



**INLAND
WATERWAYS**
ASSOCIATION

GUIDANCE NOTE

*Hand-Arm
Vibration*

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INTRODUCTION

Restoration projects often involve the use of hand-held power tools and equipment which vibrate during operation. Many volunteers will not be used to this type of equipment in their everyday lives. You must assess and control the risks to your volunteers and make them aware of the dangers.

Non-powered hand tools, such as hammer and chisel used on brickwork, can cause injury. Refer to the guidance note on Manual Handling.

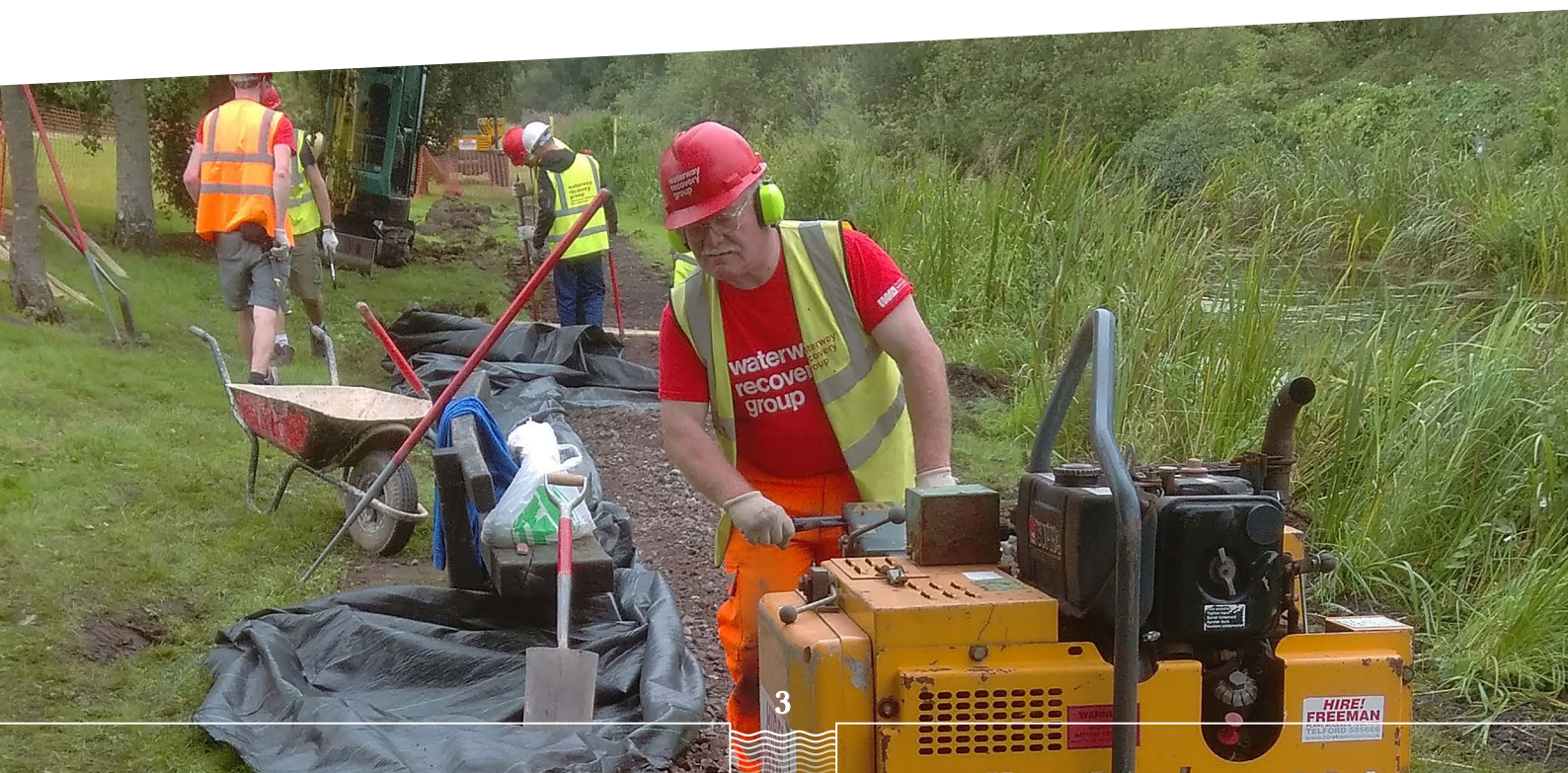
Hand-arm vibration is vibration transmitted into hands and arms when using hand-held power equipment, such as brush cutters, or pieces which vibrate, such as piles or trench sheets during driving.

It can cause Hand-Arm Vibration Syndrome (HAVS), which affects nerves, blood vessels, muscles and joints of the hand, wrist and arm. It can become severely disabling if ignored. It is also known as vibration white finger, a secondary form of Raynaud's syndrome, which is episodes of reduced blood flow that can last a few moments or much longer resulting in the affected area turning first white then blue. The symptoms of HAVS are tingling and

numbness in fingers, which can result in an inability to do fine work (assembling small components) or everyday tasks (fastening buttons), loss of strength in the hands, fingers going white and becoming red and painful on recovery reducing ability to work in cold or damp conditions. Once contracted there is no cure.



Vibrating hand tools can also cause Carpal Tunnel Syndrome (CTS), which is a nerve disorder and may involve pain, tingling, numbness and weakness of the hand and can interfere with work and everyday tasks and might affect the ability to do work safely.



CONTROL OF VIBRATION AT WORK REGULATION (2005) (THE VIBRATION REGULATIONS)

Control of Vibration at Work Regulations (The Vibration Regulations) is aimed at ensuring that risks from vibration are controlled. It requires the provision of information, instruction, training and supervision to volunteers using vibrating tools and equipment.

The regulations include an Exposure Action Value (EAV) of $2.5\text{m/s}^2\text{A}(8)$ at which control measures are required. If the EAV is exceeded the restoration group is required to provide health surveillance. The regulations set an Exposure Limit Value (ELV) of $5.0\text{m/s}^2\text{A}(8)$ which must not be exceeded.

Manufacturers and suppliers are required by the regulations to provide information in equipment guide books and to list the vibration emissions of their equipment. The intention of the regulations is to prevent long-term injury or disability by reducing the risk to the lowest level reasonably practicable.



EXAMPLES OF VIBRATION MAGNITUDES

Industry	Tool type	Vibration emission (m/s ²)
General	Circular saw	3.5
General	Cordless drill/driver	2.5
General	Cordless percussion drill	14.6
General	Percussion drill	8.5 - 15
Construction	Breaker (light)	11.5
Construction	Breaker (medium)	10
Construction	Breaker (heavy)	6.5
Construction	Disc cutter (12") (Bricksaw)	2.4
Construction	Wacker plate compactor	4.5
Construction	Roller vibrating (single drum)	5.5
Construction	Roller vibrating (22" petrol)	7.4
Construction	Roller vibrating (twin drum)	2.5
Construction	Vibrating poker (25mm)	5.6
Gardening/forestry	Brush cutter	5.5
Gardening/forestry	Chain saw	7
Gardening/forestry	Post hole borer (one man)	2.2
Gardening/forestry	Post hole borer (2 man)	8.4
Gardening/forestry	Power wheel barrow	5.8
Gardening/forestry	Rotovator (m/duty)	5.2
Gardening/forestry	Stump grinder (petrol)	10



The values have been taken from data supplied by A1 hire company. The values are for tools in good condition using sharp attachments.

As the tools age and attachments become blunt the vibration magnitude will increase.

DAILY VIBRATION EXPOSURE LEVEL A (8)

A person’s daily vibration exposure is the average vibration spread over the working day of eight hours. The table below gives a range of vibration magnitudes, together with the corresponding exposure times, which would result in exposures at the EAL (2.5 m/s² A(8)) and the ELV (5 m/s² A(8)). The daily vibration exposure level is calculated by adding the exposure on different tools over the course of a day.




The exposure time is the actual ‘trigger time’, the time spent holding the equipment while it is operating.

Vibration magnitude (m/s ²)	2.5	3.5	5	7	10	14	20
Time to reach EAL (hours)	8	4	2	1	30 min	15 min	8 min
Time to reach ELV (hours)	>24	16	8	4	2	1	0.5

e Some hire companies supply a device to their tools that monitor the level of vibration. When the EAL is reached the tools will stop operating. Each user must ‘log-on’ to the tool and device.



Some Examples of tool use and exposure values

Tool type	Vibration emission (m/s ²)	Time to reach EAV	Time to reach ELV
Cordless percussion drill 	14.6	15 min	1 hr
Disc cutter 	2.4	8 hr	>24 hr
Wacker plate compactor 	4.5	3 hr	6 hr
Brush cutter 	5.5	2 hr	4 hr
Power wheel barrow 	5.8	1.5 hr	3 hr

GUIDANCE NOTE

The ready reckoner below expresses the combination of vibration magnitude and exposure time in exposure points instead of values in $m/s^2 A(8)$. Exposure points can be added together, for example when a worker is exposed to two or more tools. The EAL ($2.5m/s^2 A(8)$) is equal to 100 points. The ELV ($5.0m/s^2 A(8)$) is equal to 400 points.

e

Using a tool rated $5m/s^2$ for three hours results in a score of 150 points.

TO USE THE READY RECKONER, FIND THE LEVEL OF THE VIBRATION MAGNITUDE ON THE LEFT, FIND THE EXPOSURE TIME ACROSS THE BOTTOM OF THE TABLE FIND THE VALUE IN THE TABLE THAT CORRESPONDS WITH THE MAGNITUDE AND TIME.

VIBRATION MAGNITUDE M/S²	40	800																				
	30	450	900																			
	25	315	625	1250																		
	20	200	400	800																		
	19	180	360	720	1450																	
	18	160	325	650	1300																	
	17	145	290	580	1150																	
	16	130	255	510	1000																	
	15	115	225	450	900	1350																
	14	98	195	390	785	1200																
	13	85	170	340	675	1000	1350															
	12	72	145	290	575	865	1150	1450														
	11	61	120	240	485	725	970	1200	1450													
	10	50	100	200	400	600	800	1000	1200													
	9	41	81	160	325	485	650	810	970	1300												
	8	32	64	130	255	385	510	640	770	1000	1200											
	7	25	49	98	195	295	390	490	590	785	865											
	6	18	36	72	145	215	290	360	430	575	720											
	5.5	15	30	61	120	180	240	305	365	485	605											
	5	13	25	50	100	150	200	250	300	400	500											
	4.5	10	20	41	81	120	160	205	245	325	405											
	4	8	16	32	64	96	130	160	190	255	320											
3.5	6	12	25	49	74	98	125	145	195	245												
3	5	9	18	36	54	72	90	110	145	180												
2.5	3	6	13	25	38	50	63	75	100	125												
2	2	4	8	16	24	32	40	48	64	80												
1.5	1	2	5	9	14	18	23	27	36	45												
1	1	1	2	4	6	8	10	12	16	20												
	15m	30m	1h	2h	3h	4h	5h	6h	8h	10h												
	DAILY EXPOSURE TIME																					

HEALTH SURVEILLANCE FOR VIBRATION

Volunteers who are regularly exposed to vibration above the EAV or who have been diagnosed with HAVS should be given health surveillance.

The HSE recommends a five-stage system:

- 1 An initial questionnaire when a volunteer first carries out a task that exposes them to vibration.
- 2 A short questionnaire answered annually by volunteers exposed to vibration.
- 3 A formal HAVS health assessment carried out by an occupational health nurse.
- 4 A formal diagnosis by a doctor, who will assess fitness for work.
- 5 The doctor refers the volunteer for tests for HAVS to assist the diagnosis in stage 4.

The CITB have forms for the questionnaires and HAVS assessment. A link to the forms are given in useful resources. GB05, Initial hand-arm vibration screening questionnaire, GB06, HAVS assessment and GB07, Annual hand-arm vibration questionnaire.'

If the health surveillance indicates that volunteers are affected by vibration the risk assessment and control measures should be reviewed. The volunteer should be allocated tasks that don't expose them to vibration. Other volunteers carrying out that task should undergo medical examination.



MANAGING RISK FROM VIBRATION

Volunteers on a work party or canal camp will only be involved in a construction activity for a short time, rather than daily for their working life. Nevertheless, volunteers can still suffer from the effects of HAVS, possibly temporarily. You should therefore take steps to manage the risk from vibration. For example, when laying a towpath that needs compacting using a wacker plate, make sure to use job rotation so that one volunteer is not at risk of HAVS from using the wacker plate for too long a time period.

The basic methods for reducing vibration exposure and risk are:

- ① Eliminate the use of vibrating tools or equipment by introducing mechanisation or alternative, vibration-free processes, for example use a breaker on an excavator rather than a hand held breaker.
- ② Reduce vibration exposures by modifying the existing process to reduce the time equipment is used or to use equipment with lower vibration magnitude.
- ③ Replace older power tools with suitable modern, efficient, ergonomic, vibration-reduced types.
- ④ Select good quality consumables (eg better-balanced and fitted grinding wheels) and replace them when required.
- ⑤ Provide volunteers with training, information and instruction on safe use of tools and equipment and ensure adequate supervision.
- ⑥ Carry out maintenance of tools and equipment and replace consumables, as recommended by the manufacturers.
- ⑦ Minimise the forces needed to operate and control the tools (eg with tensioners, balancers, jigs, fixtures).
- ⑧ Reduce the exposure time, eg through job rotation.



USEFUL RESOURCES:

The Health and Safety Executive Guidance HAVS

CITB Checklists and Forms

Sign up to read the full Practical Restoration Handbook and supporting resources here:

waterways.org.uk/practicalrestorationhandbook



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