



5 Steps to Controlling Hand Arm Vibration

According to the HSE, over 2 million workers in the UK are exposed to levels of hand-arm vibration which put them at clear risk of developing one or more of the problems associated with Hand Arm Vibration Syndrome.

What are the affects of vibration

Hand Arm Vibration Syndrome (HAVS) refers to a condition typically brought on in the workplace from vibration from the use of hand-held power tools and other powerful vibrating machinery. It is a permanent painful condition affecting blood vessels, nerves and joints which over time can stop people from carrying out normal everyday tasks and cause disability or, in extreme cases, the need for amputation. The condition can affect the body parts that make up your hand, wrist and arm and may develop slowly over time, becoming more severe the longer exposure occurs.

Other related conditions caused by vibration, and often covered generically under the HAVS term, include Carpal Tunnel Syndrome (CTS) and Vibration White Finger (VWF); claims for these make up the second largest industrial injuries disablement benefit after lung-related diseases.

Whilst new claims have generally been declining – due to greater awareness of the issues and new ways of doing things – there are still around 1000 reported cases every year with associated costly fines.

About this Guide

Unless vibration is identified and properly assessed, employers can't know the level of vibration risk and whether action is needed to protect workers. It is very important that people exposed to hand-arm vibration are informed of the early symptoms such as tingling, numbness and whitening of fingers so that they are given opportunities to be protected from further permanent damage.

This Guide provides some basic guidance for companies who are making efforts to control the risks of hand-arm vibration affecting their employees and comply with The Control of Vibration at Work Regulations (2005).

What are your duties as an employer?

Step 1: Establish whether there is a risk?

Firstly, you need to establish whether there are any vibration hazards in your workplace. This can be achieved by looking at the work being undertaken, how it is done, i.e. what tools are needed to do the work, and how often / to what extent they are used. This can be achieved through a combination of simple observation and a knowledge of employee work practices.

Tools that can cause **Hand Arm Vibration Syndrome (HAVS)** include:

- concrete breakers, concrete pokers
- sanders, grinders, disc cutters
- hammer drills
- chipping hammers
- chainsaws, brush cutters, hedge trimmers
- powered mowers
- scabblers or needle guns.

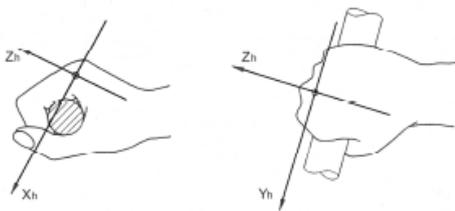


Step 2: If so, find out who is at risk?

Having found out what work practices present a hazard, you need to identify all employees who could be at risk. Evaluate how harm may occur, for instance, damage to circulation in the fingers, hands and/or arms. You should take into consideration those employees who may already have some form of damage to their hands or who are more vulnerable to HAVS because of pre-existing circulatory problems, such as those people with Diabetes or Reynaud's disease.

Step 3: Measure tool vibration

Under the Regulations, employers are asked to assess machinery and tools which pose a risk. Whilst many manufacturers provide vibration data for their tools it is often of limited value because this is how they are tested when they are new and in ideal 'laboratory' conditions; it does not take into account the condition of the tools, the age of them, the nature of the work, and the way people do a job. Instead, you should carry out vibration magnitude measurements of the tools in real time in the real environment when and how they are used.



Vibration exposure values must be determined using the vector sum (root-sum-square) of three axes of vibration. A **hand-arm vibration meter, like the Pulsar vB**, will use a tri-axial accelerometer, attached to the power tool, to do this automatically (calculating the sum of vibration across the three axes, X, Y and Z). This is also known as the vibration magnitude measured in m/s^2

What measurement information do you need?

To assess the vibration risk of individual tools you need to do the following:

1. Assess the vibration magnitude (Vector Sum) of the tools using a HAV meter. Measure as close to where the hands hold the tool as possible (with 2-handled tools measure each handle), making sure the X, Y and Z axes are pointing in the correct direction of travel.
2. Assess the tools Vibration Points Value (using the HSE's Calculator)
3. Assess how long they can use the tool for without increased risk of damage.
4. Keep a tool register of this important information. You might also include information on how the test was completed (e.g. in the case of a drill, what drill bit was used and what you drilled into), the age of the tool and its condition.



The Pulsar vB
Hand-Arm
Vibration
Meter

Step 4: Assess employee vibration exposure

As a responsible employer, not only is it vital to know the vibration risk of the power tools your employees use, it's also important to identify their individual exposure risk (or dose) during a typical shift. The overall vibration exposure of individual employees is measured over a reference period of 8 hours and is known as the A(8).

To assess the vibration risk to individuals (daily exposure) you need to carry out Step 3 of this Guide and:

1. Talk with employees and find out what their typical work routine consists of, identify what power tools they use, how regularly they use them and how long they are on for - '**trigger time**'.
2. Calculate the vibration exposure A(8) and/or partial vibration points exposure.

To calculate the A(8) for an individual, the Vector Sum m/s^2 is multiplied by the square root of the trigger time divided by the reference 8 hours. For example, if an employee uses a Strimmer for 1 hour with a Vector Sum of 5.5 m/s^2 their A(8) is as follows:

$$A(8) = 5.5 \times \sqrt{1 \text{ hour} / 8 \text{ hours}} = 1.9 \text{ m/s}^2 \text{ [under the Employee Action Value of } 2.5 \text{ m/s}^2\text{]}$$

The software provided with most HAV meters, like the Pulsar vB, will do this calculation for you. You can also input the data into the HSE's HAV calculator, or use a **HAV 'ready reckoner'** like the one on our website; all you need is the vibration magnitude (level) and the trigger time (exposure time).

Calculating daily vibration exposure for a combination of tools

If an individual uses more than one tool throughout their shift (i.e. a combination of tools to carry out their jobs) their overall vibration exposure risk should be calculated by combining the A(8) for each tool (as above). Each tool's A(8) represents the **partial vibration exposure** (or dose). These partial exposures are then combined to give the **overall exposure risk** for that person on a typical shift using that combination of tools. Again, the software provided with most HAV meters or the HSE's calculator will do this for you.

Step 5: Reporting and making recommendations

Using the data collected in Steps 3 and 4 and the knowledge of work practices and people at risk from Steps 1 and 2 you can now put together a picture of how long an individual can use a tool or tools for. There are essentially two ways to do this:

1. Via the vibration points system and/or
2. Looking at Exposure Action Values (EAV) and Exposure Limit Values (ELV) over an 8-hour working day.

The points system can be useful when people are involved in multiple tasks during a working day with risks of exposure. Tagging tools with their vibration points can be a much better way than simply colour coding them.

Exposure Action values and Limit values

Regulation 4 - of the Vibration Regulations sets out the Exposure limit values and action values for Hand Arm Vibration. The regulations define an **Exposure Action Value (EAV) of 2.5 m/s^2** , and an **Exposure Limit Value (ELV) of 5.0 m/s^2** . The EAV defines the exposure level at which point an employer must take action to reduce the exposure to as low a level as is reasonably practicable. If an employee is above the ELV an employer must reduce the exposure to below the limit value i.e. the Limit Value must not be exceeded (Regulation 6).

Values	Description	A(8) – m/s^2	Exposure Points
Exposure Action Value (EAV)	The daily exposure action value standardized to an eight-hour reference period.	2.5	100
Exposure Limit Value (ELV)	The daily exposure limit value standardized to an eight-hour reference period.	5.0	400

“The EAV is not stated to be a ‘safe’ level. Employers should concentrate on the elimination or reduction of vibration exposure and risk”

Recommendations for minimising exposure risk

The Vibration Regulations set out suggested ways to minimise exposure risk:

- Regulation 5 - Select low vibration level tools and reduce exposure 'trigger' times where needed.
- Regulation 6 - Maintain tools / machines
- Regulation 7 - Health surveillance should be implemented where the EAV is exceeded
- Regulation 8 - Provide information and instruction on the use of tools and how to detect signs of HAVs injury
- Regulation 9 - Provide training on the correct use of tools.

In addition, we recommend the following measures:

- create a tool register which keeps records of every power tool, how they are used, their vibration magnitude m/s^2 , how long they can be used for, their exposure points, age, maintenance schedule and so on
- label or tag tools using a colour-coded traffic light system (see below) for their vibration exposure levels, and/or label them with points values (this is especially useful if more than one tool is used in a typical shift).
- carry out health surveillance of anyone with pre-existing circulatory conditions or an existing diagnosis of HAVS
- redesign jobs to eliminate the need for vibrating tools in so far as is practicable and/or change working practices and put administrative controls in place to reduce individuals' exposure
- have a 'buy smooth' purchasing policy for low-vibration tools
- keep employees warm and encourage them to give up smoking to help blood circulation in hands and arms
- encourage staff to take breaks from using their power tools by doing other tasks in between.

Traffic light colour	Vector sum acceleration level (m/s^2)	Recommended exposure times
	0 – 2.5	Up to 8 hours
	2.5 – 5.0	Up to 1 hour 30 mins
	>5.0	<30 minutes (consult H&S first)

Example traffic light system for HAV tool labels and tags

Summary

Employers should concentrate on the elimination or reduction of vibration exposure and risk:

The Regulations clearly state that "risks arising from exposure to mechanical vibration shall be eliminated at their source or reduced to a minimum". The EAV is not stated to be a 'safe' level and staying below it is not a sufficient defence if there are reasonably practicable steps you can take to eliminate or reduce vibration.

Under the "assessment of the risk to health and safety created by vibration in the workplace" defined by the Regulation, employers are required to record any significant findings, and the measures they have taken to meet the requirements. We recommend that employers should show a hierarchy of controls has been put in place for any exposure of employees above $1 m/s^2$.

In summary, if you have collected information that shows you should have known there was a problem, you must be able to show you are doing something to control the risk.

Further information

We sell and hire hand-arm vibration meters and our staff are also competent in site-based vibration assessments. Contact us to find out more.

Email: sales@pulsarinstruments.com

Call: +44 (0)1723 518011

Visit: www.pulsarinstruments.com

