

# HILTI

Health and safety  
guide



**Your preferred partner  
for productivity and safety.**

**Hilti. Outperform. Outlast.**



**Safety first ...**  
... because safety inspires productivity.

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Health and safety take utmost priority at Hilti. Although many talk only about hand-arm vibration, we believe that the subject needs to be examined as a whole and therefore wish to provide you with a broader base of information. This brochure thus looks into all aspects of significance to health, safety and productivity on the jobsite, including **vibration, dust and noise**.

The extent to which workers on construction sites are exposed to risks is regulated and controlled by a number of European directives and by national legislation. Construction companies are required to ensure that these directives and regulations are observed. The employer is responsible for informing employees, and for ensuring that risks are correctly assessed and reduced wherever necessary.

**It's always good to have a reliable partner at your side. But when it comes to health and safety it's absolutely essential – and what Hilti offers in this field is simply unrivalled.**

Hilti offers a **complete range** of innovative safety solutions for all phases of your project. We also offer **alternative means** for many applications so, keeping your own special requirements in mind, you can always select the safest and most suitable method for the job on hand. Take a look at our unique application selector to find out what suits your needs best. And, of course, Hilti always provides all the data you need to carry out your own risk assessment.

We place great value on our closeness to our customers. Members of the Hilti field sales force are in direct contact with more than 200,000 customers every day. Our staff is in a position to provide tailor-made training and advice in all matters relating to health and safety in the applicable fields.

Take time to read through this information.  
A safe jobsite, after all, is a productive jobsite.



## Information and regulations

### What you need to know about ...

## Vibration

Hand-arm vibration can damage blood vessels, nerves in the fingers, bones and muscles. Long-term exposure to vibration can result in hand-arm vibration syndrome (HAVS), which has the following symptoms:

- "Pins and needles"
- Pain and numbness in the fingertips
- Reduced sensitivity of touch, painful wrists

Two key factors influence susceptibility to HAVS:

- Duration of exposure
- Vibration transmitted to the operator

### The new European Directive 2002/44/EC.

The European Physical Agents (Vibration) Directive 2002/44/EC has been applicable in all EC member states since July 6, 2005.

**The directive requires the employer to identify every source of vibration from all work-related activities in order to establish a worker's "vibration exposure". If the overall exposure exceeds the daily limits established by the directive, the employer is required to take action. Because the exposure represents all daily activities, the employer may have several options, e.g. reduce the vibration level and/or exposure time of one or more tasks.**

**The employer is also required to provide information about measurements and values regarding the vibration of the tools in use by his employees.**

### How is vibration measured?

Up to the end of 2005, the vibration of power tools was measured in one axis only. The revised European Standard EN 60745 became applicable in 2006. Its latest revisions take measurements in all three axes into account, under laboratory conditions comparable to real-life conditions.

**Note: The employer may use these triaxial vibration values for a preliminary assessment of vibration exposure for his employees.**

Where no triaxial vibration values are available, the value can be estimated as follows\*:

- Take the single-axis vibration value given in the operating instructions.
- Multiply it by 2 (for rotary and combi-hammers and reciprocating saw) or by 1.5 (for all other tools).

\* (applicable for Hilti electric power tools)

### Which limits apply to daily work?

It's not the single vibration value that's relevant for the assessment of risk to health, but daily exposure to vibration, i.e. the combination of the tool's vibration value and trigger time during individual use of the tool.

#### What is "trigger time"?

This is the period of time during which the machine is actually switched on and applied to the work. It is usually overestimated. In most applications (e.g. drilling a hole) it constitutes a very short time, perhaps seconds. For repetitive work, it can be calculated by carrying out a simple timing exercise. Measure the time for one work unit (e.g. for drilling one hole) and then multiply this figure by the number of repetitions (e.g. number of holes drilled).

This means there is no absolute maximum vibration limit for a tool, but rather a maximum trigger time that depends on the actual application, working circumstances, condition of the tool, etc.

### What must be done if limits are reached?

EU Directive 2002/44/EC uses two different values, based on a working day of 8 hours:

The **exposure action value** (2.5 m/s<sup>2</sup>) and the **exposure limit value** (5 m/s<sup>2</sup>).

Daily vibration exposure A(8)	Vibration exposure range	Action required by the employer
A(8) < 2.5 m/s <sup>2</sup>	The <b>exposure action value</b> is not exceeded.	Take reasonable action to reduce risks from vibration exposure to a minimum. Provide worker information and training on vibration.
2.5 m/s <sup>2</sup> ≤ A(8) ≤ 5 m/s <sup>2</sup>	Above the <b>exposure action value</b> , but the <b>exposure limit value</b> is not exceeded.	Implement a program of measures to reduce exposure and risks to a minimum. Ensure health surveillance is provided for exposed workers.
A(8) > 5 m/s <sup>2</sup>	Above the <b>exposure limit value</b> .	Take immediate action to bring exposure below the exposure limit value.



## Information and regulations What you need to know about ...

### An example of a simple calculation

In a repetitive application, one of your workers needs to drill **60 holes, 16 mm dia., 100 mm deep**. He intends to use a **combihammer** for this task. The instruction manual informs you that the vibration value for that tool is **16.5 m/s<sup>2</sup>**.

### Is the worker allowed to complete this task in one day?

The answer can be found in three steps:

1. Calculate the time taken to reach the exposure action value. This can be done using the formula below.

$$\left(\frac{\text{exposure action value}}{\text{vibration value}}\right)^2 \times 480 \text{ min, so in this case } \left(\frac{2.5 \text{ m/s}^2}{16.5 \text{ m/s}^2}\right)^2 \times 480 \text{ min} = 11 \text{ min}$$

2. Measure the time taken to drill one hole. For this calculation, let's assume we have measured that it takes 18 seconds to drill one hole.

3. Calculate the number of holes that you can drill under these conditions before you reach the exposure action value (EAV):

$$\frac{\text{Number of minutes to EAV} \times 60}{\text{Number of seconds for one hole}}, \text{ so in this case } \frac{11 \times 60}{18} = 36$$

The number of holes that can be drilled before reaching the exposure limit value is four times the number of holes that can be drilled before reaching EAV, i.e. in this case:  $4 \times 36 = 144$ .

### Assessment

Vibration exposure when drilling the 60 holes is above EAV (exposure action value), but below ELV (exposure limit value).

### Note

Total exposure is the cumulative effect of all activities that generate vibration greater than 2.5 m/s<sup>2</sup>, whether on the jobsite or elsewhere.

The effect of vibration may be influenced by temperature and moisture on the hands as well as gripping forces etc.

**Possible measures to reduce vibration exposures are changes in the work organization, the use of equipment with lower vibration values or the use of alternative methods.**

For more information on the directive check <http://europa.eu> or ask your local Hilti representative.

## Noise

Noise is part of everyday life, but excessive and prolonged exposure to loud noise can permanently damage your hearing. Once you lose your hearing, you will never recover it. A European directive has been issued to protect workers from exposure to excessive noise.

### The Physical Agents (Noise) Directive 2003/10/EC

The deadline for adoption of the directive in national labor protection laws was February 15, 2006. This directive is intended to protect workers from the effects noise has on the health. It uses various values to quantify noise:

**Sound pressure level:** Pressure on the workers' ears generated by the noise

**Sound power level:** Total noise emitted by the tool

**Peak sound pressure:** Maximum value of the C-frequency-weighted instantaneous noise pressure

When using electric tools, the **sound pressure level** and the **peak sound pressure** are relevant for the risk assessment. The noise exposure level is calculated on the basis of the sound pressure level of the tools used and standardized

to an **8-hour working day**. The peak sound pressure ( $P_{\text{peak}}$ ) is relevant for high-level intermittent noise (e.g. beating on sheet metal with a hammer). A certain level must not be exceeded.

Daily noise exposure	Noise exposure range	Action required by the employer
$80 \text{ dB(A)} \leq L_{\text{ex,8h}} < 85 \text{ dB(A)}$ or $112 \text{ pa} \leq P_{\text{peak}} < 140 \text{ pa}$ , respectively	Between the lower and upper exposure action value	The employer shall make individual hearing protection available to workers. Workers' hearing should be regularly checked by a doctor.
$L_{\text{ex,8h}} \geq 85 \text{ dB(A)}$ or $P_{\text{peak}} \geq 140 \text{ pa}$ , respectively	Above the upper exposure action value	Individual hearing protection <b>shall be</b> used by workers. Workers are entitled to medical checks. Reduce exposure to noise.
$L_{\text{ex,8h}} \geq 87 \text{ dB(A)}$ or $P_{\text{peak}} \geq 200 \text{ pa}$ , respectively *	Above the exposure limit value	Take immediate action to reduce exposure to noise.

\* Exposure at the workers ear when using ear protection

**Possible measures to reduce noise exposures are changes in the work organization, the use of tools with lower noise values or the use of alternative methods.**

For more information on the directive check <http://europa.eu> or ask your local Hilti representative.



## Information and regulations

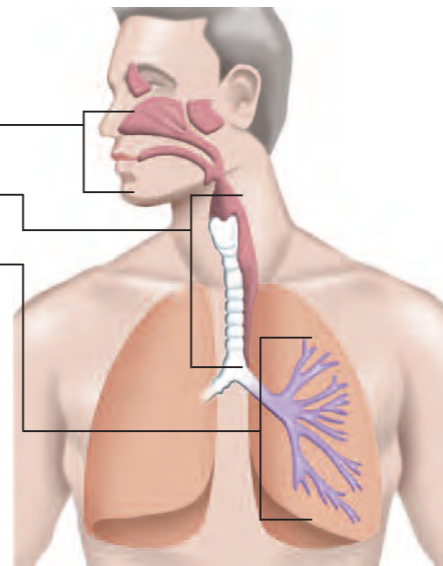
### What you need to know about ...

## Dust

Dust is produced by many of the processes carried out in the construction industry (e.g. drilling, slitting, sanding). Many of the materials used in the construction industry contain quartz (e.g. concrete and masonry) or wood. Some of these materials are suspected to cause cancer. Almost all EU member states have adopted national laws and exposure limits for different types of dust, and the topic is attracting increasing attention from national authorities.

### What type of dust are we talking about?

- **Inhalable dust:** Finds its way into the mouth and nose
- **Thoracic dust:** Reaches the upper respiratory area
- **Respirable dust:** Also reaches the finest parts of the lungs (alveola)



### Legal situation in Europe

In contrast to the situation with hand-arm vibration and noise, there is currently no statutory regulation on dust exposure which is applicable throughout the EU. Each country has its own laws, regulations and exposure limits. Dust exposure is given as the time-weighted average for an 8-hour work day.

In **country xy**, the exposure limits are:

Inhalable dust	Respirable dust	Respirable quartz dust	Inhalable wood dust
xy mg/m <sup>3</sup>	xy mg/m <sup>3</sup>	xy mg/m <sup>3</sup>	xy mg/m <sup>3</sup>

### How is dust measured?

Dust exposure is measured as a concentration, i.e. milligrams of dust per cubic meter of air: **mg/m<sup>3</sup>**. Exposure limits are also defined in mg/m<sup>3</sup>. The various dust components the worker is exposed to are measured. In this way, the actual dust concentration in the air that the operator breathes can be measured exactly. In order to deliver reliable values, the measurement has to be carried out over an extended time period. Usually, dust exposure is given as the “time-weighted average” (TWA), so that different periods of exposure time are accounted for. The total time is the 8-hour work day.

Example:

Step	Exposure duration	Dust concentration	Exposure
1	30 min	10 mg/m <sup>3</sup>	300 min x mg/m <sup>3</sup>
2	60 min	20 mg/m <sup>3</sup>	1,200 min x mg/m <sup>3</sup>
3	390 min	0 mg/m <sup>3</sup>	0 min x mg/m <sup>3</sup>
<b>Total</b>	<b>480 min</b>		<b>1,500 min x mg/m<sup>3</sup></b>

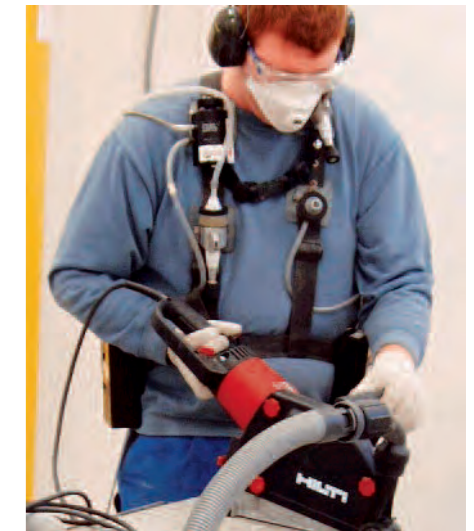
$$TWA = \frac{\sum (\text{exposure duration} \times \text{dust concentration}) \text{ for each working period}}{\text{Total time}} \quad TWA = \frac{1,500}{480} = 3.1 \text{ mg/m}^3$$

### Vacuum cleaners and dust classification

Industrial vacuum cleaners are commonly used to reduce exposure to dust on jobsites. Three different classes of dust have been defined:

- L** These vacuum cleaners permit picking up dusts with OEL values (occupational exposure limits) of > 1 mg/m<sup>3</sup>.
- M** These vacuum cleaners permit picking up dusts of the dust classes L and M with OEL values of ≥ 0.1 mg/m<sup>3</sup>, also hardwood dust.
- H** These vacuum cleaners permit picking up dusts of the dust classes L, M and H with OEL values of < 0.1 mg/m<sup>3</sup>, carcinogenic dusts and dusts with germs or bacteria.

Source: ICE / EN 60335-2269 Annex AA



Should you require more information about the various dust classes, please ask your local Hilti representative or go to [www.hilti.lokal](http://www.hilti.lokal).

**Possible measures to reduce dust exposures are dust removal systems or the use of alternative methods.**



## **Hilti - your preferred partner.**

For higher productivity and greater safety on the jobsite.

Reliable information on the subject of health and safety is essential. Specific solutions are equally important. Hilti, your partner, can provide both. The promise made in our claim “**Hilti. Outperform. Outlast.**” is reflected in our unrivalled range of safety-relevant products, product features and services. We offer innovative solutions for every phase of your project. For many applications we even offer various alternative methods. This gives you the advantage of always being in a position to choose from the most suitable alternatives.

Hilti's commitment to health and safety also encompasses membership of various institutions that deal directly or indirectly with this subject.

Our business model thrives on personal contact with our customers. With the in-depth understanding of applications gained at first hand on construction sites by our experienced representatives, we are in the position to provide individual advice and recommend **the most suitable systems for any type of work. Anytime, anywhere.**

### **Hilti is your partner**

- One of the industry leaders in health and safety
- Optimum methods for every job







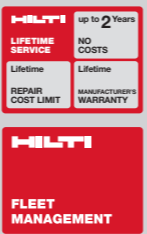
**Find out more on the following pages!**

## One of the industry leaders in health and safety.

Solutions for every phase of your application chain.

From the planning stage right through to realization, plus services from which you will continue to benefit long after completion of your project – Hilti offers a wide range of innovative solutions that bring you higher productivity and greater safety on the jobsite.

The most important products and product features are presented on the following pages.

Application	Planning and specifying	Measuring	Drilling and demolition	Cutting and grinding	Fastening and installation	Insulation and protection	Professional services
Specification, consulting, engineering software	Distance measuring, leveling and aligning, sensing	Drilling and chiseling, diamond systems	Cutting, sanding, diamond systems	Direct fastening, screw fastening, anchoring, installation	Foam systems, fire stopping	Repair Service, Lifetime Service, Fleet Management, Financial Services	
	 PS 200	 ATG AVR DRS	 Vibration dampening ATG DRS	 Pole extensions	 CP 680	 up to 2 years LIFETIME SERVICE NO COSTS REPAIR COST LIMIT MANUFACTURER'S WARRANTY HILTI FLEET MANAGEMENT	
Competent and reliable anchor calculation based on latest approvals and standards	Rebar detection, efficient drilling	Vibration and dust reduction	Vibration and dust reduction	Low vibration, virtually no dust	No drilling of holes, no exposure to chemicals, no emission of volatile organic substances	Consistent high performance, reliable safety mechanisms	

Solutions for every phase of your application chain.




## Optimum methods for every job.



Various systems to choose from. For many applications.

Unlike other suppliers, Hilti can offer alternative solutions for many common applications, resulting in greatly reduced exposure to hazards such as vibration, dust or noise.

A comparison of rotary hammers and breakers, direct fastening and diamond coring techniques shows the advantages of the systems with regard to each application.

More information can be found in the application selector on page 18.

Fastening and installation	Power tools & anchor	Direct fastening	Diamond & anchor
			
<b>Technology</b>	• Electro-pneumatic drilling and mechanical or chemical anchors	• Powder-/gas actuated direct fastening systems	• Electrically-powered wet diamond coring with chemical anchors
<b>Application area</b>	• All applications from low to heavy-duty	• Low and medium-duty applications	• Coring anchor holes in reinforced concrete
<b>Base material</b>	• Concrete and masonry	• Solid concrete and steel	• Concrete and reinforced concrete
<b>Advantages</b>	• Universal • Familiar method • Cordless available • Dust protection available	• Fast • Cordless • Low vibration • No dust	• Coring reinforced concrete • Low structure-borne noise • No dust (wet)

Drilling and demolition	Power tools	Diamond core drilling
		
<b>Technology</b>	• Electro-pneumatic drilling and chiseling	• Electric or hydraulic diamond coring
<b>Application area</b>	• Openings in walls and floors, demolition of structures	• Precise penetrations and openings, controlled demolition
<b>Base material</b>	• Concrete and masonry	• Reinforced concrete and masonry
<b>Advantages</b>	• Universal • Familiar method	• Fast concrete penetrations • Comfortable rig-based coring • Low structure-borne noise • No dust (wet)

### Outstanding solutions. Achieving higher productivity and greater safety.

#### Specification & engineering software. Minimize risks right at the planning stage.



Hilti software helps you to achieve high safety standards at an early stage of the project, e.g. by using Hilti anchor design software for the design calculations for the anchor fastenings to be used. Right from the beginning, Hilti anchor design software can save costs by avoiding errors such as setting too many anchors or drilling anchor holes too deeply, i.e. the safety and reliability of subsequent steps in the project can be optimized right at the planning stage. Updates provided free of charge keep all software up to date with the latest product generations and safety directives.



#### Active Vibration Reduction. Lower vibration for higher productivity. A Hilti technology since 1998.

Hilti has led the field for almost 10 years with a technology that cuts critical vibration effectively by up to two thirds – Hilti AVR Active Vibration Reduction.

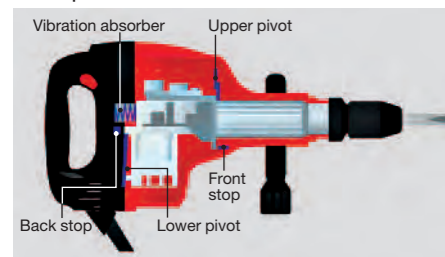
Technical features (depending on individual tool)

- Vibration damping mechanism that reduce the vibration generated by the hammering mechanism, tool bit, etc. by decoupling them from the grips (e. g. by means of springs)
- Vibration in the axial hammering direction is reduced by a vibration absorber
- Counterbalances to reduce vibration

The benefits of Hilti AVR

- Up to 2/3 lower vibration compared to conventional tools
- Longer permissible switched-on times
- Significantly higher daily productivity
- Protects effectively against the effects of long periods of vibration exposure

Example: TE 706-AVR



#### The Hilti Power Effect. Superior system performance for greater safety.

Hilti TE tools, drill bits and chisels are developed together, tested together and perfectly matched to each other to ensure that you benefit in full from the Hilti Power Effect – superior system performance that adds up to much more than just the sum of its components. By using Hilti tools exclusively with Hilti consumables, you achieve not only great performance but also benefit from high safety standards.

<b>HILTI</b>	<b>2 Years</b>
<b>LIFETIME SERVICE</b>	<b>NO COSTS</b>
<b>Lifetime</b>	<b>Lifetime</b>
<b>REPAIR COST LIMIT</b>	<b>MANUFACTURER'S WARRANTY</b>

#### Hilti Lifetime Service. Unique in the power tools business.

Hilti makes it easy to keep tools in excellent working order, thus keeping the risk of health damage or injuries as low as possible. Hilti Lifetime Service applies to all Hilti tools. We provide this comprehensive, top-class service for the entire life of the product – completely free of charge for up to the first two years from date of purchase – covering repair and maintenance of tools, replacement of defective parts (even parts subject to wear and tear!) and including free pick-up and return transport. After that, Hilti continues to prove the quality of its products by setting a repair cost limit – for the entire life of the product. That's not just reassuring to know, it's unique in the power tools business.



#### Hilti Fleet Management. Only the best tools are good enough.

Hilti provides you with a new fleet of tools for a fixed monthly charge. During the agreed period you receive only one consolidated monthly invoice for all tools, covering all costs, including standard repairs. At the end of the period, your fleet will be renewed – with the latest generation of Hilti tools. One of the advantages you have with Hilti Fleet Management is that your tools always comply with the latest safety standards.

Backed by a wealth of experience, Hilti helps you select the type and number of tools that suit your own needs. You may also decide to take advantage of additional services such as loan tools when repairs are necessary, rental tools to meet peak demand, or theft protection. You therefore select the required service level and pay for use of the tools rather than ownership.



#### Direct Customer Contact. We know what you want.

We place great importance on the unrivalled closeness of contact we maintain with our customers. Our qualified sales staff, account managers and field engineers are in direct contact with more than 200,000 of our customers every day. They know the requirements and problems faced by their customers better than any other and are in the position to suggest specific solutions. Hilti also provides advice and training, e.g. hands-on training for correct power tool use and anchor / firestop installation or fire-stop life-safety seminars.



#### Active Torque Control. Stops before you get in a twist. A Hilti technology since 1999.



In addition to the mechanical slip clutch, some combihammers are also equipped with the Active Torque Control system. In the event the tool body rotates too quickly, such as can occur with an uncontrolled drill if the bit binds – a potentially hazardous situation – special sensors coupled to the control electronics switch off the tool automatically within the fraction of a second.





### Dust Removal Systems.

Productivity and safety with dust under control.

Hilti offers a range of power tools, vacuum cleaners, insert tools and accessories which allow significant reduction of dust emissions. All of these perfectly matched individual components are designed to be combined to form systems capable of delivering exceptional performance. This becomes particularly important in work where large volumes of dust are generated because effective dust removal begins with what, at first glance, appear to be insignificant details.

#### The advantages of complete Hilti systems

Hilti **insert tools** (drill bits, chisels, discs, blades, etc.) are designed to achieve optimum air flow and to perfectly match the characteristics of the material on which they are used (type, hardness, abrasiveness, generation of dust) as well as the power output or speed of the applicable power tool. The output of the **power tool** is matched to the intended application, while its ergonomic design ensures perfect compatibility with the corresponding accessories. **Accessories** (e.g. dust removal hoods) are designed to match the suction performance of the vacuum cleaner, the geometry of the insert tool and power tool as well as the characteristics of the material on which the tool is used. The suitability of an industrial vacuum cleaner for construction site applications is determined by its rated suction performance, filter category and suction performance achieved in practical use.



#### For virtually every application



### Wide range of superior solutions.

Hilti's highly effective dust removal systems allow significant reduction of dust emissions.

#### Hilti professional dust removal systems for

- Cordless and corded rotary hammers and combihammers
- Diamond coring and grinding systems
- Cutters and slitting machines
- Hand-held circular saws, orbital-action jig saws, orbital sanders and random-orbit sanders

### DRS and their uses.



#### Attachable, integrated dust removal systems

The perfect add-on for small and mid-sized TE tools: Self-contained dust removal attachments require no additional vacuum cleaner.



#### Dust removal hood and vacuum cleaner

Hilti vacuum cleaners can be connected to many Hilti tools and models are available for dust classes L and M. Some vacuum cleaners with high-efficiency particulate filter (HEPA) which can remove at least 99.97% of airborne particles 0.3 µm in diameter from the vacuumed air-stream will also become available early in 2008.



#### Flushing with water

Water-based dust removal systems also cool the core bit or blade and are thus the ideal solution for heavy diamond coring or cutting applications.



### Choose your method. For optimum safety on every job.

Hilti can suggest alternative methods for almost every individual application! Ask us for further information about the various methods Hilti offers to suit **your** needs. Your local Hilti representative will be pleased to provide competent on-the-spot advice and assistance.

Further information about alternative methods and the complete list of vibration data can also be found at [www.hilti.com](http://www.hilti.com).



#### Building construction: rebar | doweling

Drilling small anchor holes for rebar fastening ≤ 18 mm

		Diamond drilling & chemical anchors		Rotary drilling & chemical anchors	
					
		DD EC-1		TE 50-AVR    TE 40-AVR	
<b>Vibration</b>	No. of fastenings/holes drilled at	Ø 18 mm (100 mm deep)		Ø 18 mm (100 mm deep)	
	• Exposure Action Value (2.5 m/s²)	47		57    67	
	• Exposure Limit Value (5 m/s²)	188		228    268	
<b>Noise</b>	Sound pressure level L <sub>pa</sub> according to European Standard EN 60745-2-11	84 dB(A)		93 dB(A)    94 dB(A)	
<b>Dust</b>	Dust protection solutions	Water		TE DRS-S    TE DRS-S	
<b>Other advantages</b>		<ul style="list-style-type: none"> <li>• Drilling through rebar</li> <li>• DD CR1 drilling rig for even lower vibration available</li> <li>• Low structure-borne noise</li> <li>• DD REC1 water recycling</li> </ul>		<ul style="list-style-type: none"> <li>• AVR system</li> <li>• High universality</li> <li>• Well known to workers</li> </ul>	

#### Interior finishing: drywall



Fastening drywall track to concrete

		DX direct fastening		Rotary drilling & anchor	
					
		GX 120    DX 351		TE 2 (02)    TE 6-A	
<b>Vibration</b>	No. of fastenings/holes drilled at	Ø 8 mm (50 mm deep)		Ø 8 mm (50 mm deep)	
	• Exposure Action Value (2.5 m/s²)	3500    800 - 2100*		162    219	
	• Exposure Limit Value (5 m/s²)	14 000    3200 - 8400*		648    876	
<b>Noise</b>	Sound pressure level L <sub>pa</sub> according to European Standard EN 60745-2-11	102 dB(A)**    104 dB(A)**		91 dB(A)    90 dB(A)	
<b>Dust</b>	Dust protection solutions	Virtually no dust emission from base material		TE DRS-S    TE DRS-S	
<b>Other advantages</b>		<ul style="list-style-type: none"> <li>• Cordless</li> <li>• Low structure-borne noise</li> <li>• DX 351 pole extension for ceiling</li> <li>• High working speed</li> </ul>		<ul style="list-style-type: none"> <li>• Cordless available</li> <li>• Universal method</li> <li>• Well known to workers</li> </ul>	

\* Depending on cartridge color | \*\* Workplace relevant emission value L<sub>pa,16</sub>



#### Steel and metal: metal framing

Erecting skeleton frames – drilling large-diameter anchor holes

		Diamond drilling & anchors		Rotary drilling & anchors	
					
		DD EC-1		TE 50-AVR    TE 40-AVR	
<b>Vibration</b>	No. of fastenings/holes drilled at	Ø 18 mm (100 mm deep)		Ø 18 mm (100 mm deep)	
	• Exposure Action Value (2.5 m/s²)	47		57    67	
	• Exposure Limit Value (5 m/s²)	188		228    268	
<b>Noise</b>	Sound pressure level L <sub>pa</sub> according to European Standard EN 60745-2-11	84 dB(A)		93 dB(A)    94 dB(A)	
<b>Dust</b>	Dust protection solutions	Water		TE DRS-S    TE DRS-S	
<b>Other advantages</b>		<ul style="list-style-type: none"> <li>• Drilling through rebar</li> <li>• DD CR1 drilling rig for even lower vibration available</li> <li>• Low structure-borne noise on concrete</li> <li>• DD REC1 water recycling</li> </ul>		<ul style="list-style-type: none"> <li>• AVR system</li> <li>• High universality</li> <li>• Well known to workers</li> </ul>	



#### Civil engineering: crash and noise barriers

Drilling large-diameter and deep anchor holes

		Diamond drilling (rig-based) & anchors		Combiammers & anchors	
					
		DD 130 + rig		TE 60-ATC    TE 80-ATC	
<b>Vibration</b>	No. of fastenings/holes drilled at	Ø ≤ 52 mm (100 mm deep)		Ø 25 mm (100 mm deep)	
	• Exposure Action Value (2.5 m/s²)	290		82    93	
	• Exposure Limit Value (5 m/s²)	1160		328    372	
<b>Noise</b>	Sound pressure level L <sub>pa</sub> according to European Standard EN 60745-2-11	89 dB(A)		99 dB(A)    99.5 dB(A)	
<b>Dust</b>	Dust protection solutions	Water		TE DRS-S    –	
<b>Other advantages</b>		<ul style="list-style-type: none"> <li>• Drilling rigs for reduced vibration (DD 130 + DD 130 rig)</li> <li>• Low structure-borne noise</li> </ul>		<ul style="list-style-type: none"> <li>• ATC system</li> <li>• Universal method</li> <li>• Well known to workers</li> </ul>	

#### Mechanical and electrical: wall openings

Penetrations through concrete for pipes and cable trays

		Diamond drilling (rig-based)		Breakers	
					
		DD 130 + rig    DD 200 + rig		TE 706-AVR    TE 500-AVR	
<b>Vibration</b>	No. of fastenings/holes drilled at	Ø 87 mm (140 mm deep)    Ø 152 mm (140 mm deep)		Size of opening in concrete at 140 mm wall thickness	
	• Exposure Action Value (2.5 m/s²)	80    390		140 x 891 x 891    140 x 477 x 477	
	• Exposure Limit Value (5 m/s²)	320    1560		140 x 1782 x 1782    140 x 953 x 953	
<b>Noise</b>	Sound pressure level L <sub>pa</sub> according to European Standard EN 60745-2-11	89 dB(A)    92 dB(A)		87 dB(A)    94 dB(A)	
<b>Dust</b>	Dust protection solutions	Water		–    –	
<b>Other advantages</b>		<ul style="list-style-type: none"> <li>• Drilling rigs for reduced vibration (DD 130 + DD 130 rig / DD 200 + HD 30)</li> <li>• Low structure-borne noise</li> </ul>		<ul style="list-style-type: none"> <li>• AVR system</li> <li>• Universal method</li> <li>• Well known to workers</li> </ul>	

## Frequently asked questions. And all the answers.

### Who is affected by the vibration, noise and dust directives and regulations?

The directives and regulations are primarily aimed at employers of persons who, in the course of their work, are required to operate equipment that transmit vibration to the hands or, more generally, persons who are in contact with vibrating equipment and/or exposed to dust and noise. The persons most at risk are those who work regularly with high-vibration equipment over extended periods of time. The directive also encourages manufacturers of equipment, including power tools, to reduce the level of vibration and noise produced by their products, as far as practicable, through use of up-to-date design and technology.

### What do the physical agents directives mean for employers and employees?

Generally speaking, employers are required to inform and train their workforces and, in addition, they are required to assess and manage the risks to their employees. Employees are advised to report any signs of detrimental effects, to use the right tools and ear protection, to consider alternative methods and to implement job rotation.

### Does the use of power tools in general, due to the vibration they produce, present a serious cause for alarm?

The use of power tools is only one of many possible sources of exposure to vibration. Only when certain values for total exposure to vibration are exceeded does it become necessary to take measures to reduce this vibration and exposure to it. Total exposure is the cumulative effect of all activities that generate vibration greater than 2.5 m/s<sup>2</sup>, whether on the jobsite or elsewhere. Please note that the effect of vibration can be greatly influenced by temperature and moisture on the hands as well as gripping forces etc.

### How do I know if EU vibration limits are exceeded?

First and foremost, you should assess the risk for each operator who uses high-vibration equipment. The degree of risk can be ascertained from two pieces of key information:

- 1) The typical or average time that the operator will actually use the tool or tools per day ("trigger time").
- 2) The level of vibration that the tools are likely to produce while in use, as measured by an approved test authority in accordance with the appropriate test standard. Hilti provides data according to EN 60745 wherever possible, e.g. in the operating instructions.

Once you have this information, you can quickly and simply identify who, if anyone, is at risk (those that work above EAV, or will exceed ELV) and implement your control measures as required by the directive.

Note: EU regulations do not cover leisure activities causing additional vibration.

### Do the physical agents directives affect all power tools to the same extent?

Most power tools are not affected by the directives because either the measured vibration / noise levels are very low or the actual operating time (trigger time) is quite short. Power tools with vibration levels not exceeding 2.5 m/s<sup>2</sup> can generally be considered non-critical.

However, power tools with a vibration level typically well in excess of 2.5m/s<sup>2</sup> might be affected by the directive, depending on the operator's daily usage (trigger time).

### How long do I actually work with a power tool?

This is something that many operators and employers find difficult to estimate. Most will drastically overestimate this time period, which of course has a devastating effect on the results of a risk assessment. The time that passes while the machine is actually switched on and applied to the work is usually a very short time, perhaps only seconds for each application, e.g. drilling a hole. This is referred to as "trigger time". If

repetitive work is involved, a simple timing exercise is all that's needed to establish an operator's daily trigger time. If you are planning and already know the number of holes that will be drilled per day, Hilti can help you to check roughly whether or not the job is within the vibration exposure limits. Please refer to the tool and application selectors in this document.

### How do I know what level of vibration a tool produces?

The vibration levels of a power tool are stated in the operating instructions. Every power tool manufacturer has been obliged to provide this information for many years. The vibration data provided by manufacturers, however, can be misleading since it was measured in accordance with early versions of test standards not designed to reflect typical "in use" vibration levels. A great deal of work has been carried out recently with the objective of harmonizing vibration test standards and establishing just one test code of practice for each category of tool.

The vibration values obtained in this way will be reliable, comparable and give a better indication of vibration levels likely to be experienced by the operator while carrying out most common tasks at the workplace. Manufacturers of electric power tools will amend their operating instructions and test codes in accordance with EN 60745-1:2006, which incorporates the respective testing conditions. Hilti has already tested its power tools in accordance with the latest revision of EN 60745-1:2006 and will publish data for the complete range.

### How is power tool vibration measured?

Sensors are fitted to the handles of the power tools in accordance with EN 60745-1:2006, and vibration of the power tool is then measured in three directions (tri-axially), under strictly controlled conditions, using a special measuring instrument. Tri-axial vibration levels are required for proper risk assessment. Single-axis levels should not be used without a correction factor since these have often been measured in accordance with older test standards, e.g. EN 50144, EN 60745:2003 and do not reflect "in-use" vibration levels.

### How can safety be optimized?

In any case, please refer to the Hilti Operating Instructions. According to some commonly-quoted tips, the operator should:

- Be properly trained on the correct use of the power tool and should not grip the handles too tightly.
- Not smoke (smoking affects circulation and sensitivity to HAV).
- Take regular breaks.
- Wear gloves to help maintain good circulation, keep the hands warm.
- Use premium-grade power tools and consumables and replace bits & blades promptly when worn.
- Avoid application of excessive pressure – allow the tool do the work.
- Consider job rotation or alternative working methods, e.g. rotary (diamond) drilling instead of hammer drilling.
- Take good care of the equipment used for the work and maintain it properly.
- When working, always wear the protective goggles and personal safety equipment specified in the operating instructions, such as ear plugs, work clothing, respiratory protection, hard hat etc.
- Use respiratory protection appropriate for the type of dust generated, and designed to filter out microscopic particles.



## Where should you start? General recommendations.

### Employers

- **Inform** your workforce about risks
- **Train** your workers in the correct and safe handling of tools, materials and accessories
- **Assess** the risks to your workforce in accordance with the applicable legal guidelines
- **Manage** the risks (consider alternative methods, ensure regular health checks, provide only suitable tools, materials and accessories, etc.)

### Employees

- **Ensure** that you have received training in the correct handling of tools, materials and accessories
- **Read and observe** all safety information and operating instructions
- **Use personal safety equipment** (hard hat, ear plugs, goggles, respiratory protection, gloves, working clothes, etc.)
- **Take breaks** from work and exercise your fingers to assist the circulation and aid relaxation
- **Report** any sign of health damage immediately to your supervisor

## Do you still have questions about health and safety? Get in touch with Hilti.

Our qualified and experienced account managers, field engineers and customer service representatives are at your service. Anytime. For more information, please visit [www.hilti.local](http://www.hilti.local)

### Disclaimer

#### General

All information and calculations are to be used only as a guide requiring strict adherence to the operating instructions and other technical information and annexes provided by Hilti plus maintenance of the technical system.

The employer is responsible for adhering to the legal requirements concerning workplace health and safety and for evaluation of the actual vibration levels by making the appropriate calculations specific to the application and jobsite conditions. Hilti cannot accept any respective liability.

National regulations may differ from those outlined in this documentation. Hilti cannot accept any liability resulting from incompleteness of the information in this documentation.

All vibration and noise values and calculations contained in this documentation and its annexes are based on measurements using Hilti tools and consumables (bits, chisels, blades, discs, nails, etc.). The measurements were carried out following the appropriate standards.

The vibration emission level for power tools given in this information has been measured in accordance with a standardised test given in EN 60745-1:2006 or EN 61029 and may be used to compare one tool with another. It may be used for a preliminary assessment of exposure.

The declared vibration emission level represents the main applications of the tool. However if the tool is used for different applications, with different accessories or is poorly maintained, the vibration emission may differ. This may significantly increase the exposure level over the total working period.

An estimation of the level of exposure to vibration should also take into account the times when the tool is switched off or when it is running but not actually doing the job. This may significantly reduce the exposure level over the total working period.

Identify additional safety measures to protect the operator from the effects of vibration such as: maintain the tool and the accessories, keep the hands warm, organisation of work patterns.

The measurements for direct fastening tools are single-dimensional and were taken during typical applications under laboratory conditions in accordance with ISO 8662-11.

The permissible number of fastenings was calculated following the recommendations of the Technical Report CEN/TR15350:2006. Averaged vibration values were used for calculation of the permissible numbers of fastenings.

The sound pressure and sound power values for portable electric power tools were determined in accordance with standard EN 60745 and for transportable electric power tools in accordance with standard EN 61029.

An important condition for these measurements is that the tested Hilti product is treated as a technical system comprising the tool and the applicable consumables.

Dust from material such as paint containing lead, some wood species, minerals and metal may be harmful. Contact with or inhalation of the dust may cause allergic reactions and/or respiratory diseases to the operator or bystanders. Certain kinds of dust, such as oak and beech dust, are classified as carcinogenic, especially in conjunction with additives for wood conditioning (chromate, wood preservative). Material containing asbestos must only be treated by specialists.

- Where the use of a dust extraction device is possible it shall be used.
- The workplace must be well ventilated.
- The use of a dust mask of filter class P2 is recommended.

Follow national requirements for the materials you want to work with.

#### Disclaimer for power tool selector

The vibration emission levels given in this information sheet have been measured in accordance with a standardised test described in EN 60745-1:2006 or EN 61029 and may be used to compare one tool with another. They may be used for a preliminary assessment of exposure.

The declared vibration emission levels represent the main applications of the tools. However if the tools are used for different applications, with different accessories or are poorly maintained, the vibration emission may differ. This may significantly increase the exposure level over the total working period.

An estimation of the level of exposure to vibration should also take into account the times when the tool is switched off or when it is running but not actually doing the job. This may significantly reduce the exposure level over the total working period.

Identify additional safety measures to protect the operator from the effects of vibration such as: maintain the tool and the accessories, keep the hands warm, organisation of work patterns.

The respective numbers shown in the selector indicate as follows:

- **Rotary hammers (1):** Numbers of holes that can be drilled in one working day without exceeding the exposure action value or exposure limit value as defined in the EU vibration directive 2002/44/EC.
- **Combi hammers (2):** Numbers of holes that can be drilled or respectively the size of opening that can be chiselled in one working day without exceeding the exposure action value or exposure limit value as defined in the EU vibration directive 2002/44/EC.
- **Breakers (3):** The size of opening that can be chiselled in one working day without exceeding the exposure action value or exposure limit value as defined in the EU vibration directive 2002/44/EC.
- **Diamond coring tools (4):** Numbers of holes that can be drilled in one working day without exceeding the exposure action value or exposure limit value as defined in the EU vibration directive 2002/44/EC.
- **Reciprocating saws (5):** Number of cutting meters that can be cut or respectively the number of cuts that can be performed in one working day without exceeding the exposure action value or exposure limit value as defined in the EU vibration directive 2002/44/EC.

The vibration values listed are triaxial measurements made in accordance with EN 60745-1:2006 or EN 61029. The vibration values shown are generated from laboratory test data and do not guarantee actual vibration values for any specific application on site. The values are rounded averages.

Noise values are measured in accordance with EN 60745-1:2006 or EN 61029. Regardless of the noise value, Hilti strongly recommends that appropriate noise protection is worn.

The material used for the measurements is defined as following:

- Rotary hammers, combi hammers, breakers and diamond coring tools are measured on concrete with a minimum compressive strength of 40 N/mm<sup>2</sup> (after 28 days). The concrete is not reinforced. The depth of the holes drilled is stated in the respective table.
- Reciprocating saws are measured on chipboard with the dimensions of 600 x 38 mm and beams of fir wood with the dimensions of 100 x 100 mm.

The size of opening chiselled by the small breakers up to and including the TE 706 represents chiselling out an opening in a wall (e.g. for a window) in solid material, i.e. the opening is surrounded by concrete on all sides.

When chiselling at the edge of a slab, performance is higher by a factor of 2-3. With the TE 805 and TE 905-AVR, the application is demolition chiselling towards the ground on an edge.

The productivity values are calculated on the basis of the vibration value and performance of the tool and are measured in the procedures according to EN 60745-1:2006 or EN 61029. They vary, depending on many factors, such as the material, possible rebar hits, type and sharpness of the bit, chisel or blade used and the working behaviour of the user etc. All values are measured using new Hilti power tools and bits, chisels, blades etc.

Drilling into or through rebars influences the rate of drilling progress and vibration emissions. This, as a rule, leads to a significant reduction of overall productivity (decrease in the number of holes drilled).

The values given in the tool and application selectors are therefore to be used only as a guideline. The employer is responsible for ensuring that limit values are not exceeded.

The efficiency of dust removal systems depends strongly on their correct use as well as the conditions on the jobsite, e.g. the type and surface shape of the material worked on. The values given and statements made with respect to dust removal are therefore an indication only.

Dust from material such as paint containing lead, some wood species, minerals and metal may be harmful. Contact with or inhalation of the dust may cause allergic reactions and/or respiratory diseases to the operator or bystanders.

Certain kinds of dust are classified as carcinogenic such as oak and beech dust especially in conjunction with additives for wood conditioning (chromate, wood preservative). Material containing asbestos must only be treated by specialists.

- Where the use of a dust extraction device is possible it shall be used.
- The work place must be well ventilated.
- The use of a dust mask of filter class P2 is recommended.

Follow national requirements for the materials you want to work with.

#### Disclaimer for direct fastening selector

The vibration and noise values listed in this table are generated from laboratory tests and do not guarantee actual recoil values in any specific application on site. The values are rounded averages.

These vibration and noise values are therefore to be used as a guideline only. The employer is responsible for adhering to legal requirements applicable to workplace health and safety and for evaluation of the actual vibration and noise values by taking the appropriate on-site measurements.

Underlying measurements for vibration values are one-dimensional and taken in typical applications under laboratory conditions in accordance with ISO 8662-11.

Underlying measurements for noise values are taken in typical applications under laboratory conditions in accordance with EN 12 549 acoustics - noise test code for fastener driving tools.



**Hilti. Outperform. Outlast.**

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