

Hand-Arm Vibration Audit Report

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1.0 INTRODUCTION

ASL Consultancy Limited (ASL) was requested by HAVi to carry out an audit of its hand-arm vibration risk management services to their clients and recommend appropriate actions to address any compliance/business risk which may be present regarding the advice and services offered.

An audit was conducted on 29 May 2018, by Sarah Haynes and Scott Donald, ASL Consultancy Limited and supported by David Rodger, HAVi.

2.0 LEGAL DUTIES

2.1 Compliance - What is Required

A practical first step in complying with the Control of Vibration at Work Regulations 2005 is formulating a suitable and sufficient assessment of risk. This is outlined in HSE Guidance L140 [1] as the assessment of risk and should identify:

- where there may be a risk from HAV;
- a soundly based estimate of your employees' exposures and a comparison with the exposure action value and exposure limit value;
- the available risk controls;
- the identification of those individuals who may be more at risk;
- the steps you plan to take to control and monitor those risks;
- a record of the assessment.

2.2 Consultant Duties

Certain duties are placed upon consultants to ensure the advice they offer is competent. These are outlined in Appendix 1:

- Health and Safety at Work, etc. Act 1974 sections 3 and 36;
- Control of Vibration at Work Regulations 2005 regulation 8(4).

2.3 Exposure Values

The Control of Vibration regulations 2005 contains two values of note. These are:

- Exposure Action Value (EAV), 2.5 m/s^2 or 100 points;
- Exposure Limit Value (ELV), 5 m/s^2 or 400 points

The EAV is a daily amount of vibration exposure above which employers are required to take action to control risk. The greater the exposure level, the greater the potential risk and the more action employers need to take.

It should be noted that the duty placed upon employers is to ensure that the ELV is not exceeded, or if it is:

- reduce the exposure below the limit value ASAP/immediately;
- identify the reason the limit was being exceeded;
- modify the control measures to ensure that the limit value is not exceeded again.

3.0 METHODOLOGY

To review material, products and services offered by HAVi:

- sales material;
- technical support information including customer training, measurement services and web-based databases;
- conduct a practical trial of monitoring equipment.

To compare the HAVi services with legislation, guidance and standards referred to below:

- The Control of Vibration at Work Regulations 2005;
- HSE Guidance L140 'The Control of Vibration at Work Regulations 2005 - Guidance on Regulations' [1];
- EU Directive 2002/44/EC (Vibrations at Work) 'Non-binding guide to good practice for implementing Directive 2002/44/EC' [2];
- HSE guidance on vibration monitoring
8 questions about Vibration Exposure monitoring (rev2), 2017 [3];
- BS EN ISO 5349-1:2001 'Mechanical vibration - Measurement and evaluation of human exposure to hand-transmitted vibration, Part 1: General Requirements' [4];
- BS EN ISO 5349-2:2001+A1 (2015) 'Mechanical vibration - Measurement and evaluation of human exposure to hand-transmitted vibration, Part 2: Practical guidance for measurement at the workplace' [5];
- ISO 8041-1:2017 'Human response to vibration - Measuring instrumentation - Part 1: General Purpose Vibration Metres' [6].

HSE Guidance L140 [1] - This is the HSE guidance document recommending how vibration should be managed.

BS EN ISO 5349 [4] [5] - This is the accepted standard on how to measure vibration/how vibration should be measured and is referred to by HSE Guidance L140.

ISO 8041-1 [6] - This is the standard that “measuring equipment”, used to measure vibration should meet.

4.0 HAVI

HAVi divide their service into four areas, as follows:

- Management systems
- Monitoring equipment
- Training
- Additional services

4.1 Management Systems

HAVi offer a range of packs which include paper-based systems and automated/web-based systems. These include:

- HAVi Manager - available in a variety of levels from entry to premium. All packs contain a HAVi tool timer, information cards, posters and log books.
- HAVi Watch Manager - available in a variety of levels from entry to premium. All packs contain a HAVi watch, tool timer, information cards, posters and log books.

The principal difference between the 2 packages is the paper based log book is replaced with a watch, which automatically logs the tool usage time information and synchronises it to a central database (HAVi Total).

4.2 Monitoring Equipment

The HAVi tool timer is fixed to a tool and takes a pre-programmed vibration magnitude and records the trigger time from actual tool usage to calculate the user’s exposure. The tool timer contains an accelerometer which detects when the tool is being operated. This then allows the in-built timing device to record the operators trigger time. Note the tool timer does not measure vibration.

Exposures are either recorded onto a log book provided in the HAVi Manager pack or electronically on the HAVi watch where the data is automatically transferred to a database (HAVi Total). The results are typically presented in ‘HSE exposure points’.

4.3 Training

HAVi offer a range of courses aimed at operators and managers. The aim of these courses is to ensure that participants leave fully equipped to give tool box talks and are able to implement a compliant and effective management system.

All courses are The Institute of Occupational Safety and Health (IOSH) approved, with the training delivered by suitable qualified experienced personnel (SQEP).

4.4 Additional Services

Consultancy

Helping clients by managing their HAVs risk and advising the most appropriate steps needed to achieve compliance and minimise the risk to their employees. Consultancy work is carried out by SQEP.

Measurement

Vibration data is collected as prescribed in HSE guidance L140 [1] and BS EN ISO 5349 [4] [5] using equipment which complies with ISO 8041-1 [6]. Data is collected by SQEP.

Tool Advisor

A web-based information database is provided. It contains in-use vibration levels for a growing list of commonly used tools.

Telephone Support

Support is available via telephone or email to support the use of product/queries.

5.0 AUDIT FINDINGS AND RECOMMENDATIONS

The key findings of the audit are as follows:

- 5.1 No compliance gaps have been identified.
- 5.2 The service provided to clients by HAVi is effective in helping them manage vibration risk in accordance with HSE guidance L140 [1]. A detailed consideration of the HAVi service against the requirements of specific regulations is given in Appendix 2.
- 5.3 The marketing material and web site was reviewed. All materials reviewed appeared to be in agreement and in spirit with the HSE guidance [1].

Management Systems

- 5.4 HAVi Manager (the paper-based log book variant) requires the employee to collect their vibration exposure data (HSE points) directly from the HAVi unit. Individual task exposure data is recorded by the employee into their log book. The log book provided in the HAVi Manager pack comes preformatted to prompt the user to input the necessary data which allows them to record and to calculate their daily exposure using the HSE points system. This requires the operator to have received a basic level of training in order to ensure that they set up and operate the HAVi tool timer correctly and extract and record the correct information.
- 5.5 Employers are encouraged to review vibration magnitude from several sources in order to select reliable and relevant vibration magnitudes to their application or measure to BS EN ISO 5349 [4] [5].
- 5.6 Some processes such as drilling with hand-held drills may produce different vibration magnitudes when drilling into different materials. In order to ensure that the vibration exposure is assessed correctly, HAVi recommend that the user either re-programmes the tool with the correct vibration magnitude for the task they are about to perform, or they use the highest vibration task which they will perform with that tool. This ensures that the assessment does not underestimate exposure.

Monitoring Equipment

- 5.7 HAVi offer advice regarding continuous monitoring in line with the guidance given by HSE guidance L140 [1] and HSE guidance on vibration monitoring [3].
- 5.8 The HAVi watch works in conjunction with the HAVi tool timer to which it is 'paired'. The watch is used to capture the exposure data by the HAVi unit. The watch needs to be in close proximity to the HAVi unit (around 1 metre) and can be worn on either hand, kept in the user's pocket or attached to their belt.
- 5.9 The HAVi watch and the tool timer can be programmed to give the user a running total of their daily exposure. The HAVi watch has the additional feature that it can be set to trigger an alarm to alert the user that they are reaching a predetermined exposure limit. An example where this can be particularly valuable is for an employee who has been diagnosed with early stage HAVs and under the advice of a competent occupational health physician and is working to a restricted exposure, such as 100 points per day.

- 5.10 The HAVi unit takes the measured trigger time and combines it with the pre-programmed vibration magnitude for the tool/process. Programming the unit proved to be a straight forward process.
- 5.11 During trials, the HAVi unit worked effectively at logging tool use/trigger time. Trigger time was recorded accurately and avoided the inaccuracies commonly associated with user estimates [7].
- 5.12 The HAVi Total system offers a data collection and reporting system. Data is maintained on a server, with customers able to review their own data and extract critical information regarding their employees exposures. As a new user on this trial and having had no previous training on this product, minor issues were encountered getting all devices to synchronise, upload and view the data on the HAVi Total database. Use was made of the telephone support service. This was found to be efficient, with the support team knowledgeable about the product and able to resolve any concerns quickly.

Training

- 5.13 HAVi offer courses aimed at operators and managers. The aim of these courses is to ensure that participants leave fully equipped to give tool box talks and are able to implement a 'compliant and effective management system'. All courses are approved by IOSH, with the training delivered by SQEP. The trainers are all professional trainers who have had experience of dealing with hand-arm vibration in industry. Training materials were reviewed and found to be in line with HSE guidance L140 [1].

Additional Services

- 5.14 The advice given on the frequency and duration of vibration exposure monitoring is in accordance with HSE guidance [1] [3].
- 5.15 HAVi have developed a free to access database of 'in use' tool data called Tool Advisor (www.thetooladvisor.com). This is a searchable database which contains in use tool vibration measurements made by HAVi in accordance with BS EN ISO 5349 [4] [5]. HAVi customer data can also be included in this database. Where a range of data is uploaded, the 75th percentile is reported. This ensures that the data contained within the tool advisor database is valid. HAVi state on the tool advisor website that 'the information is not intended to amount to advice on which you should rely. You must obtain professional or specialist advice before taking, or refraining from, any action on the basis of the content on our site'.
- 5.16 HAVi offer consultancy services helping clients manage their HAVs risk and advise them in the most appropriate steps needed to achieve compliance and to minimise the risk to their employees. Consultancy work is carried out by HAVi

staff who have a broad range of knowledge, experience and qualifications in the area of HAV management guidance and support. All HAVi staff have completed the IOSH HAV Managers Essential Course.

General

- 5.17 The HAVi unit and watch are not vibration measuring equipment. As such:
- they do not and are not required to meet the requirements of ISO 8041 [6].
 - they do not require any on-going calibration checks normally associated with vibration measuring equipment.
- 5.18 As the HAVi watch is not measuring vibration, so long as it is close to the operator e.g. on their wrist, in their pocket or immediately by them, the system will work as intended and accurately record data from the HAVi unit.
- 5.19 When HAVi collect in use vibration data, this is collected in accordance with HSE guidance L140 [1], BS EN ISO 5349 [4] [5] and using a vibration meter which meets the requirements of ISO 8041 [6]. All vibration measuring equipment (vibration meter and accelerometer) have current calibration certificates.

6.0 CONCLUSIONS

- 6.1 No compliance gaps have been identified.
- 6.2 All hand-arm vibration data is collected in accordance with HSE guidance L140 [1], BS EN ISO 5349 [4] [5], using equipment which meets the requirement of ISO 8041 [6].
- 6.3 All training courses meet HSE guidance L140 [1] and are IOSH approved. Training is delivered by professional trainers, who have had hand-arm vibration experience in industry.
- 6.4 The HAVi unit and watch operate as described. As they are not vibration measuring equipment they do not and are not required to meet the requirements of ISO 8041 [6].
- 6.5 The tool finder database contains in use tool vibration measurements made by HAVi in accordance with BS EN ISO 5349 [4] [5].

REFERENCES

- [1] The Control of Vibration at Work Regulations 2005 - Guidance on Regulations L140. ISBN 978 0 7176 6125 1. Published by HSE Books;
- [2] EU Directive 2002/44/EC (Vibrations at Work) ‘Non-binding guide to good practice for implementing Directive 2002/44/EC’;
- [3] HSE guidance on vibration monitoring
8 questions about Vibration Exposure monitoring (rev2), 2017 HSE guidance on vibration monitoring

[<http://www.hse.gov.uk/vibration/hav/advicetoemployers/vibration-exposure-monitoring-qa.pdf>];
- [4] BS EN ISO 5349-1:2001 ‘Mechanical vibration - Measurement and evaluation of human exposure to hand-transmitted vibration, Part 1: General Requirements’;
- [5] BS EN ISO 5349-2:2001+A1 (2015) ‘Mechanical vibration - Measurement and evaluation of human exposure to hand-transmitted vibration, Part 2: Practical guidance for measurement at the workplace’;
- [6] ISO 8041-1:2017 ‘Human response to vibration - Measuring instrumentation - Part 1: General Purpose Vibration Metres’;
- [7] Hand-transmitted vibration. Occupational exposures and their health effects in Great Britain - HSE Contract Research Report 232/1999

APPENDIX 1

CONTROL OF VIBRATION AT WORK REGULATIONS 2005 & SUPPORTING GUIDANCE

CONTROL OF VIBRATION AT WORK REGULATIONS 2005 AND SUPPORTING GUIDANCE

Hand-arm vibration (HAV) is a widespread hazard for employees in many industries and occupations. HAV exposure at work can arise from the use of hand-held power tools (such as grinders or sanders), hand-guided machinery (such as lawnmowers and plate compactors) and hand-fed machines (such as pedestal grinders). Prolonged and regular exposure to this vibration can affect the operator's health. Exposure to vibration results from the vibration emission of the tool combined with time in use (often referred to as 'trigger time'). The risks from vibration can be controlled and employees can be protected from ill health caused by vibration. To protect employees and to comply with the Control of Vibration at Work Regulations 2005, employers need to assess the risks from vibration and plan how to control them.

The Control of Vibration at Work Regulations came into force on 6 July 2005. They are based on a European Union Directive, 2002/44/EC of 6 July 2002 on the minimum health and safety requirements regarding the risks arising from physical agents (vibration). This legislation is supported by HSE guidance:

- *Hand-arm vibration: Control of Vibration at Work Regulations 2005. Guidance on Regulations L140, 2005.*
- *Hand-arm vibration at work – a brief guide INDG175(rev3), 2012.*
- *Hand-arm vibration: Advice for employees Pocket card INDG296(rev1), 2005.*
- *8 Questions about Vibration Exposure monitoring (rev2), 2017.*

The legal duties imposed by the Control of Vibration at Work Regulations are in addition to the general obligations to safeguard workers' health (including the effects of vibration) which employers have had since 1975 under the Health and Safety at Work etc Act 1974. The guidance publications listed above replace HSG88, the previous HSE guidance book on hand-arm vibration, first published in 1994.

The emphasis of the Regulations is firmly on the control of vibration exposure, so that risk eliminated or reduced to as low a level as reasonably practicable. The regulations set an Exposure Action Value (EAV) of 2.5 m/s² exposure, averaged over an 8 hour working day (A(8)), and Exposure Limit Value (ELV), of 5 m/s² A(8), at which certain duties are imposed.

At the EAV, employers are required to:

- introduce a programme of controls to eliminate risk, or reduce exposure to as low a level as is reasonably practicable;
- provide health surveillance to those employees who continue to be regularly exposed above the action value or otherwise continue to be at risk.

At the ELV, employers are required to take immediate action to reduce employee exposure below the limit value.

EN ISO 5349-1:2001 figure C.1 shows the EAV is not an entirely safe level, with an estimated 10% of the exposed population expected to develop vibration-induced white finger between 12 and 13 years exposure duration at this level of exposure. The regulations require risk to be eliminated or reduced even where exposure is below the EAV if further reductions can be achieved at a reasonable cost.

The measurement of vibration emission, used in the determination of daily vibration exposure, is underpinned by the following key standards:

- BS EN ISO 5349-1:2001 '*Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration, Part 1: General Requirements*';
- BS EN ISO 5349-2:2001+A1 (2015) '*Mechanical vibration – Measurement and evaluation of human exposure to hand-transmitted vibration, Part 2: Practical guidance for measurement at the workplace*';
- ISO 8041-1:2017 '*Human response to vibration – Measuring instrumentation – Part 1: General Purpose Vibration Meters*'.

Consultant Duties

Health and Safety at Work, etc. Act 1974 section 3

'It shall be the duty of every employer to conduct his undertaking in such a way as to ensure, so far as is reasonably practicable, that persons not in his employment who may be affected thereby are not thereby exposed to risks to their health or safety.'

Health and Safety at Work, etc. Act 1974 section 36

'Where the commission of an offence under the relevant statutory provisions by any person is due to the act or default of some other person, that other person is also liable to be prosecuted for the offence, whether or not proceedings are brought against the principal.'

Control of Vibration at Work Regulations 2005 regulation 8(4)

'the employer shall ensure anyone helping them to comply with their duties under these Regulations has suitable and sufficient information, instruction and training', i.e. they have the necessary understanding and experience.

The Control of Vibration at Work Regulations 2005 – Guidance on Regulations L140 Appendix 5 lists training and competence issues for those advising employers. It does point out that formal training is not a legal requirement, although those offering a commercial service to duty-holders may wish to assure themselves that their staff have a suitable level of knowledge and expertise.

APPENDIX 2

DETAILED AUDIT FINDINGS

Comparison of HAVi vibration management services with the requirements of the Control of Vibration at Work Regulations 2005

This table describes the relevant regulations and captures critical information considered during the audit.

Regulation	HAVi service	Evidence	Findings	Recommendations
5 (2) (a) observation of specific working practices	Consultancy, training, HAVi monitor.	Site visits, interview, training materials	Employers are advised to identify high risk areas and tools and to focus on these rather than becoming overwhelmed by trying to focus on all operations.	None
5 (2) (b) information on vibration magnitude	Consultancy, training, HAVi Total, ToolAdvisor.	Site visits, interview	Employers are advised to consider a range of vibration information and to come to a reasonable average when deciding on a value to use in their assessment. ToolAdvisor provides a freely available, open access system to allow ready access to in use data measured by HAVi (where available) and to allow comparison between different tools. The potential pitfalls and uncertainties inherent in vibration magnitude data are well understood and clearly articulated to duty holders.	None
5 (2) (c) measurement of vibration magnitude	Consultancy, training, ToolAdvisor.	Site visits, interview	Where necessary, measurements are made competently and in accordance with BS EN ISO 5349. Usually more than one measurement of a process/cycle is made to allow averaging of results. Where it is not possible to make measurements in strict accordance with the standard, adaptations are logical and in the spirit. Care is taken to involve the tool user in the measurement process and to ensure that they	None

			carry out work as usual. Wherever possible, duty holders are steered away from making unnecessary measurements and this appears to be the philosophy behind the development of ToolAdvisor.	
5 (3) risk assessment	Consultancy, training, Manager kits, HAVi Total.	Site visits, interview	Employers are supplied with the tools, information and support to enable them to make soundly based assessments of vibration risks, HAVi do not make risk assessments on behalf of duty holders but do help them to prioritise areas of concern	None
5 (4) review	HAVi Total.	Interview, demonstration	HAVi Total can be set to flag up review dates for risk assessments. Management monitoring of data before logging it onto the system allows dynamic review and risk assessment of high vibration tasks	None
6 (1), (2), (3) (a) elimination or reduction of vibration exposure	Consultancy, training, HAVi monitor & watch.	Interview, demonstration, site visits	'Elimination' message is the first consideration, and employers are challenged to explain 'why are you doing the job like that?' although this is not usually welcomed. Exposure calculated in HSE points as easier to understand than m/s^2 , reiterated that the Exposure Action Value/Exposure Limit Value are not targets.	None
6 (3) (b) to (g) organisational and technical measures	Consultancy, training, HAVi monitor & watch, HAVi Total, ToolAdvisor,	Interview, demonstration	Philosophy of advice offered to employers is in line with regulation. Importance of maintenance (also a requirement of the Provision and Use of Work Equipment Regulations 1998) is highlighted. HAVi Total allows maintenance to be scheduled and reported; ToolAdvisor allows comparison between vibration magnitude of different tools and for registered users to receive updates when	None

			new tools are brought to market; HAVi monitor & watch allow duration of vibration exposure to be controlled.	
6 (4) exposure at or in excess of limits	HAVi monitor & watch, HAVi Total.	Interview, demonstration	These systems allow dynamic monitoring and review of exposure data.	None
6 (6) those particularly at risk from vibration	HAVi monitor & watch, HAVi Total.	Interview, demonstration	Watch can be programmed with customised limits to ensure that medical advice on restrictions is not breached.	None
7, health surveillance	HAVi Total & watch.	Interview, demonstration	Management systems generate information of value to occupational health professionals when carrying out HAVS health surveillance; watch can be programmed to flag up appointments or restrictions.	None
8, information, instruction and training	Training, consultancy, HAVi total, sales literature. customer training and onsite consultancy also have relevant occupational experience of HAV management.	Site visits, interview, training material viewed	Training is delivered to IOSH accredited standard; employees routinely given information and advice during site visits and measurements. All HAVi customer facing staff have achieved IOSH managing safely; staff providing customer training and onsite consultancy also have relevant occupational experience of HAV management.	None