HILTI SUBMITTAL PACKAGE OSHA 1926.1153 TABLE 1, SECTION xii

Sections xii: Handheld grinders for uses other than mortar removal

Current Hilti angle grinders with a Hilti grinding hood:
AG 450-7S
AG 450-7D
DEG 500
DAG 500-D
DCG 500-S
AG 500-11S
AG 500-12D
DG 150

For instructions on how to assemble these systems, please refer to the Hilti North America Youtube page

DG 150

Angle grinders with a grinding hood

DBS • 08/17

TABLE 1 REQUIREMENTS

These systems fall under table 1, **section xii: handheld grinders for use other than mortar removal.** In order to be table 1 compliant, the below requirements must be met:

- When performing outdoor applications only: use a grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface

or

- Use tool 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
- Have a filter with 99% or greater efficiency and a filter-cleaning mechanism
- dust collector must provide 25 cubic feet per minute (cfm) or greater of airflow per inch of wheel diameter

Table 1 requires a respirator to be worn in certain environments based on the time of the application. Check below to see when an APF 10 respirator must be worn.

Equipment / Task	Engineering and work practice control methods	Required respiratory protections and minimum Assigned Protection Factor (APF)	
		≤ 4 hours / shift	> 4 hours / shift
(xii) Handheld grinders for uses other than mortar removal	For tasks performed outdoors only. Use grinder equipped with integrated water delivery system that continuously feeds water to the grinding surface. Operate and maintain tool in accordance with manufacturer’s instructions to minimize dust emissions. OR Use grinder equipped with commercially available shroud and dust collection system. Operate and maintain tool in accordnce with manufacturer’s instructions to minimize dust emissions. 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 effciency and a cyclonic pre-separator or filter-cleaning mechanism.	None	None
	• When used outdoors	None	None
	• When used indoors or in an enclosed area	None	APF 10

Check below to see how your system can be compliant with 1926.1153 Table 1. To verify the generation of your tool, check the rating plate, or call Hilti at 800-879-8000 with your serial number.

Tool models	Accessory	Vacuums (can use any)	Method of compliance
AG 450-7S **AG 450-7D**	**Dust guard grinding hoods (Item number 2102983)**	VC 125-6 VC 125-9 VC 20-U VC 40-U VC 40-UE VC 150-6 X VC 150-10 X VC 150-6 XE VC 150-10 XE VC 300-17 X	Table 1 compliant
DEG 500 **DCG 500-S** **DAG 500-D** **AG 500-11S** **AG 500-12D**	**Dust guard grinding hoods (Item number 267719 or Item number 2126539)**		
AG 600-A 36 grinding hoods for AG 600 are designed for 5 inch max. diameter wheels only	**Dust guard grinding hoods (Item number 267719 or Item number 2126539)**	VC 150-6 X VC 150-10 X VC 150-6 XE VC 150-10 XE VC 300-17 X VC 125-6 VC 125-9	Table 1 compliant
DG 150	**Vacuum adapter (Item number 281862)**	VC 300-17 X	Table 1
		VC 150-6 X VC 150-10 X VC 150-6 XE VC 150-10 XE	Table 1 / Objective data*
		VC 125-6 VC 125-9	Exposure assessment
		VC 20-U VC 40-U VC 40-UE	Objective data*

*See Hilti's published Objective Data — if not applicable to a specific application, exposure assessment is required.

SYSTEM OVERVIEW

Hilti concrete grinding tools are table 1 compliant through use of a dust collection shroud hooked up to a vacuum that meets table 1 requirements. Hilti currently offers the below systems with this configuration:

Tool	Accessory	Vacuum (use any)
 AG 450-7S  AG 450-7D	 4-1/2” grinding hood	 VC 125-6  VC 125-9  VC 20-U  VC 150-6 X  VC 150-6 XE  VC 40-U  VC 150-10 X  VC 40-UE  VC 150-10 XE  VC 300-17 X
 DEG 500  DCG 500-S  DAG 500-D  AG 500-11S  AG 500-11D	 5” grinding hood	

Note: previous generations of tools may have different item numbers or nomenclature. Check with your local Hilti representative or product instruction manual to verify

Tool	Accessory	Vacuum (use any)
 AG 600-A 36 grinding hoods for AG 600 are designed for 5 inch max. diameter wheels only	 5” grinding hood	 VC 125-6  VC 125-9  VC 150-6 XE  VC 150-6 X  VC 150-10 X  VC 150-10 XE  VC 300-17 X
 DG 150	 Vacuum adapter	 VC 125-6*  VC 125-9*  VC 20-U**  VC 150-6 X***  VC 150-6 XE***  VC 40-U**  VC 150-10 X***  VC 40-UE**  VC 150-10 XE***  VC 300-17 X

*Exposure assessment required
**See Hilti’s published Objective Data — if not applicable to a specific application, exposure assessment is required.
***Table 1 compliant, with the option to use objective data test report

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 m^3). 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

[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.

Hilti North America
7250 Dallas Parkway, Suite 1000
Plano, Texas 75024
T 1-800-879-8000 I www.hilti.com
February 14, 2017

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 200m^3 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 ft^3), every 3 minutes[2].
4. The OSHA 50 µg/m^3 Permissible Exposure Level (PEL), is based on an 8-hour TWA. This means the exposure level as an 8-hour TWA is ≤50 µg/m^3; a 4-hour TWA is ≤100 µg/m^3 (assuming no exposure for the remainder of the shift); a 2-hour TWA is ≤200 µg/m^3 (assuming no exposure for the remainder of the shift) etc. (time [hours] x exposure level [µg/m^3] ≤ 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 conditions[3]:

- 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.

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[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/m^3; (2) work is performed in a room with volume ≥ 200m^3, and/or having adequate ventilation; and (3) site-specific respirable silica content is ≤20% of total respirable dust.

Hilti North America
7250 Dallas Parkway, Suite 1000
Plano, Texas 75024
T 1-800-879-8000 I www.hilti.com
March 6, 2017

GRINDING

Grinding Dust Control — OSHA

Hilti developed dust collection systems for its angle grinders with a shroud, to be attached to a Hilti vacuum with a filter cleaning mechanism and 99% filter efficiency, compliant with OSHA 1926.1153, Table 1.

Set-up

1. Attach the appropriate dust collection shroud to the grinder.
2. Select appropriately-sized vacuum (per OSHA Table 1, the vacuum must have a rating of at least 25 cfm per inch of wheel diameter). Attach vacuum hose to grinder shroud.
3. Start vacuum.
4. Verify proper operation of the dust collection system, including suction at the shroud
    - Check for damage or leaks in the vacuum, hose, and shroud.
    - See instructions for vacuum.
5. Verify the shroud seal is intact, and extends to at least the face of the cup wheel.

Grinding

1. Start the vacuum before beginning to grind.
2. Hold the cup wheel face parallel with (flat to) the work surface. Always maintain the grinder such that the shroud seal is in full contact with the work surface (i.e., do not tilt the grinder)
3. Avoid grinding over a free edge of the work surface as much as possible.
    - shrouds can be opened slightly to allow close access to a perpendicular obstruction. Only operate in this opened condition when necessary.
4. Release the tool trigger and allow the grinder to come to a complete stop before lifting it from the work surface. Keep vacuum running until grinding operation is completed.

Cleaning and maintenance

- See instructions for vacuum.