOW TO INTERPRET THE PRODUCT SELECTOR GUIDE



- 1) Select your application
- 2) Select the tool you want or have
- 3) Select your accessory
- 4) Select your vacuum
- 5) Verify if the solution is Table 1 compliant, or if you will need performance data

Use item numbers on the sheet

CUSTOMERS HAVE OPTIONS

Dust Removal Systems



Products		OSHA 29 CFR 1926.1103 compliance			
Application	Tools with DRS	Dust removal accessory	Universal vacuum cleaners		
SDS+ drilling / chiseling	Rotary hammer TE 2 Item number 3497786 Rotary hammer TE 3-C Item number 3553166 Rotary hammer TE 7-C Item number 3476294 Combihammer TE 30-C Item number 3476293 Rotary hammer TE 4-A** Item number 3482498 Rotary hammer TE 6-A** Item number 3551238 Cordless combihammer TE 30-A Item number 3500960 Rotary hammer TE 4-A** Item number 3482498 Rotary hammer TE 6-A** Item number 3551238	Hammer drill bit TE-CD SAFE-ET Dust removal system DRS-S Item number 340002 Hammer drill bit TE-CD SAFE-ET Dust removal system DRS 4-A (use with TE 4-A) Item number 2088490 Dust removal system DRS 6-A (use with TE 6-A) Item number 2088511	VC 20 Item number 222428 VC 40-U Item number 218369 VC 40-UE Item number 3540269		
	Combihammer TE 50 Item number 3553052 Combihammer TE 60 Item number 3493739 Combihammer TE 60-ATC Item number 3493740 Combihammer TE 70 Item number 3514170 Combihammer TE 70-ATC Item number 3514171 Combihammer TE 80 Item number 2083438	Hammer drill bit TE-YD SAFE-ET Dust removal system TE DRS-Y Item number 2055718	VC 20 Item number 222428 VC 40-U Item number 218369 VC 40-UE Item number 3540269		
Concrete breaking	Breaker TE 500-AVR Item number 3512856 Breaker TE 700-AVR Item number 3484793 Breaker TE 800-AVR Item number 3531064 Breaker TE 1000-AVR Item number 3523418 Breaker TE 1500-AVR Item number 3455943	Dust removal system DRS-B Item number 365944	VC 20 Item number 222428 VC 40-U Item number 218369 VC 40-UE Item number 3540269		
	Angle grinder AG 450-S Item number 2075613 Angle grinder AG 450-D Item number 2075614 5" Angle grinder DAG 500 Item number 362594 5" Angle grinder DCG 500 Item number 362591 5" Angle grinder DEG 500 Item number 285937 Diamond grinder DG 150 Item number 369388	Cutting hood Item number 2101312 Grinding hood Item number 2102983 Tuck pointing/cutting Item number 284978 Grinding Item number 267719 Cutting Item number 267720	VC 20 Item number 222428 VC 40-U Item number 218369 VC 40-UE Item number 3540269		
Concrete sawing	Diamond cutter DCH 230 Item number 3444488 Hand-held gas saw DSH 700-X 14" Item number 2121540 Diamond cutter DCH 300 Item number 3444489 Hand-held gas saw DSH 900-X 16" Item number 2121542	Vacuum hose adapter Item number 281882 Vacuum hose adapter Item number 203878 DWP 10 tank (water is needed) Item number 365595	VC 20 Item number 222428 VC 40-U Item number 218369 VC 40-UE Item number 3540269		
	Diamond coring tool DD EC-1 Item number 336737 Diamond coring tool DD 120 Item number 274635 Diamond coring tool DD 150-U Item number 3463076 Diamond coring tool DD 160-U Item number 3496301 Diamond coring tool DD 250 Item number 3550346 Diamond coring tool DD 110-W Item number 2087491 Diamond coring tool DD 150-U Item number 3483121	Diamond coring tool 350-CA Item number 3536957 Diamond coring tool DD 600-CA Item number 3536965 Adapter DD-X LM Item number 315826 DD-X LM	DWP 10 tank (water is needed) Item number 365595 VC 20 Item number 222428 VC 40-U Item number 218369 VC 40-UE Item number 3540269		

*Table 1 engineering control method as specified in 29 CFR 1926.1153. Core drills under Table 1 (ii) "rig mounted core drills" are compliant when stand-mounted and used with a water delivery system. Hilti interprets a core drill as also being a Table 1 (iii) "drill", and therefore DD 110 and DD 150 and/or other "hand held core drills" are compliant when used with a shroud and dust collection system. **On-board dust control solutions are available but were not originally captured in Table 1. Objective data required to validate exposure level.

As of February 14, 2017



CORDLESS ROTARY HAMMER WITH ON-BOARD DUST COLLECTION [TABLE 1, SECTION VII]



Table 1 Requirements		OSHA Compliance
Engineering controls	Respirator needed?	Method
99% filter efficiency	No	Objective Data
Filter-cleaning mechanism		
HEPA for hole-cleaning		

Hilti solutions:

- TE 4-A with TE 4-A DRS
- TE 6-A with TE 6-A DRS
- TE 7 or TE 7-C with DRS-M

NOTES:

- Performance data allows for use with current system without respirator, under defined conditions
- Table 1 solution requires a filter cleaning mechanism in the vacuum
- HEPA filter not required for drilling, only required for hole cleaning
- HEPA does not necessarily provide an added benefit:
 - the more material collected by the filter and the smaller the filter pore size, the faster it clogs



SDS+ ROTARY DRILLING WITH A SHROUD AND DUST COLLECTION SYSTEM [TABLE 1, SECTION VII]



Table 1 Requirements		OSHA Compliance
Engineering controls	Respirator needed?	Method
99% filter efficiency	No	Table 1
Filter-cleaning mechanism		
HEPA for hole-cleaning		

Hilti solutions:

Tools:

- TE 2 / 2-A
- TE 3-C
- TE 4-A
- TE 7 / 7-C
- TE 30-A / 30 / 30-C

Accessory: DRS-S

Vacuum: VC 20/40/40-UE

NOTES:

- System available for any Hilti rotary hammer drill with a depth gauge
- HEPA filter not required for drilling, only required for hole cleaning
- Consider Hilti SafeSet™ solution for drilling applications eliminates the requirement to clean holes for anchoring by using a Hollow drill bit

SAFESET™ AND HILTI HOLLOW DRILL BITS

[TABLE 1, SECTION VII]



Hilti solutions:

Tool:

- Any Hilti SDS+ drill
- Any Hilti SDS-max drill

Accessory:

- TE-CD hollow drill bit (SDS+)
- TE-YD hollow drill bit (SDS-max)

Vacuum: VC 20/40/40-UE

Table 1 Requirements		OSHA Compliance
Engineering controls	Respirator needed?	Method
99% filter efficiency	No	Table 1
Filter-cleaning mechanism		
HEPA for hole-cleaning		

NOTES:

- Eliminates the need for manual hole cleaning when SafeSet™ system is used with either HIT-HY 200 A/R or HIT-RE 500 V3.
- For chemical anchoring applications in cracked/uncracked concrete, and masonry
- If compressed air is used to clean holes, HEPA filtered vacuum is needed

SDS-MAX CHISELING (WITH HILTI SDS-MAX COMBIHAMMER)

[TABLE 1, SECTION X]



Hilti solutions:

Tools:

- TE 50-AVR
- TE 60 / 60-ATC
- TE 70 / 70-ATC
- TE 80-ATC

Accessory: DRS-Y

Vacuum: VC 20-U, VC 40-U,
VC 40-UE

Table 1 Requirements		OSHA Compliance
Engineering controls	Respirator needed?	Method
99% filter efficiency	<u>Outdoor:</u> >4 hours or any indoor (APF 10)	Table 1
Filter-cleaning mechanism		

NOTES:

- DRS-Y shroud with Hilti vacuum provides a full Table 1 compliant solution for SDS-Max drilling, chipping or breaking

HANDHELD POWER SAWS (ANY BLADE DIAMETER)

[TABLE 1, SECTION II]



Table 1 Requirements		OSHA Compliance
Engineering controls	Respirator needed?	Method
Water delivery system	<u>Outdoor:</u> >4 hours (APF 10) <u>Indoor:</u> APF 10	Table 1

Hilti solutions:

Tools:

- DSH 700-X
- DSH 900-X

Accessory: DWP 10 (or hose with continuous water supply)

NOTES:

- Hilti gas powered saws are equipped with a water delivery system

HANDHELD GRINDERS FOR MORTAR REMOVAL (I.E., TUCKPOINTING) [TABLE 1, SECTION XI]



Table 1 Requirements		OSHA Compliance
Engineering controls	Respirator needed?	Method
99% filter efficiency	≤ 4 hours: APF 10 > 4 hours: APF 25	Table 1
Filter-cleaning mechanism or cyclonic pre-separator		
25 cubic feet per minute (cfm) of airflow per inch of wheel diameter		

Hilti solutions:

Tools:

- AG 450-7S or 7D
- DAG 500
- DEG 500
- DCG 500

Accessory: Tuck pointing hood

Vacuum: VC 20/40/40-UE

NOTES:

- Hilti vacuums are currently 129 cfm
- 4-1/2" grinders would require 112.5 cfm; 5" grinders would require 125 cfm

HANDHELD GRINDERS FOR USES OTHER THAN MORTAR REMOVAL [TABLE 1, SECTION XII]



Table 1 Requirements		OSHA Compliance
Engineering controls	Respirator needed?	Method
99% filter efficiency	<u>Outdoors:</u> none	Table 1
Filter-cleaning mechanism or cyclonic pre-separator	<u>Indoors:</u> > 4 hours (APF 10)	
25 cubic feet per minute (cfm) of airflow per inch of wheel diameter		

Hilti solutions:

Tools:

- AG 450-7S or 7D
- DAG 500
- DEG 500
- DCG 500

Accessory: Cutting/grinding hood

Vacuum: VC 20/40/40-UE

NOTES:

- 4-1/2" grinders would require 112.5 cfm; 5" grinders would require 125 cfm
- Hilti vacuums are currently 129 cfm



ELECTRIC CONCRETE CUTTERS

[TABLE 1, SECTION XII]



Hilti solutions:

Tools:

- DCH 230 (9")
- DCH 300 (12")

Vacuum: VC 20-U, VC 40-U, VC 40-UE




Table 1 Requirements		OSHA Compliance
Engineering controls	Respirator needed?	Method
99% filter efficiency	<u>Outdoors:</u> none	Objective Data
Filter-cleaning mechanism or cyclonic pre-separator	<u>Indoors:</u> >	
25 cubic feet per minute (cfm) of airflow per inch of wheel diameter	4 hours (APF 10)	

NOTES:

- Performance data allows for use with current system without respirator, under defined conditions
- Table 1 solution requires a vacuum with 225 cfm for the DCH 230 or 300 cfm for the DCH 300 (Table 1 compliant system available by June 2017)



HILTI VACUUMS

			
Name	VC 20-U	VC 40-U	VC 40-UE
CFM ¹⁾ rating	129		
Filter efficiency	99%		
Tank capacity	5 gallons	10 gallons	10 gallons
Amperage	9A	9A	20A (9A vac)
Filter-cleaning mechanism	Yes		
HEPA ready	Yes		



1) CFM = Cubic Feet per Minute airflow





OSHA 29 CFR §1926.1153
Respirable Silica Dust Exposure
Objective Test Data – Grinding
Hilti DG 150 with VC20-U/40-U/40-UE vacuum

Hilti has performed testing of the above system to determine the operator's respirable silica dust exposure in accordance with EN 50632-1 and EN 50632-2-3. Testing was performed under the following conditions:

- Room size: 7.8m x 7.8m x 3.3m (200 m³). Closed – no air exchange.
- Grinding disc: DG-CW 150/6" CR-SP
- Test duration: 1 hour.
- Weight of collected dust: 1590 g.
- Grinding orientation: 15° from vertical.
- Grinding height: 2'-6' above floor-level.
- Force applied: average 70-90% of tool rated amperage.
- Base material: concrete slab.
- Sampler: 10 l/min GSP pump, FSP sampler. ISO 7708-compliant. 5 µm filter.
- Air sample volume collected during test: 600 liters.

Results:

Time-Weighted Average Respirable Silica Dust Exposure ^{1,2}	43 µg/m ³
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¹ The silica content of base materials varies. As a result, the silica content in respirable dust samples also varies. The above-published exposure value is based on a 20% silica content applied to the total respirable dust measurement. Measured average silica content during testing was 10.0%.

² Exposure value represents the time-weighted average (TWA) over the 1-hour test period. Due to the test being conducted in a closed, non-ventilated room, this TWA exposure value would increase if the test duration was extended under the same conditions.



29 CFR §1926.1153(d)(2)(ii)

Performance Option

How to utilize Hilti “Objective Data”

Hilti has conducted testing to establish the respirable silica dust exposure (“exposure level”), associated with the use of various Hilti tool systems. These tests were performed in accordance with EN 50632, except the specific work configuration may vary to provide more versatile data and better address U.S. practices. The purpose of the testing was to generate “Objective Data” to be used as part of the exposure assessment requirements of 29 CFR §1926.1153(d)(2)(ii).

Per the EN standard, testing was performed for 1 hour in a 200m³ closed, non-ventilated room. Under these conditions, exposure levels increase over time. The exposure values published in Hilti’s Objective Data represent the average over the 1-hour test period (1-hour TWA)¹. Meaning the TWA started at zero, rose to the published 1-hour value, and would continue to rise if the test were continued.

Several underlying concepts important to applying the Objective Data to any case-specific assessment:

1. More/less work performed in a given time period will increase/decrease the exposure level.
2. Larger/smaller room size will decrease/increase the exposure level.
3. Air exchange decreases exposure levels. Specifically, a 100% air-exchange every hour (either by the work moving to a discrete area, or via sufficient air movement), means Hilti’s published 1-hour TWA exposure level is expected to conservatively represent a steady-state TWA. The conceptual basis is two-fold: air exchange would inherently reduce the published “closed room” exposure value. And sufficient air exchange to “reset” the environment every hour would keep the exposure values at that level. For reference, a typical 20", 2500 CFM box fan would introduce 100% new air volume in Hilti’s test chamber (7,200 ft³), every 3 minutes².
4. The OSHA 50 µg/m³ Permissible Exposure Level (PEL), is based on an 8-hour TWA. This means the exposure level as an 8-hour TWA is ≤50 µg/m³; a 4-hour TWA is ≤100 µg/m³ (assuming no exposure for the remainder of the shift); a 2-hour TWA is ≤200 µg/m³ (assuming no exposure for the remainder of the shift) etc. (time [hours] x exposure level [µg/m³] ≤ 400).

Hilti’s published Objective Data states the amount of work performed during the 1-hour test (“1-hour work”). Therefore, the respirable silica dust exposure level in any case-specific situation is expected to be below the 8-hour TWA PEL in the following conditions³:

- An employee performing ≤ “1-hour work” during a shift.
- An employee performing ≤ “1-hour work” in an hour, then moving to another discrete area and performing ≤ “1-hour work” in an hour, etc., throughout an entire shift.
- An employee performing ≤ “1-hour work” each hour, in an environment with sufficient air-exchange to prevent accumulation of airborne dust.

¹ Hilti’s published Objective Data incorporates a silica content of 20% of the total respirable dust measurement. Site-specific silica content varies. OSHA Docket No. OSHA-2010-0034, reviewed 588 respirable dust samples from construction tasks, finding the silica content varied from <1%-50%, with an average of 9.1%.

² Note introduction/exhaust of 100% air volume does not necessarily correlate to a 100% air exchange.

³ As long as: (1) Hilti’s published Objective Data exposure level is ≤50 µg/m³; (2) work is performed in a room with volume ≥ 200m³, and/or having adequate ventilation; and (3) site-specific respirable silica content is ≤20% of total respirable dust.

employer shall fully and properly implement the engineering controls, work practices, and respiratory

protection specified for the task on Table 1, unless the employer assesses and limits the exposure of the employee

to respirable crystalline silica in accordance with paragraph (d) of this section.

TABLE 1—SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA

Equipment/task	Engineering and work practice control methods	Required respiratory protection and minimum assigned protection factor (APF)	
		≤4 hours/shift	>4 hours/shift
(i) Stationary masonry saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None.
(ii) Handheld power saws (any blade diameter).	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions: —When used outdoors	None	APF 10.
	—When used indoors or in an enclosed area	APF 10	APF 10.
(iii) Handheld power saws for cutting fiber-cement board (with blade diameter of 8 inches or less).	For tasks performed outdoors only: Use saw equipped with commercially available dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency.	None.	None.
(iv) Walk-behind saws	Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions: —When used outdoors	None	None.
	—When used indoors or in an enclosed area	APF 10	APF 10.
(v) Drivable saws	For tasks performed outdoors only: Use saw equipped with integrated water delivery system that continuously feeds water to the blade. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None.
(vi) Rig-mounted core saws or drills.	Use tool equipped with integrated water delivery system that supplies water to cutting surface. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.	None	None.
(vii) Handheld and stand-mounted drills (including impact and rotary hammer drills).	Use drill equipped with commercially available shroud or cowling with dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions. Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.	None	None.
(viii) Dowel drilling rigs for concrete	For tasks performed outdoors only: Use shroud around drill bit with a dust collection system. Dust collector must have a filter with 99% or greater efficiency and a filter-cleaning mechanism. Use a HEPA-filtered vacuum when cleaning holes.	APF 10	APF 10.
(ix) Vehicle-mounted drilling rigs for rock and concrete.	Use dust collection system with close capture hood or shroud around drill bit with a low-flow water spray to wet the dust at the discharge point from the dust collector. OR Operate from within an enclosed cab and use water for dust suppression on drill bit.	None	None.
(x) Jackhammers and handheld powered chipping tools.	Use tool with water delivery system that supplies a continuous stream or spray of water at the point of impact: —When used outdoors	None	APF 10.
	—When used indoors or in an enclosed area	APF 10	APF 10.
	OR Use tool equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.		

TABLE 1—SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA—Continued

Equipment/task	Engineering and work practice control methods	Required respiratory protection and minimum assigned protection factor (APF)	
		≤4 hours/shift	>4 hours/shift
(xi) Handheld grinders for mortar removal (<i>i.e.</i> , tuckpointing).	<p>Dust collector must provide the air flow recommended by the tool manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism:</p> <p>—When used outdoors</p> <p>—When used indoors or in an enclosed area</p> <p>Use grinder equipped with commercially available shroud and dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism.</p>	<p>None</p> <p>APF 10</p> <p>APF 10</p>	<p>APF 10.</p> <p>APF 10.</p> <p>APF 25.</p>
(xii) Handheld grinders for uses other than mortar removal.	<p>For tasks performed outdoors only:</p> <p>Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>OR</p> <p>Use grinder equipped with commercially available shroud and dust collection system.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter and have a filter with 99% or greater efficiency and a cyclonic pre-separator or filter-cleaning mechanism:</p> <p>—When used outdoors</p> <p>—When used indoors or in an enclosed area</p>	<p>None</p>	<p>None.</p>
(xiii) Walk-behind milling machines and floor grinders.	<p>Use machine equipped with integrated water delivery system that continuously feeds water to the cutting surface.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>OR</p> <p>Use machine equipped with dust collection system recommended by the manufacturer.</p> <p>Operate and maintain tool in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Dust collector must provide the air flow recommended by the manufacturer, or greater, and have a filter with 99% or greater efficiency and a filter-cleaning mechanism.</p> <p>When used indoors or in an enclosed area, use a HEPA-filtered vacuum to remove loose dust in between passes.</p>	<p>None</p> <p>None</p> <p>None</p> <p>None</p>	<p>None.</p> <p>APF 10.</p> <p>None.</p> <p>None.</p>
(xiv) Small drivable milling machines (less than half-lane).	<p>Use a machine equipped with supplemental water sprays designed to suppress dust. Water must be combined with a surfactant.</p> <p>Operate and maintain machine to minimize dust emissions.</p>	<p>None</p>	<p>None.</p>
(xv) Large drivable milling machines (half-lane and larger).	<p>For cuts of any depth on asphalt only:</p> <p>Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.</p> <p>Operate and maintain machine to minimize dust emissions.</p> <p>For cuts of four inches in depth or less on any substrate:</p> <p>Use machine equipped with exhaust ventilation on drum enclosure and supplemental water sprays designed to suppress dust.</p> <p>Operate and maintain machine to minimize dust emissions.</p> <p>OR</p> <p>Use a machine equipped with supplemental water spray designed to suppress dust. Water must be combined with a surfactant.</p> <p>Operate and maintain machine to minimize dust emissions.</p>	<p>None</p> <p>None</p> <p>None</p> <p>None</p>	<p>None.</p> <p>None.</p> <p>None.</p> <p>None.</p>
(xvi) Crushing machines	<p>Use equipment designed to deliver water spray or mist for dust suppression at crusher and other points where dust is generated (<i>e.g.</i>, hoppers, conveyers, sieves/sizing or vibrating components, and discharge points).</p> <p>Operate and maintain machine in accordance with manufacturer's instructions to minimize dust emissions.</p> <p>Use a ventilated booth that provides fresh, climate-controlled air to the operator, or a remote control station.</p>	<p>None</p>	<p>None.</p>

TABLE 1—SPECIFIED EXPOSURE CONTROL METHODS WHEN WORKING WITH MATERIALS CONTAINING CRYSTALLINE SILICA—Continued

Equipment/task	Engineering and work practice control methods	Required respiratory protection and minimum assigned protection factor (APF)	
		≤4 hours/shift	>4 hours/shift
(xvii) Heavy equipment and utility vehicles used to abrade or fracture silica-containing materials (e.g., hoe-ramming, rock ripping) or used during demolition activities involving silica-containing materials.	Operate equipment from within an enclosed cab	None	None.
	When employees outside of the cab are engaged in the task, apply water and/or dust suppressants as necessary to minimize dust emissions.	None	None.
(xviii) Heavy equipment and utility vehicles for tasks such as grading and excavating but not including: Demolishing, abrading, or fracturing silica-containing materials.	Apply water and/or dust suppressants as necessary to minimize dust emissions. OR	None	None.
	When the equipment operator is the only employee engaged in the task, operate equipment from within an enclosed cab.	None	None.

(2) When implementing the control measures specified in Table 1, each employer shall:

(i) For tasks performed indoors or in enclosed areas, provide a means of exhaust as needed to minimize the accumulation of visible airborne dust;

(ii) For tasks performed using wet methods, apply water at flow rates sufficient to minimize release of visible dust;

(iii) For measures implemented that include an enclosed cab or booth, ensure that the enclosed cab or booth:

- (A) Is maintained as free as practicable from settled dust;
- (B) Has door seals and closing mechanisms that work properly;
- (C) Has gaskets and seals that are in good condition and working properly;
- (D) Is under positive pressure maintained through continuous delivery of fresh air;
- (E) Has intake air that is filtered through a filter that is 95% efficient in the 0.3–10.0 µm range (e.g., MERV-16 or better); and
- (F) Has heating and cooling capabilities.

(3) Where an employee performs more than one task on Table 1 during the course of a shift, and the total duration of all tasks combined is more than four hours, the required respiratory protection for each task is the respiratory protection specified for more than four hours per shift. If the total duration of all tasks on Table 1 combined is less than four hours, the required respiratory protection for each task is the respiratory protection specified for less than four hours per shift.

(d) *Alternative exposure control methods.* For tasks not listed in Table 1,

or where the employer does not fully and properly implement the engineering controls, work practices, and respiratory protection described in Table 1:

(1) *Permissible exposure limit (PEL).*

The employer shall ensure that no employee is exposed to an airborne concentration of respirable crystalline silica in excess of 50 µg/m³, calculated as an 8-hour TWA.

(2) *Exposure assessment—(i) General.*

The employer shall assess the exposure of each employee who is or may reasonably be expected to be exposed to respirable crystalline silica at or above the action level in accordance with either the performance option in paragraph (d)(2)(ii) or the scheduled monitoring option in paragraph (d)(2)(iii) of this section.

(ii) *Performance option.* The employer shall assess the 8-hour TWA exposure for each employee on the basis of any combination of air monitoring data or objective data sufficient to accurately characterize employee exposures to respirable crystalline silica.

(iii) *Scheduled monitoring option.* (A) The employer shall perform initial monitoring to assess the 8-hour TWA exposure for each employee on the basis of one or more personal breathing zone air samples that reflect the exposures of employees on each shift, for each job classification, in each work area. Where several employees perform the same tasks on the same shift and in the same work area, the employer may sample a representative fraction of these employees in order to meet this requirement. In representative sampling, the employer shall sample the employee(s) who are expected to have the highest exposure to respirable crystalline silica.

(B) If initial monitoring indicates that employee exposures are below the action level, the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.

(C) Where the most recent exposure monitoring indicates that employee exposures are at or above the action level but at or below the PEL, the employer shall repeat such monitoring within six months of the most recent monitoring.

(D) Where the most recent exposure monitoring indicates that employee exposures are above the PEL, the employer shall repeat such monitoring within three months of the most recent monitoring.

(E) Where the most recent (non-initial) exposure monitoring indicates that employee exposures are below the action level, the employer shall repeat such monitoring within six months of the most recent monitoring until two consecutive measurements, taken seven or more days apart, are below the action level, at which time the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring, except as otherwise provided in paragraph (d)(2)(iv) of this section.

(iv) *Reassessment of exposures.* The employer shall reassess exposures whenever a change in the production, process, control equipment, personnel, or work practices may reasonably be expected to result in new or additional exposures at or above the action level, or when the employer has any reason to believe that new or additional exposures at or above the action level have occurred.