

# Vibration at Work – Policy

How to Control Vibration at Work - a Model Policy for Internal Drainage/Water Level Management Boards on Hand-Arm Vibration Syndrome (HAVS)

The aim of this policy is to:

1. highlight those work activities that have the potential to cause hand-arm vibration syndrome,
2. give information on identifying the level of risk associated with such activities and
3. to suggest ways of reducing any significant risks to an acceptable level.

This policy is relevant to any employee of the Internal Drainage/Water Level Management Board.

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## What is Hand-Arm Vibration Syndrome (HAVS)?

HAVS is a condition that has the potential to severely affect any employee who uses powered hand-tools or equipment. Any employee who is regularly exposed to high vibration holding and/or operating vibrating equipment may suffer from reduced blood circulation and damage to the nerves and muscles. This damage manifests itself as a tingling or numbness in the fingers. In more advanced cases, finger blanching occurs. The condition is also often referred to as vibration white finger or 'dead finger'. (*Symptoms are often similar to 'Raynaud's Phenomenon'*)<sup>1</sup>.

The effects of HAVS are cumulative which can ultimately lead to loss of manual dexterity, resulting in clumsiness and reduced grip ability. In severe cases, blood circulation may be permanently impaired and fingers may take on a blue-black appearance.

As indicated above, the primary cause of HAVS is work involving holding vibrating tools or equipment. The risk depends on the extent of the vibration and how long an employee is exposed to it.

## Duties of the Employer

### Responsibility for Risk Assessment and Risk Reduction

It is the **Employers** responsibility to identify activities where the hazard of HAVS is an issue and address this within risk assessments.

Therefore, to establish whether there is a problem, its extent, and how it may be reduced, we will:

1. Identify the equipment that vibrates and find out about the levels of vibration

We will contact suppliers/manufacturers requesting they provide the relevant information. We will consult with Employees as they will have an opinion from using the equipment. We shall also consider vibration monitoring.

2. Equipment will be categorised in terms of hazard contribution, the level of vibration produced and frequency of use.
3. Seek to ascertain from employees whether they have noticed any specific problems with certain types of equipment or machinery.
4. Monitor the workload of employees who use vibration tools/machinery and estimate the exposure they may be receiving.

We will reduce the risk, by applying the principles of prevention:

The General Principles of Prevention are set out in descending order of preference as follows:

1. Avoid risks.
2. Evaluate unavoidable risks.
3. Deal with risks at source.
4. Adapt work to the individual wherever reasonably practicable
5. Adapt the place of work to technical progress.
6. Replace defective equipment immediately

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<sup>1</sup> Raynaud's phenomenon occurs when the extremities of the body, usually the fingers and toes, change colour and may become painful. It is due to a narrowing (constriction) of the small blood vessels on exposure to the cold, or to a change in temperature, or to emotional stress.

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7. Use collective protective measures over individual ones
8. Develop a suitable prevention policy
9. Give appropriate training and instruction to employees and refresh regularly
10. Monitor and review

Practically, we will;

- Consider the necessity to use the current types of tool or whether a task may be achieved a different way
- Seek to minimise the need for operations and tools that expose workers to hazardous vibration.
- Review the effectiveness of hand tools that require physical pressure from the operator to control output
- Evaluate the current asset management/maintenance regime of equipment, ensure it is suitable and sufficient.
- Understand where is likely to be deterioration in any anti-vibration mountings (where/if fitted), the age of equipment and replacement requirements
- Reduce exposure times by breaking up activities to minimise prolonged exposure.
- Encourage risk reduction and how this may be achieved through review of Health and Safety Executive (HSE) publications listed throughout this policy.

## Potential sources of high vibration within the workplace

The following, are lists of the types of equipment identified which may present a vibration hazard. These lists are not exhaustive;

Field equipment

- Chainsaws
- Strimmers
- Hand mowers
- Hedgetrimmers
- Disc cutters
- Flail mowers
- Excavators
- Piling equipment

Workshop equipment

- Grinding tools,
- Rotary burring tools,
- Sanders and drills
- Grinders,
- Disc cutter

## Exposure Limits

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The Regulations define two types of exposure limit.

The Exposure Action Value (EAV) is the level of daily exposure to vibration, which if exceeded requires certain actions to reduce exposure.

The Exposure Limit Value (ELV) is the maximum amount of vibration an employee may be exposed to on any single day.

## Regulation 4 Exposure limit values and action values<sup>2</sup>

1. For hand-arm vibration –
  - a) the daily exposure limit value is 5 m/s<sup>2</sup> A(8);
  - b) the daily exposure action value is 2.5 m/s<sup>2</sup> A(8),

(Daily exposure shall be ascertained on the basis set out in Schedule 1 Part I of the regulations).

2. For whole-body vibration –
  - c) (a) the daily exposure limit value is 1.15 m/s<sup>2</sup>A(8);
  - d) (b) the daily exposure action value is 0.5 m/s<sup>2</sup>A(8),

(Daily exposure shall be ascertained on the basis set out in Schedule 2 Part I of the regulations)

The vibration level produced by equipment is usually assessed by measuring the acceleration level in m/s<sup>2</sup>. The Regulations set an Exposure Action Value (EAV) of 2.5m/s<sup>2</sup> over 8 hours (A8) and an Exposure Limit Value (ELV) of 5m/s<sup>2</sup> over 8 hours (A8).

It is the aim of the Internal Drainage/Water Level Management Board to minimise the risk of HAVS to employees. This will be achieved by understanding the risk arising from using tools and equipment that produce vibration, then reducing exposure to vibration as far as is reasonably practicable<sup>3</sup> by setting time limits for exposure, ensuring equipment is properly maintained and where action values are surpassed, control measures will be put in place to reduce them.

The vibration dose received by the worker over a typical working day depends on the duration of exposure as well as the vibration magnitude.

To allow different exposure patterns to be compared they are adjusted or normalised to a standard reference period of 8 hours, similar to the approach taken for noise levels. The Control of Vibration at Work Regulations 2005 describe how an exposure normalised to 8 hours, A(8), can be calculated. The table below gives the average vibration levels over a working day and the times to reach the exposure levels.

Vibration Magnitude (m/s <sup>2</sup> )	2.5	3.5	5	7	10	14	20
Time to reach exposure action value (in hrs)	8	4	2	1	1/2	1/4	8 mins
Time to reach exposure limit value (in hrs)	>24	16	8	4	2	1	1/2

<sup>2</sup> **Hand-arm vibration** - The Control of Vibration at Work Regulations 2005 - Guidance on Regulations

<sup>3</sup> ""Reasonably practicable' is a narrower term than 'physically possible' The key case is **Edwards v. The National Coal Board**

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Exposure action value = 2.5m/s<sup>2</sup> per 8hr working day

Exposure limit value = 5m/s<sup>2</sup> per 8hr working day

The table below lists some indicative vibration values for typical equipment. Please note, **these are purely for guidance only!** Vibration levels will differ significantly between different manufacturers, the size of the equipment, the age of equipment and how well it has been maintained.<sup>4</sup>

Examples of Equipment	Typical Vibration Levels (in m/s <sup>2</sup> )
Angle Grinder	5.9
Hammer Drill	9.0
Chainsaw	7.0
Hedge Trimmer	5.2

For example, a chainsaw with a vibration level of 7 m/s<sup>2</sup> would result in exposure of the operator to the equivalent of the EAV in just one hour, hence typical use greater than this would require reasonably practicable exposure reduction measures to be taken. If this was used for 4 hours a day the ELV would be exceeded and no further use would be permitted.

*Generally, within the water level management industry, the nature of the work reduces the risk, as work may only be seasonal. Therefore, exposure is normally not prolonged on a regular basis, however due to the narrow window of opportunity to undertake certain works some tasks can take place over 12-hour days. The nature of water level management is such that employees are not continuously carrying out repetitive high-vibration tasks on a daily, 365 days per year. However, this does not negate the need to assess each situation.*

*It is understood that a diversity of work can cause difficulty in accurately assessing exposure due to the use of different tools being used in any one day and for variable lengths of time.*

*However, it should be possible to estimate a cumulative exposure by adding up the typical exposure pattern from the assortment of equipment used.*

## **Duties of Employers - (at any exposure level)**

Assess vibration risks to health and safety

Eliminate vibration risk at source, or reduce to lowest reasonably practicable level

Provide information and training for employees on vibration risks and control measures

### **If the Exposure Action Value (EAV) 2.5m/s<sup>2</sup> is likely to be exceeded**

Reduce exposure to the lowest practicable level

Provide health surveillance

### **The Exposure Limit Value (ELV) 5m/s<sup>2</sup>**

Ensure employees are not exposed above the ELV

If they are, take immediate action to prevent recurrence

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<sup>4</sup> <http://www.hse.gov.uk/research/rrpdf/rr894.pdf>

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## Health Surveillance

If there is a significant risk of HAVS, i.e. due to high vibration limits or long exposure times, then health surveillance will be undertaken. The aim of this is to identify at an early stage any employee who may be showing medical signs of developing HAVS. If at any time between scheduled surveillance an employee notices any of the signs of HAVS, they should report it to their line manager immediately in order that referral to an Occupational Health Specialist can be organised and investigation of the equipment carried out by a competent person immediately.

We will ensure that all employees at risk of exposure to HAVS receive information, instruction and training. This will include;

- information on vibration levels relevant to the equipment and machinery they use, particularly identifying pieces of equipment that are known to have higher vibration levels
- the requirement to regularly interrupt work when using vibrating machinery and intersperse this work with other tasks and/or to share such work with other colleagues
- to be aware of other factors that can increase the likelihood of HAVS such as poorly maintained equipment, inappropriate or incorrect equipment, cold temperatures and smoking
- who to contact and/or report to in case of any issues or concerns

There is an HSE leaflet on HAVS which is a good general information source for employees. Reference IND(G) (rev1) 126L Health risks from hand-arm vibration for employees and the self-employed (HSE 2002).

## Whole Body Vibration

There is also a risk of whole body vibration that can affect those who work with tractor/flail mower combinations, excavators etc. The assessment of this risk be similar to that for HAVS in that identification of a significant risk will lead to control measures such as equipment modification/maintenance, minimising length of exposure and providing information to employees.

## Vibration Monitoring of Existing Equipment

Any tool or equipment that has the potential to cause HAVS issues will be monitored. Such equipment will be clearly identified in tooling, equipment and asset lists.

The results of monitoring will be compared with the manufacturer's information. If monitoring should highlight deterioration through the effect of age or poor maintenance or that there is something wrong with a particular item of equipment it will be removed from service immediately and either repaired or in the case of small items, rendered unusable<sup>5</sup>.

Other solutions may include:

- Purchase of different/new equipment
- Improved maintenance/servicing

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<sup>5</sup> The method of monitoring should be carried out in line with the strategy given in HS(G)88, 2002.

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- Using the equipment for shorter periods of time and
- Providing information, instruction and training to employees on how to lessen the risks.

## Purchasing of New Equipment

Whenever new equipment is to be purchased, the supplier's vibration information will be checked in advance and every effort made to ensure that equipment with the lowest vibration levels and best protection is obtained.

## Asset Management and Maintenance of Equipment

In order to minimise the deterioration of equipment and ensure equipment is being used correctly, items will be inspected and serviced on a regular basis. Advice from the suppliers/manufacturers will be taken into account which may require specific checks are required that could lead to early identification of problems or accessory replacements.

All employees will be made aware that if at any point they feel an individual tool or piece of machinery has deteriorated in terms of vibration, they must report immediately so that further investigations can be made.

## Exposure Points System and Ready-Reckoner<sup>6</sup>

The table on page 9 is a 'Ready Reckoner' (RR) for calculating daily vibration exposures. All that is required is the vibration magnitude (level) and exposure time. The RR covers a range of vibration magnitudes up to 40 m/s<sup>2</sup> and a range of exposure times up to 10 hours.

The exposures for different combinations of vibration magnitude and exposure time are given in exposure points instead of values in m/s<sup>2</sup> A(8). This may be easier to work with than the A(8) values:

- exposure points change simply with time: twice the exposure time, twice the number of points;
- exposure points can be added together, for example where a worker is exposed to two or more different sources of vibration in a day;
- the exposure action value (2.5 m/s<sup>2</sup> A(8)) is equal to 100 points;
- the exposure limit value (5 m/s<sup>2</sup> A(8)) is equal to 400 points;

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<sup>6</sup> <http://www.hse.gov.uk/vibration/hav/readyreckoner.htm>

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Vibration magnitude, $a_{hw}$ (m/s <sup>2</sup> )	Exposure time, $T$											
	5 min	15 min	30 min	1 h	1 h 30 min	2 h	3 h	4 h	5 h	6 h		
40	265	800										Above exposure limit value
30	150	450	900									Likely to be at or above limit value
25	105	315	625	1250								Above exposure action value
20	67	200	400	800	1200							Likely to be at or above action value
19	60	180	360	720	1100	1450						Below exposure action value
18	54	160	325	650	970	1300						
17	48	145	290	580	865	1150						
16	43	130	255	510	770	1000						
15	38	115	225	450	675	900	1350					
14	33	98	195	390	590	785	1200					
13	28	85	170	340	505	675	1000	1350				
12	24	72	145	290	430	575	865	1150	1450			
11	20	61	120	240	365	485	725	970	1200	1450		
10	17	50	100	200	300	400	600	800	1000	1200		
9	14	41	81	160	245	325	485	650	810	970		
8	11	32	64	130	190	255	385	510	640	770		
7	8	25	49	98	145	195	295	390	490	590		
6	6	18	36	72	110	145	215	290	360	430		
5.5	5	15	31	61	91	120	180	240	305	365		
5	4	13	25	50	75	100	150	200	250	300		
4.5	3	10	21	41	61	81	120	160	205	245		
4	3	8	16	32	48	64	95	130	160	190		
3.5	2	6	13	25	37	49	74	98	125	145		
3	2	5	9	18	27	36	54	72	90	110		
2.5	1	3	6	13	19	25	38	50	63	75		
2	1	2	4	8	12	16	24	32	40	48		
1.5	0	1	2	5	7	9	14	18	23	27		
1	0	1	1	2	3	4	6	8	10	12		

Using the ready reckoner

1. Find the vibration magnitude (level) for the tool or process (or the nearest value) on the grey scale on the left of the table.
2. Find the exposure time (or the nearest value) on the grey scale across the bottom of the table.
3. Find the value in the table that lines up with the magnitude and time. The illustration shows how it works for a magnitude of 5 m/s<sup>2</sup> and an exposure time of 3 hours: in this case the exposure corresponds to 150 points.
4. Compare the points value with the exposure action and limit values (100 and 400 points respectively). In this example the score of 150 points lies above the exposure action value.

The colour of the square containing the exposure points value tells you whether the exposure exceeds, or is likely to exceed, the exposure action or limit value:

	Above limit value
	Likely to be above limit value
	Above action value
	Likely to be above action value
	Below action value



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5. If a worker is exposed to more than one tool or process during the day, repeat steps 1 – 3 for each one, add the points, and compare the total with the exposure action value (100) and the exposure limit value (400).

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## Further Information

### Publications

L140 The Control of Vibration at Work Regulations 2005 HSG88 Hand-Arm Vibration 2001 - Guidance for employers. HSG170 Vibration Solutions - Practical ways to reduce the risk of hand-arm vibration injury.

HSG175 (rev2) Advice for Employers on the Control of Vibration at Work Regulations 2005. IND(G)126 (rev1) Health risks from Hand-Arm Vibration for Employees and Self employed, 2002.

### Guidance on the Control of Vibration at Work Regulations 2005 is provided in:


- [Hand-arm vibration at work: A brief guide](#)
- [Hand-arm vibration - Advice for employees](#)
- [Hand-arm vibration - The Control of Vibration at Work Regulations 2005 \(L140\)](#) (ISBN 0-7176-6125-3) available from [HSE Books](#) or from bookshops, priced £13.95.
- [Sources of Vibration Magnitude data](#) 
- [Hand-arm vibration in foundries](#) ISBN 9780717617982, priced £6.00

### Solutions

- ['Vibration solutions: practical ways to reduce the risk of hand-arm vibration injury' \(HSG170 \(ISBN 0-7176 0954-5\)\)](#) available from [HSE Books](#), priced £13.75.  
Good practice vibration solutions. A book of 51 case studies on how vibration problems were tackled in a range of industries.

### Hand-arm vibration exposure calculator

The HSE have produced a calculator to assist in calculating exposures for hand-arm vibration which is freely available to download on the HSE website.

- [Guide to using the hand-arm vibration calculator](#)
- [Hand-arm vibration calculator](#) 

This policy will be reviewed every two years or following a change in associated legislation or regulation.

4<sup>th</sup> September 2017

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