Hand Arm Vibration
(HAV) and Power Tools

On the 6th of July 2005 the EU Physical Agents (Vibration) directive, 2002/44/EC comes into effect. Member states, including the UK, will be expected to fully implement this directive over a transitional period of up to six years until at the latest July 6th 2011.

Employers should not panic or make any immediate drastic changes to their current working practices or work equipment. The directive simply requires that Hand Arm Vibration should now be considered an official risk to health and safety in the workplace, and it should be part of on-site risk assessments in the same way that noise, dust, falling objects etc already are.

The directive is primarily aimed at employers of people who, in the course of their work, hold objects or work equipment that transmit vibration into the hand and arm.

It is therefore to safeguard workers from debilitating vibration related diseases such as Vibration White Finger, which can occur in people exposed regularly, sometimes over years, to high levels of Hand Arm Vibration.

The directive also encourages manufacturers of work equipment, including power tools, to reduce the level of vibration that their products produce through modern design and technology as far as is practicable.

The directive sets two vibration exposure (dose) thresholds, based on an 8 hour working day (A8).

These are:
The EAV – Exposure Action Value of 2.5m/s^2
The ELV – Exposure Limit Value of 5m/s^2

Note: vibration levels and exposure are normally expressed in terms of acceleration i.e. metres per second per second or m/s^2.

If a worker is found through risk assessment to be receiving a Hand Arm Vibration dose above the EAV, the risk must be acknowledged, recorded and if practicable ways should be sought to reduce the exposure. Working below this level is not mandatory but it would be recommended to asses the risk.

If a worker is found, through risk assessment, to be receiving a Hand Arm Vibration dose above the ELV, then Immediate action must be taken to reduce the exposure. Working above this level will not be permitted especially by the end of the transitional period.

Unfortunately there is no e Personal Protective Equipment (PPE) that is effective in substantially reducing Hand Arm Vibration, so the control of this new 'Physical Agent' needs to be through technique, working practices/methods, training, and careful choice of future work equipment purchases.

HAV FAQ

What is HAV?
Hand Arm Vibration is a so-called 'Physical Agent' like dust, fumes or noise that presents a health and safety risk to workers in contact with vibrating objects or work equipment in the workplace.

Why is HAV an issue?
As a result of years of research and thousands of recent compensation claims by sufferers of Vibration White Finger, it is now deemed necessary to Implement legislation to identify those at risk, monitor and regulate vibration exposure in the workplace.

How big an issue is HAV?
It would only be a big issue to an employer who finds through risk assessment that some or all of his workforce are regularly exposed to a daily HAV dose of over 5m/sÇ (A8). In reality this is extremely unlikely since the majority of hand held power tools do not produce high vibration levels, and those that do are not used for excessive periods of time.

Should I believe everything I hear about HAV?
No, there is a lot of misinformation and confusion in the market place, and only reliable sources like the HSE should be consulted. It is the case that some work equipment manufacturers will see the new regulations as a perfect sales opportunity.

Do I need to replace all my power tools?
That's very unlikely, unless they are of such poor quality/ condition that they are found to produce unacceptably high levels of HAV.

Remember power tools need to be correctly maintained, and faults or obvious malfunction dealt with promptly. The power tool itself is never the sole source of Hand Arm Vibration – the accessory, i.e. disc, blade, drill bit etc have an effect too, as does the material to which the power tool is being applied.

How is vibration measured?
It is measured, commonly in lab conditions (for repeatability) by attaching sensors called accelerometers to the handle(s) of the power tool where the hand will hold it, and reading the level on a special Hand Arm Weighted vibration meter. Three directions (Axes) of vibration movement are measured and typically only the 'dominant' or worst Axis is stated by manufacturers.

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The new EU directive requires in the future that the more realistic Tri-Axis result is to be stated which is, a mathematical combination of all three axes.

Often referred to as the 'Vector Sum', these levels, if available, should be used for risk assessment in future. As a guide a good approximation of the Vector Sum level can be calculated by multiplying the dominant (single) Axis by 1.4.

Can I use manufacturer's lab data for a risk assessment?

Manufacturers are working to certain test code norms such as EN50144, which are laboratory tests for vibration on power tools.

Unfortunately, although these tests are repeatable and give an indication of which tools are 'likely' to produce high (or low) levels of vibration, they do not reflect the 'real life' or 'working' vibration level likely to be encountered when the tool is actually being used for it's intended application. In fact more often than not, the working vibration levels are considerably higher than those obtained in the lab.

The problem is that there is at present no EU standard code for measuring working vibration levels. So working test data, while more realistic and suitable for risk assessment purposes, is prone to variation from one test organisation to another because of the multitude of factors that affect, adversely or otherwise, 'working' vibration measurement.

How can I calculate safe working times for power tools?

The easiest way is to use the excellent HAV calculator on the HSE website: www.hse.gov.uk/vibration/calculator.htm

This allows you to input power tool vibration levels and likely 'trigger times' for an individual, it then lets you know how soon the EAV would be reached and, more importantly, if the ELV is likely to be exceeded.

What is 'Trigger Time'?

This is something that a lot of employees and employers find difficult to estimate. In fact most will drastically overestimate this time period, which of course has a devastating effect on the results of a HAV risk assessment.

The trigger time is the time that passes while the machine is actually switched on and applied to the work, in most cases (per application – maybe drilling a hole) a very short time, perhaps seconds. If repetitive work is involved then a simple timing exercise is all that's needed multiplied by the number of cuts made or holes drilled.

A recent survey by a European standards agency has revealed typical daily trigger times in a lot of cases between 10 – 30mins maximum with some rare applications reaching up to 1hr 30min. With this in mind it will in many cases be very difficult for a worker to exceed the new ELV of 5m/sÇ (A8).

How can HAV risks be minimised?

There is plenty of advice available on this subject both in-line and in printed form especially from the HSE. Some commonly quoted tips are:

The worker should:

- Be properly trained on the correct use of the power tool
- Not smoke (smoking affects circulation and sensitivity to HAV)
- Not grip the handles too tightly
- Take regular breaks
- Wear gloves
- Use good quality blades/bits and if available tools with vibration control features
- Replace bits & blades promptly
- Avoid excessive feed pressure letting the tool do the work.

The employer could consider job rotation or alternative methods e.g. diamond not hammer drilling.

What type of tools are especially likely to pose an HAV risk?

Only a fairly small minority could present problems in some cases. These are: Breakers, Chipping Hammers, Rotary Hammers, Impact Drills, Impact wrenches, Needle de-scalers, Electric scrapers, Reciprocating saws, Angle Grinders etc.

Are some manufacturer's products better than others?

(Should I worry about small differences in published vibration levels?). Some manufacturers are focussing more strongly on technical solutions to vibration reduction than others, and of course, their approach will differ too.

All manufacturers are being encouraged to develop low vibration designs for new products as far as is practicable. There will be variations in declared vibration data between similar tools in different manufacturers ranges, but typical values for common classes of tools are known and documented, so exceptionally low vibration levels (where no vibration control feature exists) should be viewed with suspicion. Small differences in vibration levels are relatively insignificant.

Is a tool with the lowest vibration level the best for the job?

Not necessarily, Vibration from a power tool is often a product of the application, not the tool itself. E.g. if a small rotary hammer has a strong hammer blow, it will tend to vibrate more. However a stronger blow nearly always makes the drilling progress faster, resulting in less trigger time and less exposure to the vibration.

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Is vibration the only factor I should consider when buying new power tools?

No; weight, shape and position of handles (comfort), performance – speed of cut / drilling are all factors worth considering. A low vibration power tool could well be a low performance power tool resulting in longer trigger times and greater exposure to HAV. High performance accessories (blades, bits etc.) kept in good condition can also reduce exposure / trigger times, fatigue etc.

What are Bosch doing about HAV on their range of power tools?

For many years Bosch has been manufacturing a range of power tools for trade professionals. Any power tool that is hand-held should be as low in vibration as possible, since high levels of vibration are not only unpleasant, but are a significant risk to health and safety. All Bosch electric motors are dynamically balanced by computer, with counterbalance weights in many of our products to ensure the smoothest operation. We first addressed the HAV issue as early as 2001 with the introduction of “Vibration Control” handles for Angle Grinders.

Since then our SDS-Max hammer range has featured vibration reduction back handles, and we continue to innovate and develop new ideas in this important area. We also strive to increase the performance of our power tools and accessories in order to improve productivity for our users and potentially reduce trigger times and therefore exposure to HAV.

Contact your Bosch Power Tools for full product range information.