Vibration Exposure Guidance

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1. Introduction

Swansea University holds a moral and legal obligation to ensure all staff and students are not exposed to vibration levels in work that may be harmful. Vibration exposure can cause (or further aggravate) existing health conditions including muscle and joint pain, nerve and blood vessel damage and carpal tunnel syndrome. This can occur over a period of months or years, resulting prolonged or permanent pain and discomfort for those affected.

Through risk assessment and identified controls we can effectively manage the risk from vibration to ensure staff and students are not subject to conditions whereby they are exposed to excessive vibration that will have a detrimental impact on their health and wellbeing.

Vibration exposure is typically categorised into two categories, both of which will be covered in this guidance:

- Hand arm vibration (HAV)
- Whole body vibration (WBV)

2. Regulations

The Control of Vibration at Work Regulations 2005 detail the legal requirements imposed on Swansea University as an employer to protect persons against risk to their health and safety arising from exposure to vibration at work.

The legal duty applies to employers in respect of their employees. However, Swansea University will afford the same level of protection to students who may be involved in teaching or research activity where excessive vibration exposure has been identified as a hazard.

These duties may also extend, so far as is reasonably practicable, to any other person at work who is affected by vibration undertaking an activity under the control of Swansea University

3. The Health Effects of Vibration Exposure

Regular and frequent exposure to vibration can manifest in varying forms of permanent pain, ill health, or disability. It is important that users understand the signs, symptoms and health effects to be able to identify potential issues as early as possible.

Hand-arm vibration syndrome (HAVS)

Symptoms and effects of HAVS include:

- Tingling and numbness in the fingers which can result in a reduction in fine motor skills, such handling or assembling small components, or everyday tasks such as fastening buttons.
- Loss of strength in the hands which may affect your ability to lift or hold tools safely.
- Fingers turning white (blanching) and becoming red and painful on recovery, impacting your ability to work outdoors in cold or damp conditions. Commonly known as vibration white finger.

Carpal tunnel syndrome (CTS)

The symptoms of carpal tunnel syndrome can include tingling, numbness, pain and weakness in the hand, impacting your ability to complete everyday tasks and work safely.

Symptoms of both CTS and HAVS will come and go but will be exacerbated by continued exposure to vibration. This can happen over a period of months, but more commonly years. This is why it is important to understand the risks, signs and symptoms to enable prevention and early intervention and diagnosis.

Typical sources of HAV at Swansea University could include:

- Use of power tools
- Use of equipment such as mowers, strimmers, and leaf blowers
- Chainsaws
- Work with vibrating machinery such as grinders or cutting equipment in workshops

Whole body vibration

Whole body vibration is the shaking or jolting of the human body through a supporting surface, typically a seat or the floor.

Sources of WBV could include:

- Driving a vehicle on bumpy unmade ground
- Use of diggers or earth movers
- Sitting or standing on a fixed machine or surface which is impacting or vibrating
- Using tractors or other ride on agricultural vehicles

Whole body vibration on its own is unlikely to cause a new illness or injury. The primary risk from WBV is where it may aggravate and intensify an existing injury such as back pain, caused by lifting or an injury sustained elsewhere in the gym or playing sport.

4. Exposure Action Values (Regulation 4)

To ensure individuals are not exposed to excessive levels of vibration, there are legal limits which employers are required to take action to control exposure.

An exposure action value (EAV) is the daily amount of vibration exposure above which employers are quired to act in order to control exposure.

An exposure limit value (ELV) is the maximum amount of vibration an employee may be exposed to on any single day.

The legal limits are as follows:

Hand-arm vibration

- Exposure action value of 2.5 m/s² A(8) at which level employers should introduce technical and organisational measures to reduce exposure.
- Exposure limit value of 5.0 m/s² A(8) which should not be exceeded.

Whole body vibration

- Exposure action value of 0.5 m/s² A(8) at which level employers should introduce technical and organisational measures to reduce exposure.
- Exposure limit value of 1.15 m/s² A(8) which should not be exceeded.

The units of measurement use are as follows:

m/s² – metres per second squared.
A(8) – this means the limits are for an average of an 8-hour working day.

5. Risk Assessment (Regulation 5)

In the first instance it may be beneficial to undertake a high-level assessment of the tasks or activities your team is undertaking to identify any potential vibration risks. You can then assess those tasks in further details, with the aim of:

- identifying where there might be a risk from vibration and who is likely to be affected
- conducting a reasonable estimate of the employees' exposure
- identifying if any EAV or ELV or being reached
- identifying whether vibration control measures are needed, and, if so, where and what type
- identify any employees who need to be provided with health surveillance or are at increased risk of vibration exposure due to their role or existing health conditions

Sources of information to complete your risk assessment can include:

- consultation with employees through discussion, team meetings, questionnaires, or task analysis.
- manufacturers data sheets for tools and equipment. These will detail the vibration output of a piece of equipment.
- employee's health assessments or information they provide you on existing health conditions that make them more prone to the risks of vibration exposure.

It is important the person undertaking the risk assessment is competent to do so and has an undertaking and knowledge of the work being undertaken. Please contact the H&S team if you require any further support or guidance.

Once you have gathered all available information, you can then complete your risk assessment and prioritise your actions, as follows:

- Collate a list of all equipment that may cause vibration, including make, model, power and vibration output.
- Collate a list of all employees involved in using vibrating equipment.
- Record how long employees are physically engaged in using vibrating equipment. This data can then be used to assess if the are meeting an exposure action value
- Discuss with users as part of meetings and toolbox talks which equipment they feel is emitting high vibration, or causes them other discomfort due to its size or weight
- Record your findings and prioritise from highest risk above the ELV then those above the EAV.

The HSE provides helpful guidance on estimating vibration exposure through a range of tools and equipment. You can also use the vibration ready reckoner and vibration exposure calculator located in Appendix 1 and 2 to assist in your assessment.

Remember it is important to consider all aspects of the task, such as manual handling, posture, or other hazards such as noise, dust or particulates produced by the activity.

Once you have completed this section and recorded your findings you can then look to implement suitable controls where required.

6. Managing and controlling risks from vibration exposure (Regulation 6)

Once you have identified the people and activities that pose a risk of vibration exposure, you must then introduce control measures to eliminate or reduce this exposure.

Appropriate risk control methods can include:

Elimination

- Look for alternative working methods or equipment that can eliminate or significantly reduce the vibration exposure.
- See if the process can be automated, physically removing the person from the source of vibration.

Equipment selection (substitution)

- Consult with equipment suppliers on the most suitable tool for the job with the lowest vibration output.
- Compare products from different suppliers, taking to account suitability and the vibration output.
- Consider switching from petrol to electric items.

- Get users to test different equipment to gain feedback of what works best in practice.
- Explore the range of operation settings on the equipment that can reduce vibration while remaining effective.

Environment and task

- Change the layout of the workstation or posture for completing a task, which reduces the amount of vibration transferring to the user's hands, arms or body
- Use methods that can suspend the tool or absorb vibration, reducing the grip needed to hold the equipment.
- Ensure all equipment is inspected and maintained in accordance with the manufacturer's recommendations.
- Ensure the correct tool is always used for its intended purpose.

Task scheduling

- Limit the amount of time users are exposed to vibration as far as is reasonably practicable.
- Plan work so works involving vibrating equipment can be spread over the course of a day or working week to avoid continuous exposure.
- Use job rotation to share the duration of vibration exposure amongst a team, so no one is close to reach an EAV or ELV.

Clothing

- Provide employees with protective clothing keeping them warm and dry, to encourage good blood circulation.
- Use gloves to keep hands warm, but not as a means of protecting against vibration exposure.

Regularly monitor and review your risk assessment and control measures:

- At least annually or more frequently for high vibration activities or users
- Following the purchase of new plant or equipment
- Following a change in the process
- Following a change in the people completing the work
- If anyone involved displays symptoms of adverse health effects because of vibration.

7. Information, Instruction and Training (Regulation 8)

Line manager must ensure that employees are provided with suitable information, instruction, and training on the following. This can be through a combination of sharing this guidance, signposting to the HSE or other website, toolbox talks, inductions, and face to face training.

- The effects of HAV and WBV where appropriate
- The sources of HAV and WBV

- If they have been identified as at risk as part of the risk assessment process or their pre-existing health conditions
- The ELV and EAV
- How to spot the signs and symptoms of the health effects of vibration
- The health surveillance arrangements in place to support them
- The control measures and methods in place to help them manage and control their exposure to vibration

8. Vibration Monitoring

In most cases, a combination of the manufacturers data sheets and HSE calculator will be able to provide sufficient information on an employee's vibration exposure.

In high-risk cases or were deemed necessary, vibration monitoring can be undertaken on individuals, tools or equipment where required. Only appropriate calibrated equipment should be used to monitor vibration.

Please contact the health and safety team for further assistance.

9. Occupational Health Surveillance (Regulation 7)

The purpose of health surveillance is to:

- Identify anyone exposed or about to be exposed to hand-arm vibration who may be at particular risk, for example those with pre-existing medical conditions
- Identify any vibration-related disease at an early stage in employees regularly exposed to hand-arm vibration.
- Help you prevent disease progression and eventual disability.
- Help people stay in work.
- Check the effectiveness of your vibration control measures.

Basic health surveillance will involve routinely gathering information on the early symptoms of ill health caused by vibration by using a questionnaire. This will be the starting point where any concerns, signs or symptoms can be captured at the earliest opportunity. From this point forward, a tiered process of surveillance and diagnosis will be followed as below.

Tier 1: Baseline assessment – questionnaire to identify at risks persons
Tier 2: Annual screening questionnaire – to identify symptoms.
Tier 3: Assessment by a qualified person – by qualified University Occupational Health professional
Tier 4: Formal diagnosis by a doctor
Tier 5: Use of standardised tests by medical practitioners

Where the risk assessment and HSE calculator has identified anyone being at significant risk of vibration, Occupational health will progress to a Tier 2 and or Tier 3 assessment, based on their professional assessment. In addition, if there are positive responses at Tier

1 or 2, or negative responses for three consecutive years at Tier 2, a face-to-face interview should take place with a Qualified Person.

Health surveillance is not a replacement for risk assessment and cannot be progressed until a suitable and sufficient risk assessment, management and control process has been implemented and recorded.

10. Appendices

Appendix1: Vibration Ready Reckoner

https://www.hse.gov.uk/vibration/hav/vibrationcalc.htm

HAV Points Ready Reckoner

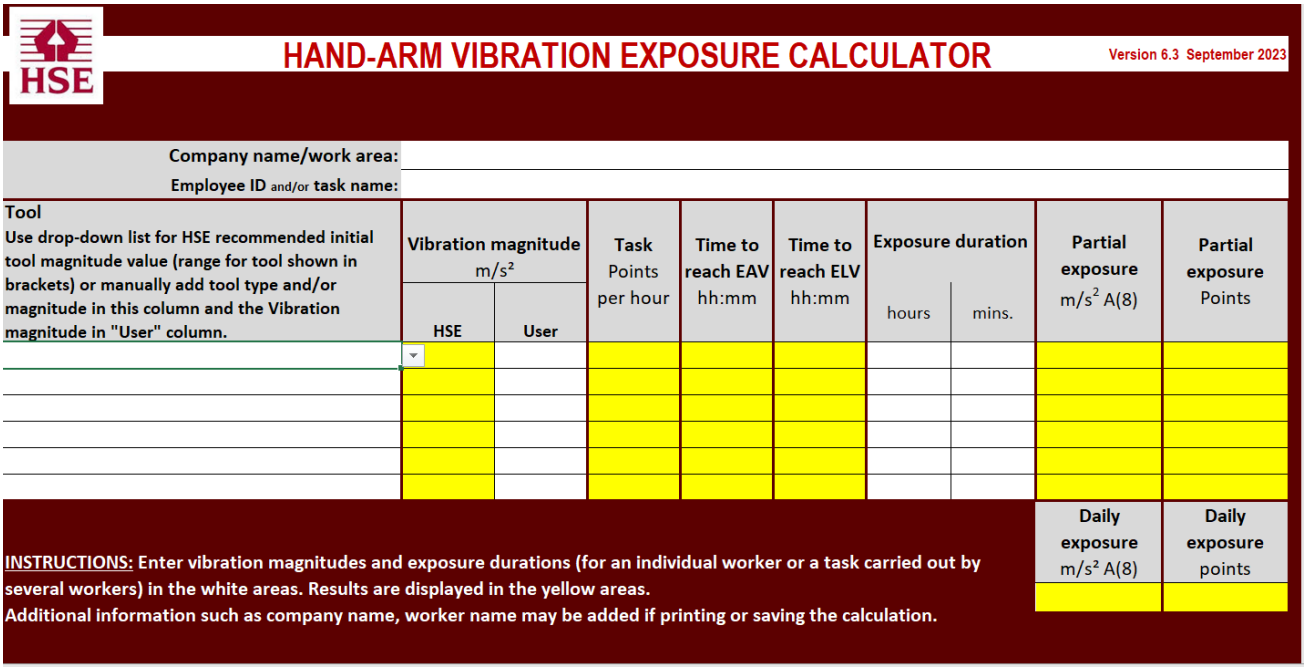
Vibration (m/s²)	15 m	30 m	45 m	1 h	1.5h	2 h	2.5 h	3 h	3.5 h	4 h	4 .5h	5 h	5.5 h	6 h	6.5h	7 h	7.5h	8 h	10 h
40	801																		
30	450	901	1351																
25	313	626	938	1251															
20	200	400	600	801	1201														
19	181	361	542	723	1084	1445													
18	162	324	486	649	973	1297													
17	145	289	434	578	868	1157	1446												
16	128	256	384	512	769	1025	1281												
15	113	225	338	450	676	901	1126	1351											
14	98	196	294	392	588	785	981	1177	1373										
13	85	169	254	338	507	677	846	1015	1184	1350									
12	72	144	216	288	432	576	721	865	1009	1153	1297	1441							
11	61	120	182	242	363	484	605	725	848	969	1090	1211	1332	1450					
10.5	55	110	166	221	331	441	552	662	772	883	993	1103	1214	1324	1434				
10	50	100	150	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400			
9.5	45	90	135	181	271	361	452	542	632	723	813	903	994	1084	1147	1265	1355	1445	
9	41	81	122	162	243	324	405	486	567	649	730	811	892	973	1054	1135	1216	1297	
8.5	36	72	108	145	217	289	362	434	506	578	651	723	795	868	940	1012	1087	1157	1446
8	32	64	96	130	192	256	320	384	448	512	576	641	705	769	833	897	961	1025	1281
7.5	28	56	84	113	169	225	281	338	394	450	507	563	619	676	732	788	844	901	1126
7	25	49	75	98	147	196	245	294	343	392	441	490	539	588	638	637	736	785	981
6.5	21	42	63	85	127	169	211	254	296	338	381	423	465	507	550	592	634	677	846
6	18	36	54	72	108	144	180	216	252	288	324	360	396	432	468	504	540	576	723
5.5	15	30	45	61	91	121	151	182	212	242	272	303	333	363	394	424	454	484	605
5	13	25	38	50	75	100	125	150	175	200	225	250	275	300	325	350	375	400	500
4.5	10	20	30	41	61	81	101	122	142	162	182	203	223	243	263	284	304	324	405
4	8	16	24	32	48	64	80	96	112	128	144	160	176	192	208	224	240	256	320
3.5	6	12	18	25	37	49	61	74	86	98	110	123	135	147	159	172	184	196	245
3	5	9	14	18	27	36	45	54	63	72	81	90	99	108	117	126	135	144	180
2.5	3	6	9	12	18	25	31	38	44	50	56	63	69	75	81	88	94	100	125

Time (Hours/Minutes)

Use the Ready Reckoner to <u>manage and plan</u> your tool usage at the <u>start</u> of the day to ensure that your Exposure Limit Value will not be exceeded. It is too late to identify that you are exceeding the 400 points Exposure Limit Value before the end of your working day.

Appendix 2: Vibration Exposure Calculator

https://www.hse.gov.uk/vibration/hav/vibrationcalc.htm



HSE

HAND-ARM VIBRATION EXPOSURE CALCULATOR Version 6.3 September 2023

Company name/work area:	
Employee ID and/or task name:	

Tool Use drop-down list for HSE recommended initial tool magnitude value (range for tool shown in brackets) or manually add tool type and/or magnitude in this column and the Vibration magnitude in "User" column.	Vibration magnitude m/s²		Task Points per hour	Time to reach EAV hh:mm	Time to reach ELV hh:mm	Exposure duration		Partial exposure m/s² A(8)	Partial exposure Points
	HSE	User				hours	mins.		
								Daily exposure m/s² A(8)	Daily exposure points

INSTRUCTIONS: Enter vibration magnitudes and exposure durations (for an individual worker or a task carried out by several workers) in the white areas. Results are displayed in the yellow areas.
Additional information such as company name, worker name may be added if printing or saving the calculation.

Appendix 3: Hierarchy of Controls