



# HILTI SUBMITTAL PACKAGE OSHA 1926.1153 TABLE 1, SECTION XI AND XII

**Sections xi: Handheld grinders for  
mortar removal**

**Section xii: Handheld grinders for  
uses other than  
mortar removal**

Current Hilti angle grinders with a Hilti cutting hood:

- AG 450-7S
- AG 450-7D
- DEG 500
- DAG 500-D
- DCG 500-S
- AG 500-11S
- AG 500-12D
- DCH 230
- DCH 300



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



DCH



Angle grinders with a cutting hood

## TABLE 1 REQUIREMENTS

These systems fall under table 1, **section xi: handheld grinders for mortar removal**; and **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 non-mortar removal applications outside: 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 cowl 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 or APF 25 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
(xi) Handheld grinders for mortar removal (i.e., tuckpointing)	<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 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>	APF 10	APF 25
(xii) Handheld grinders for use 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>	None	None
	<ul style="list-style-type: none"> <li>• When used outdoors</li> </ul>	None	None
	<ul style="list-style-type: none"> <li>• When used indoors or in an enclosed area</li> </ul>	None	APF 10

Check below to see how your system can be compliant with 1926.1153.

Tool models	Accessory	Vacuums (can use any)	Method of compliance
AG 450-7S AG 450-7D	Dust guard cutting (Item number 2101312)	VC 125-6 VC 125-9 VC 20-U VC 40-U	Table 1 compliant
DEG 500 DCG 500-S DAG 500-D AG 500-11S AG 500-12D	Dust guard cutting (Item number 284978) or Dust guard slitting (Item number 267720)	VC 40-UE VC 150-6 X VC 150-10 X VC 150-6 XE VC 150-10 XE VC 300-17 X	
DCH 230**	Depth gauge DCH230 (Item number 212187)	VC 300-17 X	Table 1
		VC 125-6 VC 125-9	Exposure assessment
		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	Objective data*
DCH 300**	Depth gauge DCH300 (Item number 212131)	VC 300-17 X	Table 1
		VC 125-6 VC 125-9	Exposure assessment
		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	Objective data*

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

\*\* Hilti interprets the DCH 230/300 as a section xii: handheld grinder for other than mortar removal.

## SYSTEM OVERVIEW

Hilti concrete cutting tools are table 1 compliant for both mortar removal and non-mortar removal applications 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	 4-1/2" cutting hood	 VC 125-6	 VC 125-9
 AG 450-7D		 VC 20-U	 VC 150-6 X
 DEG 500	 5" cutting hood	 VC 150-6 XE	 VC 40-U
 DCG 500-S		 5" slitting hood	 VC 150-10 X
 DAG 500-D	 VC 150-10 XE		 VC 300-17 X
 AG 500-11S	 AG 500-11D		

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)	
 <p>DCH 230 ***</p>  <p>DCH 300 ***</p>	 <p>Depth gauge</p>	 <p>VC 125-6*</p>  <p>VC 20-U**</p>  <p>VC 150-6 XE**</p>  <p>VC 150-10 X**</p>  <p>VC 150-10 XE**</p>	 <p>VC 125-9*</p>  <p>VC 150-6 X**</p>  <p>VC 40-U**</p>  <p>VC 40-UE**</p>  <p>VC 300-17 X***</p>

\*Exposure assessment required  
 \*\*See Hilti's published Objective Data — if not applicable to a specific application, exposure assessment is required.  
 \*\*\* Hilti interprets the DCH 230/300 as a section xii "handheld grinder for other than mortar removal".



OSHA 29 CFR §1926.1153  
Respirable Silica Dust Exposure  
Objective Test Data

**Hilti DCH 230-300, depth gauge, VC 20-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 50632-2-22. Testing was performed under the following conditions:

- Room size: 7.8m x 7.8m x 3.3m (200 m<sup>3</sup>). Closed – no air exchange.
- Cutting disc: EQD SPX.
- Test duration: 1 hour.
- Cutting depth: 40 mm.
- Cutting length: 45 feet.
- Cutting orientation: horizontal down, approx. 3 ft above floor level.
- Force applied: average 70-90% of tool rated amperage.
- Base material: concrete.
- 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 <sup>1,2</sup>	327 µg/m <sup>3</sup>
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The 8-hour TWA is 41 µg/m<sup>3</sup> if working one hour @ 327 µg/m<sup>3</sup> (1-hour TWA), and no further exposure occurs throughout the shift.

<sup>1</sup> 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 15.5%.

<sup>2</sup> 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 200m<sup>3</sup> 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)<sup>1</sup>. 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<sup>3</sup>), every 3 minutes<sup>2</sup>.
4. The OSHA 50 µg/m<sup>3</sup> 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<sup>3</sup>; a 4-hour TWA is ≤100 µg/m<sup>3</sup> (assuming no exposure for the remainder of the shift); a 2-hour TWA is ≤200 µg/m<sup>3</sup> (assuming no exposure for the remainder of the shift) etc. (time [hours] x exposure level [µg/m<sup>3</sup>] ≤ 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<sup>3</sup>:

- 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.

<sup>1</sup> 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%.

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

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

# DCH 300/230

## Presentation

Hilti developed DCH 300/230 tool which could be connected to a vacuum cleaner to collect dust (which Hilti interprets to be compliant with OSHA 1926.1153, table 1 “hand-held grinder using a vacuum cleaner with at least 25 cfm per inch of the wheel diameter and a filter cleaning mechanism with an efficiency of 99% or greater)

## Set-up

1. When cutting mineral materials, use a suitable vacuum cleaner (eg. Hilti VC 300) with the corresponding filter
2. Attach the depth gauge (DCH 300 = #212131/DCH 230 = #212187) to DCH tools with the desired depth of cut. Always keep the depth gauge in full contact with the base material when cutting
3. Connect vacuum cleaner hose to respective opening in DCH 300/DCH 230 blade guard
4. Connect the tool to a suitable electric power source
5. Adjust the depth/ cut in steps of max. 40-50mm
6. Switch vacuum cleaner on first then switch DCH 300/DCH 230 on and start cutting
7. Start cut by placing front of tool on base material, and then pivoting back of tool into the cut. Always keep front of tool in contact with base material.
8. Verify proper operation => Check for damage or leakage at tool, hose to connection of both. Ensure tool disc guard and exhaust port are free of obstruction.
9. When cut is finished, release trigger of DCH and allow to stop before removing from cut
10. Keep vacuum running until cutting is completed
11. The following will increase dust exposure — minimize these activities:
  - through cutting
  - cutting past the end of the base material
  - making multiple passes for a cut
  - pulling the DCH toward you to cut
  - attempting to angle the disc at other than a perpendicular cut into the base material

## Application

- Electric powered cutter for the construction industry
- Design to for cutting mineral material with Diamond blades without use of water
- With synthetic resin-bonded fibre-reinforced abrasive disc discs the tools could be also used to cut metal (not connected to vacuum cleaner)

# HILTI ANGLE GRINDERS WITH A CONCRETE CUTTING HOOD

## Presentation

Hilti developed various angle grinders for mortar removal and other cutting applications. When configured with the correct guard/hood and connected to the appropriate vacuum, these tools are compliant with OSHA 1926.1153 Table 1 (xi) “handheld grinders for mortar removal (i.e., tuckpointing)” or (xii) “handheld grinders for uses other than mortar removal” (note Hilti interprets the DCH 230/300 to be a “handheld grinder”). For Table 1 compliance, the vacuum cleaner must have at least 25 cfm per inch of the wheel diameter, a filter cleaning mechanism, and a filter efficiency of at least 99%.

## Set-up

1. When cutting mineral materials, use a suitable vacuum cleaner (eg. Hilti VC 300) with the corresponding filter
2. Attach the guard/hood/depth gauge (see submittal package for appropriate item number) to the tool with the desired depth of cut. Always keep the depth gauge in full contact with the base material when cutting
3. Connect vacuum cleaner hose to respective opening in grinder blade guard
4. Connect the tool to a suitable electric power source
5. Adjust the depth/ cut in steps of max. 40-50mm
6. Switch vacuum cleaner on first then switch grinder on and start cutting
7. If setup properly, the blade will rotate toward the vacuum collection port. The end of the guard with the vacuum port must always be placed against the concrete first. Always pull or push the tool in the direction of the vacuum port.
8. Verify proper operation => Check for damage or leakage at tool, hose to connection of both. Ensure tool disc guard and exhaust port are free of obstruction.
9. When cut is finished, release trigger of tool and allow to stop before removing from cut
10. Keep vacuum running until cutting is completed
11. The following will increase dust exposure — minimize these activities:
  - through cutting
  - cutting past the end of the base material
  - making multiple passes for a cut
  - pulling/pushing the tool in a direction opposite the vacuum port
  - attempting to angle the disc at other than a perpendicular cut into the base material

## Application

- Electric powered angle grinders/cutters for the construction industry
- Design to for cutting mineral material with Diamond blades without use of water
- With synthetic resin-bonded fibre-reinforced abrasive disc discs the tools could be also used to cut metal (not connected to vacuum cleaner)