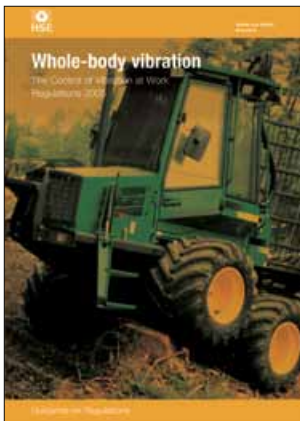


Whole-body vibration

The Control of Vibration at Work

Regulations 2005

Guidance on Regulations



This is a free-to-download, web-friendly version of L141, (First edition, published 2005). This version has been adapted for online use from HSE's current printed version.

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Exposure to whole-body vibration (WBV), particularly to large shocks and jolts, is a back-pain health risk for employees who drive mobile machines or other work vehicles over poor surfaces as a main part of their job.

Employers have a duty to control health risks to their employees from exposure to WBV under the Control of Vibration at Work Regulations 2005 (the Vibration Regulations).

This book will be of particular interest to employers in industries where there may be a health risk from WBV include agriculture, construction, forestry, mines and quarries. Risks may also exist where industrial trucks are used to transport materials, eg in factories, depots, warehouses and docks, particularly where the surfaces the trucks travel on are in poor condition or the drivers use poor driving techniques.

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Contents

Introduction 4

Part 1: Legal duties of employers to control the risks to health and safety from whole-body vibration 6

- Regulation 1** Citation and commencement 6
- Regulation 2** Interpretation 6
- Regulation 3** Application and transitional provisions 7
- Regulation 4** Exposure limit values and action values 10
- Regulation 5** Assessment of the risk to health created by vibration at the workplace 11
- Regulation 6** Elimination or control of exposure to vibration at the workplace 16
- Regulation 7** Health surveillance 21
- Regulation 8** Information, instruction and training 23
- Regulation 9** Exemption certificates for emergency services 25
- Regulation 10** Exemption certificates for air transport 26
- Regulation 11** Exemptions relating to the Ministry of Defence 27
- Regulation 12** Extension outside Great Britain 27
- Regulation 13** Amendments 28

- Schedule 1** Hand-arm vibration 28
- Schedule 2** Whole-body vibration 30

Part 2: An introduction to whole-body vibration for employers 31

Part 3: Risk assessment and control 33

Part 4: Machinery manufacturers' duties on whole-body vibration risks 42

Part 5: Health monitoring 47

Part 6: Postural risks 49

- Appendix 1** Selecting a competent person 50
- Appendix 2** Examples of WBV measurements 51
- Appendix 3** Sample health monitoring questionnaire 53

References 54

Further reading 55

Further information 56

Introduction

1 Exposure to whole-body vibration (WBV), particularly to large shocks and jolts, is a back-pain health risk for employees who drive mobile machines or other work vehicles over poor surfaces as a main part of their job. The Control of Vibration at Work Regulations 2005¹ (the Vibration Regulations) require employers to control the health risks to their employees from exposure to WBV. The main industries where there may be a health risk from WBV include agriculture, construction, forestry, mines and quarries. Risks may also exist where industrial trucks are used to transport materials, eg in factories, depots, warehouses and docks, particularly where the surfaces the trucks travel on are in poor condition or the drivers use poor driving techniques.

2 Vehicles such as vans, lorries and buses, which are normally driven on well-maintained public roads, may also expose their drivers to some WBV, but the levels are likely to be relatively low and therefore the likelihood of related health risks is low. Some drivers of road-going vehicles may report back pain, but this is more likely to be caused by other factors such as poor posture, prolonged periods confined to the driver's seat or doing related work such as regular manual lifting and carrying of vehicle loads. However, there may be some work activities where road-going vehicles may expose their drivers to higher levels of WBV. For example, where drivers regularly have to take their vehicles off-road or along unadopted roads or tracks such as farm tracks or construction site roadways. Where this is the case, employers may need to consider the guidance in this book.

3 While this book is mainly concerned with the health risks from WBV, it also suggests that you try to prevent back pain in your employees by taking a holistic approach which includes managing the other risks of back pain. For example, there may be risks of back pain where a mobile-machine driver may be forced to adopt a strained posture in the vehicle cab for long periods, or where their duties include frequently loading or unloading a vehicle manually. Tackling all these risk factors together is more likely to succeed in eliminating back problems in your workforce.

4 The main ways to control risk from WBV described in this book are generally easy to carry out, and often involve normal good management practices. They include choosing suitable machines and vehicles for particular tasks, training drivers to operate them in ways which avoid unnecessary bumping and jolting, and keeping site roadways and vehicle work areas as level as possible by filling in potholes and removing rubble and debris.

5 HSE is commissioning research in collaboration with a number of industry representative bodies to establish likely levels of WBV for a variety of industrial machines and vehicles carrying out different tasks. The results of this research will help employers to decide where the main risks are and to decide which control methods will be most effective. Some results are already available and can be found at HSE's vibration website (www.hse.gov.uk/vibration). More will be published as they become available.

The guidance

6 This book contains in-depth guidance on the Vibration Regulations as they relate to whole-body vibration. It does not contain guidance on those parts of the Regulations which apply only to hand-arm vibration. Guidance on those parts of the Regulations is provided in a separate book (*Hand-arm vibration. The Control of Vibration at Work Regulations 2005. Guidance on Regulations L140*).² The parts of the Regulations which apply specifically to hand-arm vibration are identified by grey shading.

7 General health and safety regulations, supported by HSE guidance, have required employers to control the risks from vibration and protect their employees since the early 1990s. However, the Control of Vibration at Work Regulations 2005¹ now place specific duties on employers. The Vibration Regulations are based on a European Union Directive³ requiring similar basic laws throughout the Union on reducing the risks of vibration-related diseases. If employers comply with the Vibration Regulations and follow HSE's guidance, it will be possible to stop employees developing advanced stages of these diseases. The requirements are straightforward and will be easy for employers to carry out.

8 The legal duties described in this book 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 1974⁴ (the HSW Act). These general obligations also apply to safeguarding the health of people who are not employees, such as students, voluntary workers, visitors and members of the public. Employees also have duties under the HSW Act to take care of their own health and safety and that of others whom their work may affect; and to co-operate with employers so that they may comply with health and safety law.

9 This book is divided into colour-coded parts to help readers go directly to the information that is most relevant to them. Other useful information is in a series of appendices.

Part 1: Guidance on the Regulations

10 Part 1 of the book includes the text of the Vibration Regulations and explains what they mean and what they require you to do. It sets out your legal obligations as an employer to control risks to health and safety from exposure to whole-body vibration (WBV), in particular, risks of back pain in drivers and operators of work machines and vehicles. This part will also be of interest to health and safety professionals.

Parts 2-6: Guidance for employers

11 Part 2 is a practical guide for employers on carrying out a risk assessment, estimating vibration exposure, controlling risks, arranging health monitoring, understanding the duties of machinery manufacturers and suppliers to their customers and how to obtain competent help with your assessment and control of risks.

12 HSE has also produced a free leaflet and quick-reference pocket card about the new requirements. For employers, leaflet *Control back-pain risks from whole-body vibration* INDG242(rev1)⁵ includes a brief introduction to the Vibration Regulations and provides the essential information that you will need to be able to comply with them. The pocket card *Drive away bad backs: Advice for mobile machine operators and drivers* INDG404⁶ contains straightforward advice for employees. Both can be obtained from HSE Books (see *Further information* at the back of this book for details) or downloaded from HSE's vibration website at www.hse.gov.uk/vibration.

PART 1: LEGAL DUTIES OF EMPLOYERS TO CONTROL THE RISKS TO HEALTH AND SAFETY FROM WHOLE-BODY VIBRATION

Citation and commencement

Regulation

1

Regulation 1

These Regulations may be cited as the Control of Vibration at Work Regulations 2005 and shall come into force on 6th July 2005.

Interpretation

Regulation

2

Regulation 2

(1) *In these Regulations -*

“daily exposure” means the quantity of mechanical vibration to which a worker is exposed during a working day, normalised to an 8-hour reference period, which takes account of the magnitude and duration of the vibration;

“emergency services” include -

- (a) *police, fire, rescue and ambulance services;*
- (b) *Her Majesty’s Coastguard;*

“enforcing authority” means the Executive or local authority, determined in accordance with the provisions of the Health and Safety (Enforcing Authority) Regulations 1998;^(a)

“exposure action value” means the level of daily exposure set out in regulation 4 for any worker which, if reached or exceeded, requires specified action to be taken to reduce risk;

“exposure limit value” means the level of daily exposure set out in regulation 4 for any worker which must not be exceeded, save as set out in regulation 6(5);

“the Executive” means the Health and Safety Executive;

“hand-arm vibration” means mechanical vibration which is transmitted into the hands and arms during a work activity;

“health surveillance” means assessment of the state of health of an employee, as related to exposure to vibration;

“mechanical vibration” means vibration occurring in a piece of machinery or equipment or in a vehicle as a result of its operation;

“risk assessment” means the assessment of risk required by regulation 5;

(a) S.I. 1998/494, as amended by S.I. 1999/2024, S.I. 1999/3232, S.I. 2002/2675, and S.I. 2004/3168.

Regulation

2

“whole-body vibration” means mechanical vibration which is transmitted into the body, when seated or standing, through the supporting surface, during a work activity or as described in regulation 5(3)(f); and

“working day” means a daily working period, irrespective of the time of day when it begins or ends, and of whether it begins or ends on the same calendar day.

(2) In these Regulations, a reference to an employee being exposed to vibration is a reference to the exposure of that employee to mechanical vibration arising out of or in connection with his work.

Application and transitional provisions

Regulation

3

Regulation 3

(1) These Regulations shall have effect with a view to protecting persons against risk to their health and safety arising from exposure to vibration at work.

(2) Subject to paragraph (3), regulation 6(4) shall not apply until 6th July 2010 where work equipment is used which-

- (a) was first provided to employees prior to 6th July 2007 by any employer; and*
- (b) does not permit compliance with the exposure limit values,*

but in using such equipment the employer shall take into account the latest technical advances and the organisational measures taken in accordance with regulation 6(2).

(3) For the agriculture and forestry sectors, regulation 6(4) shall not apply to whole-body vibration until 6th July 2014 in respect of work equipment which-

- (a) was first provided to employees prior to 6th July 2007 by any employer; and*
- (b) does not permit compliance with the exposure limit value for whole-body vibration,*

but in using such equipment the employer shall take into account the latest technical advances and the organisational measures taken in accordance with regulation 6(2).

(4) Where a duty is placed by these Regulations on an employer in respect of his employees, he shall, so far as is reasonably practicable, be under a like duty in respect of any other person, whether at work or not, who may be affected by the work carried out by the employer except that the duties of the employer -

- (a) under regulation 7 (health surveillance) shall not extend to persons who are not his employees; and*

Regulation

3

(b) under regulation 8 (information, instruction and training) shall not extend to persons who are not his employees, unless those persons are on the premises where the work is being carried out.

(5) These Regulations shall apply to a self-employed person as they apply to an employer and an employee and as if that self-employed person were both an employer and an employee, except that regulation 7 shall not apply to a self-employed person.

(6) These Regulations shall not apply to the master or crew of a ship or to the employer of such persons in respect of the normal shipboard activities of a ship's crew which are carried out solely by the crew under the direction of the master, and for the purposes of this paragraph "ship" includes every description of vessel used in navigation, other than a ship forming part of Her Majesty's Navy.

Guidance

3

Purpose

13 The Vibration Regulations are designed to protect against risks to both health and safety from whole-body vibration, ie the risk of back pain in those exposed and situations where vibration may affect ability to handle controls or read indicators.

Transitional periods

14 Regulation 3(2) and (3) defers the application of the exposure limit value (see regulations 4(2) and 6(4)) until 6 July 2010 (or for agriculture and forestry, until 6 July 2014) where it is not reasonably practicable to comply with it, if you are using a machine or vehicle which was already in use before 6 July 2007.

15 The transitional period applies only to the exposure limit value. The other requirements of the Regulations came into force from 6 July 2005 and must be complied with from that date.

16 The purpose of the transitional period is to allow:

- (a) a reasonable period of time for you to introduce new working methods which eliminate vibration exposure or reduce it to below the exposure limit value;
- (b) time for machines or vehicles with reduced vibration emission to be developed and introduced.

17 The transitional period is intended to apply to older machinery (first brought into use before 6 July 2007) which, in normal use, may cause employees to be exposed above the exposure limit value. You can continue to use such machinery (ie your own existing machine, or a second-hand machine you may have purchased, or older machines from hire companies) right up to 6 July 2010 (2014), but only if it is not reasonably practicable to purchase or hire newer, lower vibration machines or to introduce alternative working methods which would reduce exposures below the exposure limit value. If you make use of the transitional period, you will need to keep the availability of lower vibration equipment or work methods under regular review. If it becomes reasonably practicable for you to introduce lower vibration equipment or work methods before 6 July 2010 (2014), then you must do so.

18 It is important to remember that the transitional period is not a licence to do nothing at all. Even if you cannot reduce exposures below the exposure limit value, you must reduce them to as low a level as is reasonably practicable (see regulation 6(2)) and plan your longer-term strategy for getting exposures below the limit value by July 2010 (2014).

Guidance

19 Any equipment first brought into use after 6 July 2007, whether bought or hired, will need to be used in a way that will keep vibration exposure below the exposure limit value. So you will need to choose and manage the use of such equipment carefully to ensure the exposure limit value is not exceeded.

People not your employees

20 Sometimes your activities may cause employees of other employers, or other people, to be exposed to vibration, for example where subcontractors use machines for work you specify and control, or where volunteers are engaged alongside workers. Regulation 3(4) applies to all the employers involved and each will have a responsibility:

- (a) to their own employees;
- (b) so far as is reasonably practicable, to anyone else who is exposed to vibration in work activities under their control.

21 This responsibility applies to all the duties under the Vibration Regulations except that information, instruction and training (regulation 8) need only be given to others' employees in relation to the specific job they are undertaking for you.

22 Health surveillance (regulation 3(4)(a)) is not appropriate for WBV because it is considered that no methods currently exist for detecting changes in peoples' backs which can reliably indicate the early onset of changes (which may cause low back pain) that are specifically related to workplace factors.

23 In most cases, employers will need to exchange information and collaborate when working on joint projects to ensure they fulfil their duties without confusion or unnecessary duplication. On multi-contractor sites, employers will usually need to agree on who is to co-ordinate action to comply with health and safety requirements. This will normally be the person in overall control of the work. Where contractors and subcontractors are involved, it is usually best for responsibilities to be set out in the contractual arrangements. For construction projects, the principal contractor under the Construction (Design and Management) Regulations 1994⁷ (as amended) should ensure co-operation between all contractors through the use of pre-tender health and safety plans, method statements etc.

The self-employed

24 Regulation 3(5) defines both employer and employee to include self-employed people. So if you are self-employed, you will need to take action as set out in the Vibration Regulations to protect yourself from vibration risks. Although health surveillance is not appropriate for WBV, it is recommended that both employers and the self-employed follow the guidance on health monitoring in Part 5. This will help identify any back pain and possible causes and will allow risk controls to be reviewed and revised as necessary.

Trainees

25 The Health and Safety (Training for Employment) Regulations 1990⁸ require trainees on relevant workplace training schemes (but not those on courses at educational establishments such as universities or schools), to be treated as the employee of the person whose organisation is providing the training. Your duties towards trainees will include all the requirements of the Vibration Regulations, including assessment and control of risks, provision of information and training and consideration of whether any trainees might be at particular risk.

Guidance

Application to shipping and aircraft

26 The Vibration Regulations apply to work taking place in ships, boats and other vessels operated by Her Majesty's Navy, and to work on any vessel carried out alongside shore workers when it is moored or in dock. Regulation 3(6) states that the Vibration Regulations do not apply to the master and crew of a ship. This refers to work done by the crew under the control of the ship's master when the ship is under way, or work done by them in harbour when no shore-based workers are involved. However, in the future, similar regulations relating to control of vibration on merchant shipping and fishing vessels, enforced by the Maritime and Coastguard Agency, will apply to vessels in UK waters and to UK-registered vessels in international waters.

27 The Vibration Regulations apply to aircraft in flight over British soil. However, the Regulations are not intended to interfere with the flight safety of aircraft. Any proposals to alter an aircraft in order to comply with the Regulations should be agreed with the Civil Aviation Authority (CAA).

3

Exposure limit values and action values

Regulation

Regulation 4

(1) For hand-arm vibration -

- (a) the daily exposure limit value is $5 \text{ m/s}^2 A(8)$;
- (b) the daily exposure action value is $2.5 \text{ m/s}^2 A(8)$,

and daily exposure shall be ascertained on the basis set out in Schedule 1 Part 1.

(2) For whole body vibration -

- (a) the daily exposure limit value is $1.15 \text{ m/s}^2 A(8)$;
- (b) the daily exposure action value is $0.5 \text{ m/s}^2 A(8)$,

and daily exposure shall be ascertained on the basis set out in Schedule 2 Part 1.

4

Guidance

28 The daily exposure limit value is the maximum amount of vibration an employee may be exposed to on any single day (see regulation 6(4)). The daily exposure action value is the level of daily exposure to vibration above which you are required to take actions to reduce exposure (see regulations 6(2), 7(1)(b) and 8(1)(b)).

29 Guidance on how to determine employees' daily exposure for comparison with the exposure values is given Part 3.

4

Assessment of the risk to health created by vibration at the workplace

Regulation

Regulation 5

(1) *An employer who carries out work which is liable to expose any of his employees to risk from vibration shall make a suitable and sufficient assessment of the risk created by that work to the health and safety of those employees and the risk assessment shall identify the measures that need to be taken to meet the requirements of these Regulations.*

(2) *In conducting the risk assessment, the employer shall assess daily exposure to vibration by means of-*

- (a) observation of specific working practices;*
- (b) reference to relevant information on the probable magnitude of the vibration corresponding to the equipment used in the particular working conditions; and*
- (c) if necessary, measurement of the magnitude of vibration to which his employees are liable to be exposed,*

and the employer shall assess whether any employees are likely to be exposed to vibration at or above an exposure action value or above an exposure limit value.

(3) *The risk assessment shall include consideration of-*

- (a) the magnitude, type and duration of exposure, including any exposure to intermittent vibration or repeated shocks;*
- (b) the effects of exposure to vibration on employees whose health is at particular risk from such exposure;*
- (c) any effects of vibration on the workplace and work equipment, including the proper handling of controls, the reading of indicators, the stability of structures and the security of joints;*
- (d) any information provided by the manufacturers of work equipment;*
- (e) the availability of replacement equipment designed to reduce exposure to vibration;*
- (f) any extension of exposure at the workplace to whole-body vibration beyond normal working hours, including exposure in rest facilities supervised by the employer;*
- (g) specific working conditions such as low temperatures; and*
- (h) appropriate information obtained from health surveillance including, where possible, published information.*

(4) *The risk assessment shall be reviewed regularly, and forthwith if-*

- (a) there is reason to suspect that the risk assessment is no longer valid; or*
- (b) there has been a significant change in the work to which the assessment relates,*

and where, as a result of the review, changes to the risk assessment are required, those changes shall be made.

Regulation

5

(5) *The employer shall record-*

- (a) *the significant findings of the risk assessment as soon as is practicable after the risk assessment is made or changed; and*
- (b) *the measures which he has taken and which he intends to take to meet the requirements of regulations 6 and 8.*

Guidance

Risk assessment

30 The purpose of the assessment is to enable you to make a valid decision about the measures necessary to prevent or adequately control the exposure of your employees to WBV. It enables you to demonstrate readily to others who may have an interest (eg employees, safety representatives and enforcement authorities) that you have, from the earliest opportunity, considered:

- (a) all the factors related to the risk;
- (b) the practicability of preventing exposure;
- (c) the steps which need to be taken to achieve and maintain adequate control of exposure where prevention is not reasonably practicable; and
- (d) how to put the steps you have decided on into action.

Other risk factors you should consider

31 There are factors other than WBV which increase the risk of back pain. You should take account of these in your risk assessment. They include:

- (a) poor design of controls, making it difficult for the driver to adjust and/or operate the machine or vehicle easily, or to achieve good visibility without twisting, leaning or stretching;
- (b) failure to correctly adjust controls and seat, resulting in continual twisting, bending, leaning or stretching to operate the machine;
- (c) sitting for long periods without being able to change position;
- (d) poor driver posture while operating/driving mobile machines and vehicles;
- (e) repeated manual handling and lifting of loads by the driver;
- (f) repeatedly climbing into or jumping down from a high or difficult access cab.

32 The risk may increase further where the driver/operator is exposed to two or more of these factors together.

33 Part 3 sets out structured guidance on risk assessment. Below is a glossary of what the various terms in regulation 5 can be taken to mean and their effects on the risk assessment.

5

Guidance

"A suitable and sufficient assessment"

34 An assessment will be suitable and sufficient if it identifies:

- (a) where there may be a risk from WBV;
- (b) a reasonable estimate of the extent of your employees' exposure and a comparison with the exposure action and limit values;
- (c) the available risk controls;
- (d) the steps you plan to take to control and monitor those risks;
- (e) the steps that have been taken and their effectiveness.

5(1)

Guidance

35 Broadly speaking, you can assume the exposure action value is exceeded if vehicles or machines are used off-road. Driving vehicles solely on-road is unlikely to result in the exposure action value being exceeded, unless the vehicles have poor suspension and they are driven for most of a working day or shift. In most cases where the evidence suggests that exposure is unlikely to exceed the exposure action value, it will be sufficient to record that fact.

36 When comparing exposure with the exposure limit value, your estimate will only be reasonable if it uses vibration data which can be judged to be reasonably representative of your work process.

“The measures that need to be taken to meet the requirements of these Regulations”

37 When you have identified the work processes which expose your employees to vibration, you should decide what can be done to eliminate or reduce the risks, and when to take action. If the exposure action value is likely to be exceeded, you must establish a programme of formal risk control measures and your vibration assessment should contain an action plan. This should include, as appropriate, plans for selecting machines, routes and speeds which will avoid excessive vibration exposure, operator training, job rotation to reduce exposure time etc.

5(1)

Guidance

“Observation of specific working practices”

38 In order to assess the daily exposure to vibration of a worker (or a group of workers doing similar work), it is necessary to know approximately how long, on average each day, they are exposed to vibration. These details can be obtained by observing the employee. Observation should allow you to exclude pauses and breaks, and periods when the operator has switched to non-WBV-exposed work. You should also identify which work activities generate large shocks and jolts, eg travelling over rough ground or travelling at higher speeds, which is likely to cause greater risks. The person need not be observed for a complete day, but for a period or periods sufficient to provide a representative sample of typical machine use. If this is not practical, seek the information from the employee.

5(2)(a)

Guidance

“Relevant information on the probable magnitude of the vibration”

39 The manufacturer or supplier of the machine should supply you with information on vibration emissions, but check that the conditions under which it was measured match the way you use the machine. Your trade or industry representative body may have useful vibration data, and there are international vibration databases on the internet which may meet your needs.

40 Ideally you should use vibration information specific to the machine you plan to use, but if this is not available, you may need to use information relating to a similar machine. When choosing published vibration information, the factors you need to take account of include:

- (a) the type of machine (eg backhoe loader);
- (b) its class (eg power or size);
- (c) any anti-vibration features, eg suspended cab and/or wheels);
- (d) the task the equipment was used for when producing the vibration information;
- (e) the speed it was operated at; and
- (f) the ground conditions etc.

5(2)(b)

Guidance

"If necessary, measurement of the magnitude of vibration"

41 An assessment of exposure based on published information will normally be adequate, but you will need to be able to show, at least from 2010 (or 2014), that the measures you have put in place will prevent the exposure limit value being exceeded. If you cannot do this using published data, you may have to arrange for measurements to be taken.

42 You may also need to arrange for measurements to be taken when you need confirmation that your control actions have reduced exposure, particularly if you need to show that you have brought them below the exposure limit value. However, provided you can clearly demonstrate that, based on suitable published vibration data, you have introduced effective controls so far as is reasonably practicable, and which can reasonably be expected to keep exposures below the exposure limit value, it may not be necessary to measure.

43 Measurement of vibration requires additional skills, including training in the use of the specialised measuring equipment and a good understanding of the factors which can lead to inaccurate measurement. You could arrange for yourself or one of your staff to undergo training in using measuring equipment, or you could employ a competent contractor to do the measurement for you.

5(2)(c)

Guidance

"Magnitude, type and duration of exposure"

44 The factors which govern someone's vibration exposure are the magnitude (level) of vibration which the machine transmits into them, and the length of time they are exposed to it. The greater the magnitude and the longer the time of exposure, the greater the person's vibration exposure will be.

45 The pattern of work may also be relevant, eg intermittent exposures may indicate a lower risk than a long, uninterrupted exposure. The types of vibration can broadly be described as either steady-state vibration or vibration which includes occasional shocks and jolts. Vibration which includes shocks and jolts is believed to present a greater risk of back pain. It is therefore important to identify whether shocks and jolts are present when doing your risk assessment and concentrate on reducing these when identifying the measures you need to take.

5(3)(a)

Guidance

"Employees whose health is at particular risk"

46 Under regulation 6(6), the measures to be taken must be adapted to take into account employees who are particularly sensitive to vibration. These include:

- (a) young people (whose muscles and bones are still developing);
- (b) pregnant workers;
- (c) people with neck or back problems;
- (d) people who have recently undergone any form of surgery and those people with internal or external prosthetic devices (not including dentures).

5(3)(b)

Guidance

"Any effects of vibration on the workplace and work equipment"

47 Vibration can cause damage to vehicle equipment which may cause safety risks. Safety-critical instruments, gauges and meters may be particularly vulnerable to vibration damage. Vibration may also affect people's ability to read instruments or indicators or to handle controls. You should identify any such risks and take action to control them.

5(3)(c)

Guidance

"Information provided by the manufacturer of work equipment"

48 Manufacturers of most types of machines are required by the Supply of Machinery (Safety) Regulations 1992⁹ to design and construct their products to minimise vibration risks and to provide their customers with information on:

- (a) vibration emissions from their machines;
- (b) safe use of the machines;
- (c) training requirements for machine operators;
- (d) maintenance requirements; and
- (e) vibration risks.

49 In many cases, manufacturers' or suppliers' published vibration emission data may underestimate vibration emissions for the particular way you are using the machine. You should not use this data to estimate exposure unless you are reasonably sure it represents the way you use your machine, eg the operating conditions of the test are similar to your operating conditions (ie machine tasks, ground conditions, vehicle speed etc). Part 4 of this guidance provides more detail on the legal duties of machine manufacturers, importers and suppliers in respect of health and safety risks.

5(3)(d)

Guidance

"The availability of replacement equipment designed to reduce exposure to vibration"

50 For some types of machine there may be models available which are designed to reduce WBV exposure, eg with improved wheel suspension or with vibration-isolated cabs. When buying, hiring or replacing machines you should take these factors into account so far as is reasonably practicable. It is more important, however, to select a machine that is suitable for the work you are going to do. A suitable machine with higher vibration emissions may be more efficient and enable you to get the job done more quickly, leading to lower exposure than a lower vibration but less suitable machine. Your machine supplier should be able to advise you on this.

5(3)(e)

Guidance

"Any extension of exposure at the workplace ... beyond normal working hours"

51 This might apply, for example, where a driver takes rest periods on his vehicle while it is driven by his co-driver. In such cases the whole of the vibration exposure should be taken into account. This provision does not, however, apply to travel to and from work.

5(3)(f)

Guidance

"Specific working conditions such as low temperatures"

52 Cold exposure may not be a factor in causing musculoskeletal disorders, but may accelerate the onset or worsen the severity of pain. It is good practice to ensure that those working in the cold are provided with warm and (if necessary) waterproof clothing.

5(3)(g)

Guidance

"Appropriate information obtained from health surveillance"

53 There is, at present, no health surveillance appropriate for WBV. Nevertheless, information gained from an informal system of health monitoring, ie checking regularly with employees for reports of back pain, may identify possible risks from WBV or other back pain risk factors such as manual handling.

5(3)(h)

Guidance

"The risk assessment shall be reviewed regularly"

54 The risk assessment should be reviewed when you identify any changes in availability or suitability of machinery or work processes likely to offer reduced vibration exposure, or if you have any doubt about the effectiveness of the controls implemented. In any case, you should review your risk assessment at least every three years, but you may wish to review sooner if:

- (a) the level of risk is high;
- (b) there is doubt that your control measures remain effective;
- (c) there is a likelihood of better work methods or equipment becoming available.

5(4)

Guidance

"Record ... the significant findings of the risk assessment"

55 Your record of the risk assessment can be kept in any convenient form. The record must contain information on the significant findings of the assessment and the measures taken (or planned). The record should include:

- (a) the tasks assessed;
- (b) the risk of back pain faced by your employees;
- (c) the likelihood of the exposure action and limit values being exceeded;
- (d) the measures you have put in place to control and manage the risk;
- (e) plans, with timescales, for any new measures you plan to introduce;
- (f) the appropriate information, instruction and training to be provided to employees.

5(5)

Elimination or control of exposure to vibration at the workplace

Regulation

Regulation 6

(1) *The employer shall ensure that risk from the exposure of his employees to vibration is either eliminated at source or, where this is not reasonably practicable, reduced to as low a level as is reasonably practicable.*

(2) *Where it is not reasonably practicable to eliminate risk at source pursuant to paragraph (1) and an exposure action value is likely to be reached or exceeded, the employer shall reduce exposure to as low a level as is reasonably practicable by establishing and implementing a programme of organisational and technical measures which is appropriate to the activity.*

(3) *The measures taken by the employer in compliance with paragraphs (1) and (2) shall be based on the general principles of prevention set out in Schedule 1 to the Management of Health and Safety at Work Regulations 1999^(a) and shall include consideration of -*

- (a) *other working methods which eliminate or reduce exposure to vibration;*

6

(a) *S.I. 1999/3242, as amended by S.I. 2003/2457.*

Regulation

- (b) choice of work equipment of appropriate ergonomic design which, taking account of the work to be done, produces the least possible vibration;
- (c) the provision of auxiliary equipment which reduces the risk of injuries caused by vibration;
- (d) appropriate maintenance programmes for work equipment, the workplace and workplace systems;
- (e) the design and layout of workplaces, work stations and rest facilities;
- (f) suitable and sufficient information and training for employees, such that work equipment may be used correctly and safely, in order to minimise their exposure to vibration;
- (g) limitation of the duration and magnitude of exposure to vibration;
- (h) appropriate work schedules with adequate rest periods; and
- (i) the provision of clothing to protect employees from cold and damp.

(4) Subject to regulation 3(2) and (3) and paragraph (5), the employer shall-

- (a) ensure that his employees are not exposed to vibration above an exposure limit value; or
- (b) if an exposure limit value is exceeded, he shall forthwith-
 - (i) reduce exposure to vibration to below the limit value;
 - (ii) identify the reason for that limit being exceeded; and
 - (iii) modify the measures taken in accordance with paragraphs (1) and (2) to prevent it being exceeded again.

(5) Paragraph (4) shall not apply where the exposure of an employee to vibration is usually below the exposure action value but varies markedly from time to time and may occasionally exceed the exposure limit value, provided that-

- (a) any exposure to vibration averaged over one week is less than the exposure limit value;
- (b) there is evidence to show that the risk from the actual pattern of exposure is less than the corresponding risk from constant exposure at the exposure limit value;
- (c) risk is reduced to as low a level as is reasonably practicable, taking into account the special circumstances; and
- (d) the employees concerned are subject to increased health surveillance, where such surveillance is appropriate within the meaning of regulation 7(2),

and exposure within the meaning of this paragraph shall be ascertained on the basis set out in Schedule 1 Part II for hand-arm vibration and Schedule 2 Part II for whole-body vibration.

(6) The employer shall adapt any measure taken in compliance with the requirements of this regulation to take account of any employee or group of employees whose health is likely to be particularly at risk from vibration.

Guidance

Control of exposure

56 This regulation means you have to take action to prevent risk from vibration exposure completely wherever it is reasonably practicable to do so (regulation 6(1)). You will need to consider whether there are alternative processes, machines and/or working methods which would largely eliminate exposure to vibration, in particular vibration containing large shocks and jolts. If it is not reasonably practicable to eliminate the risks completely, you should reduce them to as low a level as is reasonably practicable (regulation 6(1)). You should:

- (a) introduce a formal programme of control measures whenever your employees' daily exposure to vibration is likely to exceed the exposure action value (regulation 6(2)). Your programme of controls should be proportionate to the degree of risk;
- (b) not expose your employees above the exposure limit value (regulation 6(4)).

6

Guidance

"Establishing and implementing a programme of organisational and technical measures"

57 The action plan produced during your vibration risk assessment should describe a programme of control measures, and your plans to put it into action with realistic timescales. Risk are likely to be low for exposures at or just above the exposure action value and since your controls should be proportionate to risk, little (if any) action is likely to be required in these circumstances. Higher exposures, particularly those closer to the exposure limit value and where the vibration includes large shocks and jolts, will need proportionately more control action. The programme of control measures should be devised to reduce the risks from vibration exposure to as low a level as is reasonably practicable. The actions you take will depend on the particular work activities and processes and the possibilities for control.

58 Some controls may take time to put in place, particularly where machines must be replaced or new industrial processes developed. Your programme of controls is likely to include several different actions and may be planned for implementation over several months or even years. The action plan should also state clearly which managers, supervisors and employees have responsibility for delivering the various parts of the plan and by when. It should also include provisions for testing the effectiveness of control measures.

6(2)

Guidance

"The general principles of prevention"

59 Schedule 1 to the Management of Health and Safety at Work Regulations 1999¹⁰ lists the general principles of prevention:

- (a) avoiding risks;
- (b) evaluating the risks which cannot be avoided;
- (c) combating the risks at source;
- (d) adapting the work to the individual, especially as regards the design of workplaces, the choice of work equipment and the choice of working and production methods, with a view, in particular, to alleviating monotonous work and work at a predetermined work-rate and to reducing their effect on health;
- (e) adapting to technical progress;
- (f) replacing the dangerous by the non-dangerous or the less dangerous;
- (g) developing a coherent overall prevention policy which covers technology, organisation of work, working conditions, social relationships and the influence of factors relating to the working environment;

6(3)

<p>Guidance</p> <p>6(3)</p>	<p>(h) giving collective protective measures priority over individual protective measures;</p> <p>(i) giving appropriate instructions to employees.</p> <p>60 The list of possible control measures in regulation 6(3) is specific to vibration but follows similar principles.</p>
<p>Guidance</p> <p>6(3)(a)</p>	<p><i>“Other working methods which eliminate or reduce exposure”</i></p> <p>61 There are few examples of other methods of work that eliminate or reduce exposure to WBV. It is possible in some cases to minimise the transport of goods or materials or to replace manned with unmanned machines such as remotely controlled conveyors.</p>
<p>Guidance</p> <p>6(3)(b)</p>	<p><i>“Choice of work equipment of appropriate ergonomic design”</i></p> <p>62 The choice of machine can be an important means of reducing exposure to vibration, though the difference in vibration emissions of directly competing machines can be small. However, equipment selected must be suitable for the job and the efficiency of the machine should be taken into account when evaluating the likely effect on exposure.</p>
<p>Guidance</p> <p>6(3)(c)</p>	<p><i>“The provision of auxiliary equipment”</i></p> <p>63 There are few items of auxiliary equipment that can reduce risks from WBV. They are largely limited to the choice of seat (including suspension seats) and the choice of tyres.</p>
<p>Guidance</p> <p>6(3)(d)</p>	<p><i>“Appropriate maintenance programmes”</i></p> <p>64 Suspensions are prone to wear and will need regular servicing. Components such as suspension seats will usually wear out several times during the life of a machine. Maintenance of unmade roads and ground conditions throughout sites to suit the machines that use them will greatly reduce shocks and jolts.</p>
<p>Guidance</p> <p>6(3)(e)</p>	<p><i>“The design and layout of workplaces”</i></p> <p>65 The choice of machine should take account of ergonomic factors that influence the risk of back pain and other health complaints. For example:</p> <ul style="list-style-type: none"> (a) visibility should be such that the machine can be operated without stretching and twisting to observe the work, especially when simultaneously exposed to WBV; (b) it should be easy to get in and out of the machine by using handholds and footholds so that the temptation to climb or jump is minimised; (c) access to manually loaded areas should be unimpeded by the machinery structure and involve minimal lifting; (d) if the machine cab is the sole workplace of the machine operator, including break time, it should have sufficient space and facilities for rest periods. <p>66 The design and layout of workplace sites can reduce the need to transport materials, and so reduce the WBV exposure of transport machinery operators.</p>
<p>Guidance</p> <p>6(3)(f)</p>	<p><i>“Suitable and sufficient information and training for employees”</i></p> <p>67 Guidance on information and training for employees is given at regulation 8.</p>

Guidance

“Limitation of the duration and magnitude of exposure”

6(3)(g)

68 When all reasonably practicable steps have been taken to reduce the vibration magnitude, and taking account of the fact that there is no personal protective equipment available for WBV, the final resort for compliance with the exposure limit value is to limit the duration of exposure.

Guidance

“Appropriate work schedules with adequate rest periods”

6(3)(h)

69 The scientific basis for recommending appropriate work schedules and breaks is incomplete. However, a recommended precautionary measure is to take a short break between operating mobile machinery and manual handling of materials, to give tired muscles time to recover before handling heavy loads.

Guidance

“Protect employees from cold and damp”

6(3)(i)

70 Cold exposure may accelerate the onset or worsen the severity of back pain. It is good practice to ensure that those working in the cold are provided with warm, and (if necessary) waterproof clothing.

Guidance

“Reduction of exposure below the exposure limit value”

6(4)

71 You must not permit an employee to be exposed above the exposure limit value. Your programme of measures must be designed to prevent this level of exposure. If you find the exposure limit value is being exceeded, you must immediately take action to reduce exposure and to identify the reason for overexposure.

72 You should not consider reduction below the exposure limit value to be a target – you must reduce exposure as low as you reasonably can. This may mean reducing the time for which the employee uses the machine each day, eg spreading that particular task over several days or sharing it between two or more employees.

73 The exposure limit value is subject to a transitional period in certain circumstances (see paragraphs 14-19).

Guidance

“Occasional exposures above the exposure limit value (weekly averaging of exposure)”

6(5)

74 This regulation allows employers to average exposures over a week rather than over a day, but only in particular circumstances. This exception is primarily designed for where workers exceptionally need to carry out work causing uncommonly high vibration exposure in a single day, eg for emergency work. The main conditions are:

- (a) that the person’s exposure is usually below the exposure action value;
- (b) that the risk is less than if the employee were exposed at the exposure limit value for the week.

75 This flexibility does not remove the duty on you to reduce the exposure so far as is reasonably practicable. Schedule 2 Part II to the Vibration Regulations describes the method for calculating weekly average exposure.

Guidance

6(6)

“Employees whose health is likely to be particularly at risk”

76 Paragraph 46 identifies those who may be particularly sensitive to WBV. Extra care will be needed to ensure that their exposure is kept to a minimum, that they are given and take account of adequate information, instruction and training, and that symptoms of back pain are monitored.

Health surveillance

Regulation

Regulation 7

(1) If-

- (a) *the risk assessment indicates that there is a risk to the health of his employees who are, or are liable to be, exposed to vibration; or*
- (b) *employees are likely to be exposed to vibration at or above an exposure action value,*

the employer shall ensure that such employees are placed under suitable health surveillance, where such surveillance is appropriate within the meaning of paragraph (2).

(2) *Health surveillance, which shall be intended to prevent or diagnose any health effect linked with exposure to vibration, shall be appropriate where the exposure of the employee to vibration is such that-*

- (a) *a link can be established between that exposure and an identifiable disease or adverse health effect;*
- (b) *it is probable that the disease or effect may occur under the particular conditions of his work; and*
- (c) *there are valid techniques for detecting the disease or effect.*

(3) *The employer shall ensure that a health record in respect of each of his employees who undergoes health surveillance in accordance with paragraph (1) is made and maintained and that the record or a copy thereof is kept available in a suitable form.*

(4) *The employer shall-*

- (a) *on reasonable notice being given, allow an employee access to his personal health record; and*
- (b) *provide the enforcing authority with copies of such health records as it may require.*

(5) *Where, as a result of health surveillance, an employee is found to have an identifiable disease or adverse health effect which is considered by a doctor or other occupational health professional to be the result of exposure to vibration the employer of that employee shall-*

- (a) *ensure that a suitably qualified person informs the employee accordingly and provides the employee with information and advice regarding further health surveillance, including any health surveillance which he should undergo following the end of the exposure;*

7

Regulation

7

- (b) ensure that he is himself informed of any significant findings from the employee's health surveillance, taking into account any medical confidentiality;
- (c) review the risk assessment;
- (d) review any measure taken to comply with regulation 6, taking into account any advice given by a doctor or occupational health professional or by the enforcing authority;
- (e) consider assigning the employee to alternative work where there is no risk from further exposure to vibration, taking into account any advice given by a doctor or occupational health professional; and
- (f) provide for a review of the health of any other employee who has been similarly exposed, including a medical examination where such an examination is recommended by a doctor or occupational health professional or by the enforcing authority.

(6) An employee to whom this regulation applies shall, when required by his employer and at the cost of his employer, present himself during his working hours for such health surveillance procedures as may be required for the purposes of paragraph (1).

Guidance

7

"Suitable health surveillance"

77 Health surveillance for WBV is not appropriate since it fails to meet the criteria listed in regulation 7(2). It is not considered that any methods exist for the detection of changes in peoples' backs which can reliably indicate the early onset of changes (which may cause low back pain) that are specifically related to workplace factors.

78 Valuable information can, however, be obtained from less precise measures than those provided for by a formal health surveillance approach, such as reporting and monitoring of symptoms. This is generally known as 'health monitoring'. It is good practice to put in place this type of system to allow individuals to make early reports of low back pain in order to assess the need for action on WBV, manual handling or posture. However, it is not a legal requirement under these regulations.

Information, instruction and training

Regulation

Regulation 8

(1) If -

- (a) the risk assessment indicates that there is a risk to the health of his employees who are, or who are liable to be, exposed to vibration; or
- (b) employees are likely to be exposed to vibration at or above an exposure action value,

the employer shall provide those employees and their representatives with suitable and sufficient information, instruction and training.

(2) Without prejudice to the generality of paragraph (1), the information, instruction and training provided under that paragraph shall include-

- (a) the organisational and technical measures taken in order to comply with the requirements of regulation 6;
- (b) the exposure limit values and action values set out in regulation 4;
- (c) the significant findings of the risk assessment, including any measurements taken, with an explanation of those findings;
- (d) why and how to detect and report signs of injury;
- (e) entitlement to appropriate health surveillance under regulation 7 and its purposes;
- (f) safe working practices to minimise exposure to vibration; and
- (g) the collective results of any health surveillance undertaken in accordance with regulation 7 in a form calculated to prevent those results from being identified as relating to a particular person.

(3) The information, instruction and training required by paragraph (1) shall be updated to take account of significant changes in the type of work carried out or the working methods used by the employer.

(4) The employer shall ensure that any person, whether or not his employee, who carries out work in connection with the employer's duties under these Regulations has suitable and sufficient information, instruction and training.

8

Guidance

"Provide...employees and their representatives with...information, instruction and training"

79 You should be informative and open to your exposed workers and to their employee and safety representatives. Employees should be properly trained to carry out their jobs safely. Regulation 8(2) lists some of the issues that must be covered, but it is not exhaustive.

80 Driver skill is likely to be the main contributor to reducing WBV exposure. Training is therefore likely to be one of the most important elements in your risk control programme.

8(1)

Guidance

81 It is important that employees fully understand the level of risk they may be exposed to, how it is caused and the possible health effects, ie:

- (a) which machines and processes cause vibration risks, and their respective levels of risk;
- (b) how their personal daily exposures compare to the exposure action and limit values;
- (c) what symptoms of ill health they should look out for, to whom they should report them and how they should report them. You might do this through the introduction of an informal health monitoring programme;
- (d) what control measures you plan to introduce to reduce risks;
- (e) what training you plan for operators, supervisors and managers in their respective roles to ensure control of exposure, eg through correct selection, use and maintenance of machines or restrictions of exposure times. Machine manufacturers and suppliers might advise you on this;
- (f) what employees' duties are to:
 - (i) follow the employer's guidance on safe use of the equipment;
 - (ii) report problems with the equipment such as broken suspension seats.

82 You can provide the information, instruction and training in different ways, including:

- (a) presentations;
- (b) computer-based training;
- (c) individual counselling and training;
- (d) leaflets and posters;
- (e) videos;
- (f) short local training sessions.

83 No single way will be suitable for all circumstances and you will need to reinforce the messages from time to time, eg by giving 'tool-box' talks. You should draw the employee's attention to any relevant advice provided by HSE, trade associations etc and provide them with the free HSE pocket card (*Drive away bad backs* INDG404).⁶

84 You should make sure that you give the information in a way in which the employee can be expected to understand (for example you might need to make special arrangements if the employee is not fluent in English or cannot read).

85 Working with trade union-appointed safety representatives or other employee representatives can be a very useful means of communicating on health and safety matters in your workplace. You are required by the Safety Representative and Safety Committees Regulations 1977,¹¹⁻¹² the Offshore Installations (Safety Representatives and Safety Committees) Regulations 1989¹³ and the Quarries Regulations 1999¹⁴ to make certain information available to safety representatives appointed under the relevant regulations. The representatives are entitled to inspect some of your documents which will normally include your vibration assessment covering those employees represented. You should make sure the representatives know how the information can be obtained and give them any necessary explanation of their meaning.

86 There is also a duty on you to provide information to employee representatives elected under the Health and Safety (Consultation with Employees) Regulations 1996,^{15, 16} which apply to groups of workers who are not covered by a trade union-appointed safety representative.

Guidance

Information, instruction and training in connection with the employer's duties

87 Anyone who assists you to comply with your duties under the Vibration Regulations (eg by making vibration measurements, determining exposures or planning for control of risk through changes to processes or working practices) must have suitable and sufficient information, instruction and training. This means that they must be competent to undertake this responsibility.

88 Part 2 contains guidance on appropriate levels of knowledge and expertise for competent assessment and management of WBV. Whether you employ a consultant or use members of your staff for these purposes, you should ensure that they have the necessary understanding and experience.

8(4)

Exemption certificates for emergency services

Regulation

Regulation 9

(1) Subject to paragraph (2), the Executive may, by a certificate in writing, exempt any person or class of persons from regulation 6(4) in respect of activities carried out by emergency services which conflict with the requirements of that paragraph, and any such exemption may be granted subject to conditions and to a limit of time and may be revoked by a certificate in writing at any time.

(2) The Executive shall not grant any such exemption unless it is satisfied that the health and safety of the employees concerned is ensured as far as possible in the light of the objectives of these Regulations.

9

Guidance

89 Any emergency service wishing to seek exemption under this regulation should contact HSE for further advice. HSE is likely only to consider applications made in relation to an emergency service as a whole rather than from local units. Emergency services will only need to apply for exemption after the end of the transitional period on 6 July 2010.

9

Exemption certificates for air transport

Regulation

Regulation 10

(1) Subject to paragraph (2), the Executive may, by a certificate in writing, exempt any person or class of persons from regulation 6(4) in respect of whole-body vibration in the case of air transport, where the latest technical advances and the characteristics of the workplace do not permit compliance with the exposure limit value despite the technical and organisational measures taken, and any such exemption may be granted subject to conditions and to a limit of time and may be revoked by a certificate in writing at any time.

(2) The Executive shall not grant any such exemption unless -

- (a) it consults the employers and the employees or their representatives concerned;*
- (b) the resulting risks are reduced to as low a level as is reasonably practicable; and*
- (c) the employees concerned are subject to increased health surveillance, where such surveillance is appropriate within the meaning of regulation 7(2).*

10

Guidance

10

90 Any organisation wishing to seek exemption under this regulation should contact HSE for further advice. Organisations will only need to apply for exemption after the end of the transitional period on 6 July 2010.

Exemptions relating to the Ministry of Defence

Regulation

11

Regulation 11

(1) Subject to paragraph (2), the Secretary of State for Defence may, by a certificate in writing, exempt any person or class of persons from regulation 6(4) in respect of activities carried out in the interests of national security which conflict with the requirements of that paragraph, and any such exemption may be granted subject to conditions and to a limit of time and may be revoked by a certificate in writing at any time.

(2) The Secretary of State shall not grant any such exemption unless he is satisfied that the health and safety of the employees concerned is ensured as far as possible in the light of the objectives of these Regulations.

Extension outside Great Britain

Regulation

12

Regulation 12

These Regulations shall apply to and in relation to any activity outside Great Britain to which sections 1 to 59 and 80 to 82 of the 1974 Act apply by virtue of the Health and Safety at Work etc. Act 1974 (Application outside Great Britain) Order 2001^(a) as those provisions apply within Great Britain.

(a) S.I. 2001/2127.

Guidance

12

91 The Vibration Regulations apply to all work activities on offshore installations, wells, pipelines and pipelines works and to certain connected activities within the territorial waters of Great Britain or in designated areas of the UK Continental Shelf. The Regulations also apply to certain other activities within territorial waters, including the construction and operation of wind farms.

Amendments

Regulation

Regulation 13

(1) *In the Offshore Installations and Wells (Design and Construction etc.) Regulations 1996,^(a) paragraph 67 of Schedule 1 shall be omitted.*

(2) *In the Provision and Use of Work Equipment Regulations 1998,^(b) to the end of the list in regulation 12(5) add-*

“(g) the Control of Vibration at Work Regulations 2005”.

(a) *S.I. 1996/913, amended by S.I. 1997/1993.*

(b) *S.I. 1998/2306.*

13

Guidance

92 The Schedules provide definitions of hand-arm and whole-body vibration exposure relevant to the exposure action and limit values set out in the Vibration Regulations. The Schedules are not generally intended to be used by employers, who should be able to assess daily vibration exposure adequately by following the guidance in this book.

Schedules 1 and 2

Schedule

Hand-arm vibration

Schedule 1 Regulations 4(1) and 6(5)

Part I: Daily exposure to vibration

The daily exposure to vibration $A(8)$ of a person is ascertained using the formula:

$$A(8) = a_{hv} \sqrt{\frac{T}{T_0}}$$

where:

a_{hv} is the vibration magnitude, in metres per second squared (m/s^2);

T is the duration of exposure to the vibration magnitude a_{hv} ; and

T_0 is the reference duration of 8 hours (28,800 seconds).

To avoid confusion between vibration magnitude and daily exposure to vibration, it is conventional to express daily exposure to vibration in $m/s^2 A(8)$.

The vibration magnitude, a_{hv} , is ascertained using the formula:

$$a_{hv} = \sqrt{a_{hvx}^2 + a_{hvy}^2 + a_{hvw}^2}$$

where:

a_{hvx} , a_{hvy} and a_{hvw} are the root-mean-square acceleration magnitudes, in m/s^2 , measured in three orthogonal directions, x, y and z, at the vibrating surface in contact with the hand, and frequency-weighted using the weighting W_h .

1

Schedule

The definition for the frequency weighting W_h is given in British Standard BS EN ISO 5349-1:2001.

Where both hands are exposed to vibration, the greater of the two magnitudes a_{hvi} is used to ascertain the daily exposure.

If the work is such that the total daily exposure consists of two or more operations with different vibration magnitudes, the daily exposure $A(8)$ for the combination of operations is ascertained using the formula:

$$A(8) = \sqrt{\frac{1}{T_0} \sum_{i=1}^n a_{hvi}^2 T_i}$$

where:

n is the number of individual operations within the working day;

a_{hvi} is the vibration magnitude for operation i ; and

T_i is the duration of operation i .

Part II: Exposure to vibration averaged over one week

The exposure to vibration averaged over one week ($A(8)_{\text{week}}$) is the total exposure occurring within a period of seven consecutive days, normalised to a reference duration of five 8-hour days (40 hours). It is ascertained using the formula:

$$A(8)_{\text{week}} = \sqrt{\frac{1}{5} \sum_{j=1}^7 A(8)_j^2}$$

where:

$A(8)_j$ is the daily exposure for day j .

The exposure to vibration averaged over one week is for use only for the purposes of regulation 6(5).

1

Schedule

Whole-body vibration

Schedule 2 Regulations 4(2) and 6(5)

Part I: Daily exposure to vibration

The daily exposure to vibration ($A(8)$) of a person is ascertained using the formula:

$$A(8) = k a_w \sqrt{\frac{T}{T_0}}$$

where:

a_w is the vibration magnitude (root-mean-square frequency-weighted acceleration magnitude) in one of the three orthogonal directions, x, y and z, at the supporting surface;

T is the duration of exposure to the vibration magnitude a_w ;

T_0 is the reference duration of 8 hours (28,800 seconds); and

k is a multiplying factor.

To avoid confusion between vibration magnitude and daily exposure to vibration, it is conventional to express daily exposure to vibration in $\text{m/s}^2 A(8)$.

Daily exposure to vibration ($A(8)$) is evaluated separately for the x, y and z directions of vibration.

For horizontal vibration (x and y directions), $k = 1.4$ and a_w is obtained using the W_d frequency weighting. For vertical vibration (z direction), $k = 1.0$ and a_w is obtained using the W_k frequency weighting.

Definitions for the frequency weightings are given in International Standard ISO 2631-1:1997.

If the work is such that the total daily exposure consists of two or more operations with different vibration magnitudes, the daily exposure ($A(8)$) for the combination of operations is ascertained using the formula:

$$A(8) = \sqrt{\frac{1}{T_0} \sum_{i=1}^n a_{wi}^2 T_i}$$

where:

n is the number of individual operations within the working day;

a_{wi} is the vibration magnitude for operation i ; and

T_i is the duration of operation i .

Schedule

2

Part II: Exposure to vibration averaged over one week

The exposure to vibration averaged over one week ($A(8)_{\text{week}}$) is the total exposure occurring within a period of seven consecutive days, normalised to a reference duration of five 8-hour days (40 hours). It is ascertained using the formula:

$$A(8)_{\text{week}} = \sqrt{\frac{1}{5} \sum_{j=1}^7 A(8)_j^2}$$

where:

$A(8)_j$ is the daily exposure for day j .

The exposure to vibration averaged over one week is for use only for the purposes of regulation 6(5).

PART 2: AN INTRODUCTION TO WHOLE-BODY VIBRATION FOR EMPLOYERS

93 Parts 2-6 of this guide aims to explain what whole-body vibration (WBV) is, when it is a risk to health and what you need to do to minimise the risk to your employees.

When WBV occurs

94 WBV occurs when a person's body is supported on a vibrating surface. This is most likely when sitting on the seat of a moving vehicle or other form of transport, or when operating vibrating machines. WBV can be caused by:

- movement of the wheels or tracks of a vehicle or mobile machine crossing an uneven surface, or while using mobile machines to excavate holes or trenches in the ground or to load materials such as sand or gravel into lorries;
- the rotation of the rotor blades of a helicopter, which may transmit WBV through the airframe into the seats;
- fast boats travelling across rough seas;
- railway vehicles;
- operating large static compaction, hammering or punching machines, such as hammer mills and mobile crushers.

The risk of back pain

95 Exposure to high levels of WBV can be extremely uncomfortable and unpleasant, but it can also cause or aggravate back pain. Hundreds of thousands of workers suffer from back pain at one time or another. Although back pain may be caused by other work factors (see paragraph 96), long-term exposure to WBV, particularly to repeated shocks and jolts, is linked to back pain.

Other causes of back pain in drivers/plant operators

96 Other possible contributing factors to back pain include:

- poor posture while driving/operating plant;
- sitting for long periods without being able to change position;
- poorly placed controls which require the driver/operator to stretch or twist to operate them;

- manual lifting and carrying of heavy or awkward loads;
- repeatedly climbing into or jumping out of a high or difficult access cab.

97 All these factors (as well as WBV) can separately cause back pain. However, the risk will be increased where a person is exposed to two or more factors together. For example:

- WBV exposure for long periods without being able to change position;
- driving over rough ground while looking over your shoulder to check on the operation of attached equipment;
- being exposed to high levels of WBV and then doing work involving manually lifting and carrying heavy loads.

98 It would be sensible to consider all these potential causes together in your plans to minimise risk of back pain. Regulations and guidance on manual handling of materials^{17, 18} should be considered where this is a factor in your employees' work. There are no specific regulations on health risks from poor posture but some guidance on this is given in Part 6.

Vehicles/plant likely to cause the greatest risk

99 All types of vehicle, when in motion, are likely to cause the driver to experience WBV. However, this is only likely to cause health problems to people who are regularly exposed to high levels of WBV over a long period.

100 High levels of WBV are most likely for people who drive vehicles over rough surfaces as part of their job, for example drivers of off-road vehicles such as tractors, quad bikes, and dumper trucks.

101 Some industrial vehicles, such as fork-lift trucks, which are designed to lift and move heavy materials, may not have wheel suspension and may be fitted with solid tyres to provide them with the necessary stability to work safely. Provided they are driven on smooth surfaces, WBV levels should not be high. However, if they are driven on poorly maintained surfaces which are cracked, holed or uneven, they can generate high levels of WBV, including shocks and jolts.

102 Excavators may generate high levels of WBV when excavating difficult ground.

103 Railway vehicles with modern suspension systems running on well-maintained track are likely to cause low levels of WBV, but higher levels may be experienced when old rolling stock is running on older designs of track.

Road vehicles

104 Most road vehicles will generate fairly low levels of WBV provided the road surface they travel on is well maintained. Cars, vans and modern designs of suspended-cab lorries are generally unlikely to present a risk from WBV when used on well-maintained roads. However, vehicles with less effective suspension (such as rigid body lorries) may cause higher levels of WBV, particularly when they are driven over poor surfaces, or when they are unladen. Some heavily laden vehicles may transmit shocks and jolts to the driver with hard use of the brakes.

What do I have to do?

105 You need to decide if there might be a risk to your employees from exposure to WBV and, if so, to assess that risk and introduce appropriate controls. Part 3 will help you do this.

PART 3: RISK ASSESSMENT AND CONTROL

Overview

- How do I do a risk assessment?
- How do I estimate employees' exposure to WBV?
- What are the main factors to risk?
- What controls can I use to reduce risks from WBV?
- What records do I need to keep?

Purpose of the risk assessment

106 Your WBV risk assessment will identify the likely risks of causing or aggravating back pain in your workers who are exposed to WBV. It will give you information to help you decide what you can do to control WBV exposure and to draw up an action plan to reduce the risk of back pain. Your WBV assessment is not a one-off activity – you will need to keep it up-to-date.

107 WBV is not the only cause, and in many cases is not the main cause, of back pain at work. Addressing the risk of back pain will include assessment of other factors such as manual handling and driver posture, and of how one factor might influence another. Further information is provided in Part 6 (*Postural risks*) and in the publication *Getting to grips with manual handling: A short guide* INDG143(rev 1).¹⁹ Employers may also need to be aware of possible risks from leisure activities and lifestyle. This Part of the book deals solely with how you can assess WBV exposure and what measures you can introduce to reduce it.

Five steps to vibration risk assessment

108 You will need to take five basic steps in assessing the risks from WBV in the workplace:

- Step 1** Look to see whether there is likely to be a WBV hazard (see paragraphs 109-115);
- Step 2** Identify all workers likely to be exposed to the hazard (see paragraphs 116-118);
- Step 3** Evaluate the risks arising from the hazard – estimate the vibration exposures to help you decide what further action is appropriate to comply with regulations 5, 6 and 8 (see paragraphs 119-156);
- Step 4** Record the findings (paragraphs 157-161);
- Step 5** Review the assessment and revise it if necessary (see paragraphs 162-163).

Step 1 – Deciding whether a WBV exposure assessment is needed

109 Under the Management of Health and Safety at Work Regulations 1999,¹⁰ you are required to make an assessment of all risks to health and safety in the workplace. This overall risk assessment should cover all potential hazards, including WBV.

110 Everyone who drives or travels on any kind of vehicle, or who stands or sits on vibrating machines, will be exposed to WBV. However, comparatively few of them will be at risk. The main thing to look for is whether the workers suffer any shocks and jolts during their exposure (for example, by driving over a ploughed field), as opposed to being exposed to continuous but low-level vibration (for example, in a car on a motorway).

Factors likely to indicate risk

111 There is likely to be a risk from WBV where one or more of the following occur:

- workers regularly drive vehicles off-road;
- the driver/operator is jolted, shaken, or lurches from side to side or backwards and forwards as the machine or vehicle moves or operates;
- severe shocks and jolts are transmitted into the driver/operator's seat;
- vehicles have no wheel suspension or have solid tyres;
- the manufacturer of the vehicle/machine warns of WBV risks;
- vehicles are used for work they were not designed for;
- vehicle maintenance records suggest that wear and breakages may be due to high levels of vibration or shock;
- vehicles have damaged seats or seat adjustment mechanisms;
- replacement suspension seats are unsuitable for the vehicle;
- vehicles use unmade or poor quality (eg potholed) roads for any part of their journey (eg delivery to farms, construction sites, depots);
- vehicles are used on worksites with poor surfaces (cracked, potholed, uneven or covered in rubble);
- workers sit or stand on a mobile or static machine when it is operating;
- there is a history of back pain in the job;
- employees report uncomfortable levels of vibration;
- employees report pain in their lower back during and after exposure to WBV.

112 Nearly all drivers of off-road vehicles are likely to be at risk. Some vehicles used off-road for long periods are capable of generating exposures to WBV approaching or exceeding the exposure limit value.

113 Few road vehicles driven on the public highway are likely to be sources of exposures to WBV sufficient to pose a risk to health, unless:

- they are driven for periods much longer than eight hours; and
- they make frequent deliveries to off-road sites.

114 Examples include rigid-body trucks – especially drop-side trucks and small tipper trucks – when driven for several hours on poor quality road surfaces.

115 You should be able to judge from this guidance whether or not there might be a WBV risk at your workplace. If you decide there is not, all you need to do is to record that fact in your workplace risk assessment. If there might be a risk, you should move on to Step 2.

Step 2 – Who might be exposed to a WBV risk?

116 Employees who may be at risk will include those who, as part of their job, regularly:

- drive a vehicle under conditions listed in paragraph 111;
- sit or stand on a mobile or static machine which vibrates or shakes violently when it is operating;
- ride in or pilot a helicopter;
- ride in or drive a fast boat.

117 You will need to consider all your employees who may be at risk from WBV, including those working away from the main site. Part 1 paragraphs 20-23 give guidance on co-operation with other employers whose workers work on your site or where your employees work at another employer's site.

People particularly sensitive to risks from WBV

118 Regulation 5(3)(c) requires you to take particular account of the health and safety of people who are more sensitive to vibration risks. These include:

- pregnant workers and those who have recently given birth. You should not expose such workers to uncomfortable WBV, particularly where the abdomen is exposed to shocks and jolts;
- young people, who may be at greater risk of damage to the spine as muscle strength is still developing and their bones do not fully mature until around the age of 25. Regular exposure to shocks and jolts should therefore be limited;
- people with neck or back problems. You may need to get a doctor's assessment of whether such people are fit for certain work involving WBV. If they are exposed, their neck or back problems should be monitored (see Part 5);
- people who have recently undergone any form of surgery and people with internal or external prosthetic devices (not including dentures), who will also be susceptible to shocks and jolts. Again, you may need to get a doctor's assessment of whether such people are fit for certain work involving WBV.

Step 3 – Assess exposures, evaluate risks and plan controls

119 Having decided who might be at risk, the next step is to quantify the risk in order to decide what the best ways to control the risk are. You have to quantify the risk by assessing the levels of exposure to WBV.

Determining whether the exposure action value is exceeded

120 The Vibration Regulations require you to take certain measures when exposure exceeds the exposure action value. If your risk assessment at Step 1 suggests there is no WBV risk, it is safe to assume that the exposure action value is not exceeded. If, on the other hand, you have moved on to Step 3, you should assume that the exposure action value is exceeded and that a programme of control measures is required. You do, of course, always have the option to measure the vibration exposure to see whether the exposure action value is exceeded, but that is not likely to be cost-effective and is not recommended.

Appointing a competent person

121 You will need to appoint a 'competent person' to undertake the exposure assessment. Appendix 1 sets out what is required of a competent person. In most cases, the competent person can be chosen from among your workforce (it could even be you), since the most important criteria are:

- knowledge of the requirements of the Vibration Regulations;
- knowledge of your work processes;
- the practicalities of using the work equipment; and
- a good knowledge of the industry your business is in, though they may need some training in assessing vibration exposure;
- the ability to learn how to obtain vibration information and to use it correctly to assess exposure.

122 You will probably only need to engage a specialist vibration contractor if you propose to measure exposure (see paragraph 123).

Doing a vibration exposure assessment

123 Non-vibration experts can, without difficulty, carry out an exposure assessment which does not involve use of technical measuring equipment. However, it will involve some time and effort to complete. It makes use of pre-existing vibration information for your machines or work processes and combines that with simple information you can collect on duration of exposure, use of the machines and relevant working conditions (eg ground conditions and vehicle speeds).

124 Pre-existing vibration information consists of:

- typical exposures from typical work processes using typical machines. Appendix 2 lists some measured examples from research findings. This information will be expanded over time on HSE's website and in future revisions of this book;
- sample vibration data from the manufacturer of your machines. Guidance on what you can expect from your manufacturer and how you can use the data is given in Part 4;
- other information on emissions and exposure which might be available from or through your trade association, from published research or from international databases on the internet (eg www.las-bb.de/karla).

125 The vibration information you use to carry out your vibration assessment needs to match, as closely as possible, the likely vibration performance of the machine you plan to use in the way you plan to use it. Ideally, you should use vibration information specific to the machine you plan to use, but if this is not available you may need to use information relating to a similar machine.

126 When choosing published vibration information, the factors you need to take account of in making your choice include:

- the type of machine (eg backhoe loader);
- the class of machine (eg power or size);
- any anti-vibration features (eg suspended cab and/or wheels);
- the task the machine was used for when producing the vibration information;
- any attachments used (eg arm-mounted picks or trailers);
- the speed it was operated at;
- the ground conditions, etc.

127 You will need to discuss with your managers and employees how the machinery and plant is used, for example:

- What is the range of tasks it is used for?
- What ancillary equipment is used (eg concrete breaking tools, trailers)?
- What ground conditions are encountered?
- What is the condition of site roadways the machine travels across?
- Are drivers exposed to large shocks and jolts?
- What speeds are machines driven at for different activities?

128 You should estimate how long employees spend operating/driving the machines, excluding breaks, pauses and switching to other tasks. These details can be obtained by observing the employee. The person need not be observed for a complete day, but for a period or periods sufficient to provide a representative sample of typical machine use. Many sources of shocks and jolts can be identified by observation. If observation is not practicable, you may need to ask the employee to note these details and let you have them.

129 Work patterns need careful consideration. For example some workers may only use vehicles for specific periods in a day or week. Typical usage patterns should be established as these will be an important factor in estimating a person's vibration exposure. If daily durations of exposure are variable, use the longest estimated daily duration of exposure as a basis for your vibration assessment. This will help you identify likely maximum levels of exposure.

130 You will be able to use the vibration information, adjusted to take into account the conditions under which the machine is used (eg if the ground is very uneven you should assume a higher level of WBV), and combine it with the daily exposure time to produce a WBV exposure figure using the downloadable calculator available on HSE's vibration website (www.hse.gov.uk/vibration).

131 HSE appreciates that this will not generate a very precise assessment of exposure, but it should be 'suitable and sufficient' if it:

- indicates the likelihood of the exposure action value being exceeded;
- gives you a broad idea of the severity of exposure, in particular, whether exposure may exceed the exposure limit value;
- identifies machine operations/conditions which subject the driver to large shocks and jolts;
- identifies the tasks and factors which cause most exposure;
- identifies possible control measures; and
- enables you to choose the most effective control measures, and the priority you should give them.

132 In cases of exposure from air transport, and from static vibrating machines, the conditions of use are unlikely to vary as significantly as those of ground vehicles, and you should be able to achieve a more accurate exposure assessment.

133 The higher the exposure, the more you need to do to reduce that exposure, particularly if it results from significant shocks and jolts. And if your assessment suggests that the exposure limit value is exceeded, you must take immediate action to reduce exposure below it (but see paragraph 137).

Determining whether the exposure limit value is exceeded

134 It is worth remembering that prior to the Vibration Regulations coming into force, HSE estimated that less than 1% of people exposed to WBV were likely to exceed the exposure limit value. Your assessment may show that although exposure is high, it is not apparent whether the exposure limit value is exceeded or not. If you do not feel it is reasonably practicable to take control measures which will reduce exposure so that you can be certain that the exposure limit value is not exceeded, you will need to evaluate exposure more accurately. This will mean measuring the actual level of exposure. You may also decide to take some measurements to confirm that your control measures have worked.

135 If you want to share the cost of measurement you could collaborate with your trade or industry association and other members who might be willing to share the cost of measurement so that they can make use of the vibration data.

136 You could arrange for you or one of your staff, as the competent person, to be trained to undertake measurements, but it is likely to be more practicable to engage a specialist vibration contractor to do the work for you. Appendix 1 provides advice on selecting a person competent to undertake an advanced WBV risk assessment.

137 There are transitional periods that apply to the exposure limit value where it is not reasonably practicable to comply with it using older machines and vehicles (see Part 1 paragraphs 14-17). This does not mean, though, that the exposure limit value can be ignored. You still need to be aware if it is exceeded and take measures to reduce exposure to as low a level as is reasonably practicable.

Where there are significant shocks and jolts

138 The exposure values are expressed in terms of $m/s^2 A(8)$, which expresses a person's exposure as an average over an eight-hour period. It does not fully represent the risks which are generated by vibration when it includes severe shocks and jolts (for instance, when driving over potholes or large rocks), which are considered to be an important risk factor in back pain. It is possible to make a basic assessment the severity and frequency of shocks and jolts by observing the working vehicle and the movement of the driver in the seat, or by asking the driver about them.

139 If you wish to quantify the risk from this type of exposure, a better measurement method to use is the Vibration Dose Value (VDV). An exposure level of $17 m/s^{1.75}$ VDV is considered very high and should be avoided. It may be useful to note any VDV values available from the information sources listed in paragraph 124. A calculator is available on HSE's vibration website that will allow you to use the information to estimate exposure in terms of VDV. Whether or not you estimate exposures using VDV, it is important to minimise the shocks and jolts by working through the control measures in the following paragraphs.

Other factors to take into account in your risk assessment

140 Regulation 5(3)(g) requires you to take account of WBV exposures which may occur outside of normal working hours but which are under the employer's responsibility. For example, where a driver takes rest periods on his vehicle while it is driven by his co-driver. You will need to include that period of exposure in your assessment. The regulation does not apply to travel to and from work.

141 Vibration can cause damage to vehicle equipment which may cause safety risks. Safety-critical instruments, gauges and meters may be particularly vulnerable to vibration damage. You should identify any such risks and take action to control them.

Drawing up a programme of control measures

142 You should include a suitable programme of control measures in your risk assessment. Paragraphs 143-156 list possible control measures. You will need to identify which of these will be most effective in relation to the specific tasks you undertake, and then prioritise them. You should decide who is responsible for carrying them out and by when, and check that all those with responsibilities are aware of them and that they carry them out effectively. You will need to discuss these with your safety and/or employee representatives.

143 Some examples of controls you could introduce are listed in paragraphs 144-156. Driver competence, knowledge and skill are some of the most important factors for reducing risk and you should give priority to providing good information, instruction and training.

144 Inform your drivers of:

- the possible link to back pain from exposure to WBV, especially from large shocks and jolts;
- the likely sources of hazardous vibration;
- the risk factors (eg severity of vibration and length of exposure);
- other back pain risk factors such as manual handling and poor posture;
- how to report back pain symptoms;
- the findings of your risk assessment, including your decisions on which employees' vibration exposures need to be managed;
- whether they are likely to be exposed above the exposure action or limit values;
- the control measures you have introduced;
- what they need to do to help you minimise risks;
- any health monitoring scheme you plan to introduce.

145 Train your drivers to:

- adjust the driver weight setting on their suspension seats, where it is available, to minimise vibration and to avoid the seat suspension 'bottoming out' when travelling over rough ground;
- adjust the seat position and controls correctly, where adjustable, to provide good lines of sight, adequate support and ease of reach for foot and hand controls;
- be aware of higher exposure activities;
- adjust vehicle speed to suit the ground conditions and to avoid excessive bumping and jolting;
- steer, brake, accelerate shift gears and operate attached equipment, such as excavator buckets, smoothly;
- follow worksite routes to avoid travelling over rough, uneven or poor surfaces;
- avoid potholes, bumps etc as well as generally driving safely;
- reduce speed if such obstacles cannot be avoided;
- use techniques to minimise WBV, particularly shocks and jolts, when carrying out tasks such as excavating, loading or travelling off-road;
- avoid twisted posture, particularly when exposed to shocks and jolts;
- look out for and report excessive WBV;
- look out for and report bouts of back pain.

146 Use the right vehicle for the job, eg:

- adequate load capacity;
- wheels and/or tyres suitable for likely obstacles;
- vehicle capable of required speed;
- large enough machine, eg for excavating hard ground conditions;
- large enough tractor, eg for heavy field work.

147 You are likely to find that a smaller vehicle used at the limit of its recommended capacity will produce more vibration than a larger capacity machine of the same type.

148 Discuss developments in lower-vibration vehicles with machinery manufacturers before purchasing or hiring vehicles.

149 Check suspension seats if fitted, eg:

- is the seat suitable for the vehicle, ie does the seat match the vibration characteristics of the vehicle (check with vehicle and/or seat manufacturer)? An unsuitable or ineffective suspension seat is likely to be worse than an unsuspended seat;
- is the seat suspension in good condition and working properly? Particular attention needs to be given to maintenance of the components (mechanical or air springs) beneath the cushion. Mechanically sprung seats will require regular lubrication and dampers will need to be replaced from time to time;
- can the seat be adjusted to match the driver's weight? If so, is it properly adjusted?

150 Maintain and repair the vehicle, including suspension systems, tyres and tyre pressures.

151 Replace solid tyres on machines such as fork-lift trucks, sweepers and floor scrubbers before they reach their wear limits.

152 Plan work site routes to take account of vibration risks as well as safety factors;

- regularly maintain paved surfaces, tracks and site roadways and remove potholes, debris, bumps and ridges on your premises;
- assess work patterns to minimise time spent in vehicles/plant by individuals, eg introduce rotas.

153 Inform your drivers of the risks of back pain, including those from:

- WBV exposure;
- poor driving posture (see Part 6);
- manual handling of materials.

154 HSE recommends that you set up a simple system of health monitoring (see Part 5) for your drivers or mobile machine operators whose jobs carry a higher than average risk of back pain. You should:

- agree an ongoing system for early reporting of back pain symptoms with your employees and safety or employee representatives;
- arrange for them to complete a health questionnaire (HSE recommends once a year);
- encourage them to report any symptoms of back pain which they think may be caused or made worse by work (note that back problems may have been caused by other activities in previous jobs or by non-work activities, but could be aggravated by WBV);
- refer employees with back problems to your occupational health service provider, where available; otherwise
- advise them to avoid any activities which aggravate back pain. Generally it is best for them to stay active as back pain is rarely serious. They could try simple pain relief to help with the pain, but they should see their doctor if they are worried, or if the pain persists or suddenly gets worse.

155 Consider whether there is any pattern of symptoms linked to particular work activities.

156 Consider whether further protective measures are needed and introduce them if appropriate.

Step 4 – Recording your findings and steps taken

157 After making your assessment of the risk of back pain from WBV exposure and the measures likely to reduce the risk, you will need to make a record of your assessment, your action plan for introducing controls and the steps taken. Even if your preliminary assessment at Step 1 shows that the exposure action value is not likely to be exceeded and you decide that there is no need for you to do a detailed risk assessment, you should record this fact and how you came to this decision.

158 The record of your assessment can be on paper or computer and should be retained at least until a fresh assessment has been done or the work process which it relates to has ceased. You may wish to retain out-of-date assessments for much longer than this, so that you have a historical record of the vibration to which your employees have been exposed and how you controlled the risks.

159 Your assessment record should, as a minimum, show:

- the vehicles, jobs or people assessed;
- estimates of WBV exposures and comparison with the exposure action value and exposure limit value;
- any relevant reports of back pain;
- the measures identified as likely to reduce risk of back pain;
- a record of the measures taken;
- the date of the assessment;
- who is responsible for making, monitoring and reviewing the risk assessment.

160 Additionally, you should:

- consult your safety or employee representative on your proposals;
- set out, in an action plan, the measures to be taken, by when and by whom;
- consider other relevant risk factors (see paragraphs 140-141 above).

161 The enforcing authorities may ask to see your vibration risk assessment and action plan. You should also make it available to your managers, supervisors and safety and employee representatives.

Step 5 – Review the vibration risk assessment and revise it if necessary

162 You will need to reassess the risk of back pain from WBV whenever there are any changes in routine activity likely to alter exposures to WBV, or changes in other factors which might affect the risks from WBV. Changes that might create the need for a review include:

- substantial changes in workload, work pattern and exposure time, work processes or driving surfaces;
- introduction or removal of machines which expose employees to WBV;
- modification to the machine, new or changed seats, used of towed accessories, changes in roadway construction, changes in routes;
- reports of back pain in drivers.

163 Even where there have been no obvious changes, it may be useful to carry out regular reviews to identify, for example, where, despite machine maintenance programmes, there may have been a gradual increase in vibration exposures due to wear or changes in working practice. There may also be new opportunities for exposure control, perhaps because newer, lower vibration or more efficient machines, seats and work attachments have become available. Also, there may be opportunities to change work-site routes or to improve surfaces travelled by vehicles or machines.

PART 4: MACHINERY MANUFACTURERS' DUTIES ON WHOLE-BODY VIBRATION

Overview

- What are the legal duties in relation to designing, manufacturing and supplying vibrating machines?
- What information should be the manufacturer or supplier provide?
- What are the limitations of the information?
- What test procedures should be used to measure vibration emission?

Introduction

164 The law requires machine manufacturers to make their products as safe as possible and to provide you with information to help you use them safely. This Part deals with the legal obligations of manufacturers and suppliers of machines (including vehicles) to control vibration emissions and to provide you with information that warns of the risks from WBV. It also indicates special precautions that may be required in interpreting this information.

165 For most classes of machine the differences in vibration emission from directly comparable machines will, in many cases, be too small to be readily distinguished.

166 Differences in vibration emission for a machine are likely to be highly dependent upon the task it is required to perform. Driver skill and provision of information, instruction and training are likely to have greatest influence on vibration exposures.

167 The most important factors for controlling exposure to WBV when selecting a machine are:

- choosing a machine that is designed for the tasks/job you require it to perform;
- avoiding machines with unusually high vibration for the class (if vibration data from comparable test methods and test conditions are available).

Supply of Machinery (Safety) Regulations

168 The Supply of Machinery (Safety) Regulations 1992⁹ (the SM(S) Regulations) implement the European Machinery Directive (98/37/EC).²⁰ This Directive exists to support the free movement of goods within the European Economic Area (EEA). It establishes minimum health and safety requirements for machines supplied in the EEA and these include specific requirements on vibration for mobile machines.

169 The SM(S) Regulations do not apply to means of transport, seagoing vessels, cableways, agricultural and forestry tractors, or specialist machines for military or police purposes. For full details see Schedule 5 to the SM(S) Regulations: *Excluded Machinery*. However, manufacturers of excluded machinery may be able to provide you with vibration information on request.

170 The SM(S) Regulations require suppliers of vibration-emitting machines to:

- design and construct such machines so that risks, including those from vibration emissions, are reduced to the lowest level taking account of technical progress (Schedule 3 clauses 1.1.2 and 1.5.9);
- provide information to warn the user where there are residual risks (Schedule 3 clauses 1.1.2 and 1.7.2);
- provide information on WBV emissions which reach or exceed 0.5 m/s² in the information/instructions accompanying mobile machines (Schedule 3 clause 3.6.3).

171 General guidance on the requirements of the SM(S) Regulations is available from the Department of Trade and Industry.²¹

Reduction of vibration emissions

172 Schedule 3 clause 1.1.2 of the SM(S) Regulations requires manufacturers and suppliers to design and construct machines so that risks are eliminated or reduced as far as possible. They must also take appropriate steps to protect the user against any risks that remain. Clause 1.5.9 specifically requires that risks from vibration emissions are reduced to the lowest level taking account of technical progress.

173 Designers and manufacturers should aim to minimise the vibration likely to be generated under all reasonably foreseeable uses (and misuses) of the machine so that people at work are not exposed at levels likely to result in vibration injuries. This will involve the application of effective techniques by engineers familiar with vibration control methods.

174 If risk of WBV affecting the health of the end user is to be kept to a minimum, vibration control and good ergonomic design need to be considered at all stages of design and development.

Provision of information

175 Schedule 3 clauses 1.1.2 and 1.7.2 of the SM(S) Regulations require the supplier to warn the user of residual risks which have not been eliminated and which the user needs to manage. This includes, for example, any training requirements for users of the machine.

176 Additionally, Schedule 3 clause 3.6.3 of the SM(S) Regulations requires that information on vibration emissions must be provided in instructions accompanying mobile machines. If this information alone is sufficient to enable use of the machines without risk from vibration the supplier need do no more.

177 In practice this means the information should:

- alert purchasers to the vibration emission of machines;
- help purchasers select machines suitable for the planned work;
- help purchasers design the work processes for which they will be used; and
- enable purchasers to plan their arrangements to protect their workers.

178 The principal information which must be supplied is:

- any measures needed to keep vibration under control when the machine is used. For example, for a suspension seat, if periodic inspection and replacement of the damper is required, this should be mentioned in the maintenance instructions;
- the vibration emission (supplied as units of acceleration or m/s^2) to which the body (feet or posterior) is subjected where this exceeds 0.5 m/s^2 when determined using the harmonised standards or the most appropriate methods for the machine concerned;
- the fact that the acceleration does not exceed 0.5 m/s^2 where this is the case.

Manufacturers' vibration data

179 Vibration data can tell you how much vibration is likely to enter a person's feet or posterior when operating a particular machine. This is useful to help you to:

- compare the vibration of different brands and models of the same type of machine (provided test methods and conditions are similar);
- identify (and avoid) machines that have unusually high WBV emissions (where test methods and conditions are otherwise similar);
- consider the differences in vibration of several machines which are, in other respects, suitable for the particular task;
- identify the range of likely vibration levels when a machine is used for different tasks (where manufacturers offer this information);
- make an estimate of daily exposure (where manufacturers confirm their vibration data is suitable for this purpose) and an assessment of risk and gauge the need for controlling WBV exposure;
- compare the daily exposure with the exposure action value (EAV) and exposure limit value (ELV) and decide what actions you need to take – for example, limiting the time employees spend on some tasks in any one day.

180 According to BS EN ISO 12096,²² two values should be reported by machine manufacturers: a (the average measured acceleration value) and K (the uncertainty). The supplier guarantees that the value obtained from a reproduction of the vibration test used to determine the emission will produce a measured magnitude of less than $a + K$. The difference between the a values for two machines should not be considered significant if it is smaller than one of the quoted K values. Note: it may not be essential or desirable to choose the machine with the lowest declared vibration emission, but it must be safe and suitable for the particular task – just aim to avoid machines with above average vibration.

181 Suppliers should usually report vibration emission data according to harmonised European vibration test codes produced by the European Committee for Standardization (CEN) or adopted from the International Organization for Standardization (ISO). Examples include BS EN 1032²³ (the general method(s) of evaluating WBV emission) and BS EN 13490²⁴ (the test code specific to industrial trucks).

Limitations of manufacturers' data

182 At present (2005), there are very few harmonised WBV test codes and little experience in their ability to produce numbers that adequately describe vibration risk.

183 Harmonised test codes are reviewed every five years and the revised versions should ensure emission values which provide an accurate guide to likely vibration emissions during 'intended use'.

184 Where a test code does not adequately produce emission values which reflect real use of the machine, the declared vibration emission is not sufficient to warn of the residual risk to be managed, and supplementary information is required. Machine manufacturers' instructions must inform users of residual risks, methods for safe use and, where necessary, training instructions.

185 Where no test code exists for a specific type of machine, a general standard method (BS EN 1032)²³ is available to manufacturers to determine vibration emission. They should select operating conditions for vibration tests with care, and should report the test procedures they have adopted, including:

- machine configuration, operating and loading conditions during the test; and
- the positions and directions in which the vibration was measured.

Residual risks

186 Under Schedule 3 section 1.7.2 of the SM(S) Regulations, information must be supplied on the residual risk if, after all means of vibration reduction have been incorporated in the design of the machine, there remains a risk that may require management. Machine suppliers will not know the exact vibration exposure their products will cause in use. They will therefore need to make an assessment, taking into account all reasonably foreseeable ways in which the machine might be used, to decide whether it is likely to cause exposure at a level which might constitute a risk to the operator's health. For example, the manufacturer of a wheeled loader will need to consider how the vibration magnitude changes with the various modes of operation (travelling, loading, etc) and how the terrain likely to be encountered will change the vibration emission and the daily durations of exposure which might occur.

187 The emission value declared will often be sufficient to alert you to the need to control the vibration risk, but where the test code is inadequate (see paragraph 184) additional information is required to help you to use the machine safely (for example, by specifying maintenance programmes, operating techniques and training requirements).

188 If the emission value provided by the supplier is below the declaration threshold of 0.5 m/s², but the likely value in the workplace is much higher, the emission data have failed to inform of a residual vibration risk likely to require management. In such cases, suppliers must make the likelihood of a vibration risk evident. Similarly, if the supplier declares a value which is above the threshold of 0.5 m/s² but is unrepresentative of the vibration likely during 'intended use', the supplier should provide further information to the user. The range of vibration magnitudes likely to be measured in accordance with ISO 2631-1²⁵ in the workplace, during the full range of intended uses of the machine, is useful information for the user.

Training requirements

189 Some machines may require operator training to ensure that low WBV exposures are achieved and sustained. It may also be necessary to train others, such as those who will carry out machine maintenance. Suppliers have a duty to alert users to particular training that is required. This might include:

- notification of applications of the machine that produce unusually high vibration emissions;
- information about particular methods of using the machine to be adopted or avoided that greatly affect the emitted vibration; and
- training in maintenance requirements to avoid unnecessary exposure.

Presentation of information, labelling and marking

190 Schedule 3 clause 1.7.2 of the SM(S) Regulations requires that the information on residual risks should be provided in any way which will be easily understood by the user, for example, using readily understandable pictograms or written information in an appropriate language. Warning information should be included in the instructions accompanying the machine and may also appear in catalogues or in separate data sheets.

191 Schedule 3 clause 1.7.3 of the SM(S) Regulations requires that all machines must be labelled/marked with the following minimum information:

- the name and address of the manufacturer;
- CE marking, which includes the year of construction;
- a designation of series or type;
- a serial number, if any.

192 The CE mark indicates that the machine is designed and manufactured to meet all the relevant *Essential Health and Safety Requirements* in Schedule 3 of the SM(S) Regulations. These include the duties to minimise risks by design and to provide information on vibration emission and the management of residual risks.

Second hand equipment

193 The SM(S) Regulations do not apply to machines first supplied or put into service in the EEA before 1993. However, Section 6 of the HSW Act⁴ requires importers and suppliers of machines for use at work to ensure, so far as is reasonably practicable, that they are safe and without risks to health at all times when they are being set, used, cleaned or maintained by a person at work. They must also provide such information as is required for safe use of the machine.

194 Further, machines provided for use at work by employers must comply with the essential health and safety requirements laid down in the SM(S) Regulations by virtue of regulation 10 of the Provision and Use of Work Equipment Regulations 1998.²⁶

195 Suppliers of second-hand machines may be able to rely on information originally supplied with the machine if this is available and sufficient. However, they may need to provide new information if, for example, the original information is no longer available, if the machine has been significantly modified so that the existing information is no longer valid, or if the original information did not meet the standard required.

Selecting low-vibration machines

196 When selecting machines, remember:

- to ensure that the machine is generally suitable for the job;
- to make your final choice of machine, you will need to ask about likely vibration magnitudes for your intended use(s);
- to check that manufacturers' vibration data is representative of likely workplace vibration magnitudes;
- if particular uses of the machine are likely to cause unusually high vibration, there should be a warning in the instruction book;
- where manufacturers declare in their instruction books that their machine produces 'less than 0.5 m/s²', you should be aware that magnitudes may be much greater in your workplace.

PART 5: HEALTH MONITORING

Overview

- Why should I carry out health monitoring?
- How can I monitor health?
- What do I do with the results of health monitoring?

197 Health monitoring is an informal, non-statutory method of surveying your employees for symptoms of ill health including low back pain. This type of occupational health management system can enable you, as an employer, to be aware of health problems and to intervene to prevent employees' problems being caused or made worse by work activities. Another important purpose of health monitoring is to provide feedback on your risk controls.

198 This guidance focuses on the risk of low back pain as the main health effect of concern for drivers and operators of mobile machinery at work (hereafter described as 'drivers').

199 As part of an overall strategy for occupational health management, health surveillance may be appropriate to ensure control methods you have put in place are working and to detect any incidence of ill health. However, there are no methods available for the detection of changes in people's backs which can reliably indicate the early onset of low back pain that are specifically related to workplace risk factors. Therefore, no formal health surveillance programme can be required under the Vibration Regulations.

200 However, valuable information can be obtained from less precise measures than those provided for by a formal health surveillance approach, such as an informal system for reporting, monitoring and investigation of symptoms. This is known as 'health monitoring'. It is good practice to put in place this type of system to allow individuals to make early reports of low back pain. All workers at risk of back pain should be encouraged to report to their employer/manager any symptoms that they may be suffering.

201 There are specific regulations dealing with manual handling in the workplace. If manual handling is a risk in your workplace you should refer to HSE guidance to ensure you are complying with your duties under these regulations. There is also guidance available on how to deal with low back pain in the workplace; this is available at HSE's back pain website (www.hse.gov.uk/msd/backpain).

What is health monitoring?

202 Health monitoring is a system for collecting basic information from your employees on possible health problems which may be caused by, or could be aggravated by, work activities. The results of health monitoring are informal and cannot be treated as a diagnosis of ill health.

203 Health monitoring will help you, as an employer, to take action to prevent back pain being caused or aggravated by work activities. It provides a means of obtaining early reports of back complaints which can be investigated and acted upon as appropriate, eg referral to an occupational health professional or doctor and revision of control methods.

When would health monitoring be appropriate?

204 Health monitoring could play an important part of your overall strategy to manage the risks of developing back pain in drivers in your workplace. Your risk assessment (see Part 3) will indicate whether or not you may have a problem with back pain in your drivers. Examples of situations where the risk to drivers' health may be considered high are:

- significant manual handling of loads by drivers;
- having to stretch and twist to operate machinery;
- driving on badly prepared surfaces in vehicles with poor suspension;
- static postures (ie remaining in the same position for long periods);
- driving off-road, too fast, over rough terrain or with inappropriate vehicles.

205 You should also identify high-risk groups. This will include employees who are pregnant, young employees and employees with previous back problems. Those workers identified as being at higher risk of back pain in the workplace should be subject to health monitoring. All other employees should be encouraged to report any low back pain symptoms as soon as possible. In order to gain your employees' co-operation, it will be important to ensure that they understand the purpose of health monitoring is to help them to avoid work-related ill health and to stay fit to continue working. You should discuss your proposals for health monitoring with safety or employee representatives.

How to carry out health monitoring

206 A health monitoring regime for low back pain in drivers should involve a structured system for the self-reporting of symptoms. This system should allow the individual to describe the symptoms that they are suffering or have suffered in the recent past.

207 It is important to involve your employees and their representatives early on in the development of your health monitoring programme. This can overcome any problems with employees not reporting symptoms because they do not understand why the programme has been introduced, and shows them that it is in place to protect their health. You should consult safety or employee representatives in good time.

208 Where possible, any health monitoring should be under the responsibility of an occupational health professional. However, an employer can implement a simple annual questionnaire for all employees at risk of back pain without any other support.

209 An example of a simple questionnaire which you, as an employer, could use for the purpose of health monitoring is given in Appendix 3. In most cases, where significant symptoms of back pain are reported this will require further investigation by referral to a GP or occupational health professional. If in doubt about any aspect of a person's health, the individual should be referred on for further advice from a health professional.

What to do with the information

210 Use the information from health monitoring to check trends in back pain in your drivers. If your drivers can be grouped by the types of vehicle they drive, it may be worth analysing the data from each group separately; for example, does one group report more back pain than another? If the data suggests your drivers (or groups of them) are reporting similar symptoms, you may need to investigate further. Look for risk factors in the work, or evidence that control measures are not working as intended. It may be worth reviewing the risk assessment to help find out what the problem is, and to help you decide on corrective action.

PART 6: POSTURAL RISKS

Overview

- How does posture affect the risk of back pain?
- How can postural risks be reduced?

211 Your employees may develop back pain if they are uncomfortably positioned in the machine or vehicle cab, or where movement is restricted, particularly if they do not have regular breaks where they can change position. The risks of back pain may be increased if they are also subject to WBV exposure and have to manually lift and carry heavy loads as part of their job. This Part deals with the risks from poor posture and how you can reduce those risks.

Strains from poor posture

212 Strains on the driver will occur when they cannot sit comfortably with good support for back, legs and feet and/or they are unable to reach and operate the main controls without needing to stretch, lean or twist in the seat. Continually stretching, leaning or twisting to operate the vehicle will strain muscles and joints if it goes on for several hours each day. Staying in the same position for a long time also places a strain on muscles and joints and this can apply to any seated work. These strains may lead to back, neck and shoulder pain and muscle fatigue which may impair ability to perform manual tasks in vehicle drivers and machine operators. Where this occurs, the risks from WBV exposure and manual handling of materials are likely to be increased.

Simple controls for postural risks

213 Select vehicles or machines where:

- there is sufficient and easy adjustment of the seat for height, rake, fore and aft position, allowing for a wide range of driver sizes;
- main driving/operating controls (foot and hand) are in the optimum position and can be reached without stretching, twisting or leaning;
- operation of controls does not require high levels of muscular effort;
- the seat gives good support to back, buttocks, thighs and feet and is comfortable;
- access to or exit from the cab is neither awkward nor difficult or causing an awkward posture;
- the vehicle or machine can be operated or driven without twisting, leaning or stretching (eg to see attached equipment such as a plough attached to a tractor).

214 You should train drivers to adjust seats and controls correctly to suit them, to adopt a good posture and to avoid stretching, leaning or twisting as they operate the vehicle. The vehicle or machine manufacturer or supplier should be able to advise you on best practice for its operation to avoid postural stress.

215 You should try to arrange work so that the drivers can have regular breaks and are not confined to the cab for long periods.

Appendix 1

Selecting a competent person

Introduction

1 Regulation 5 of the Vibration Regulations requires you to make a suitable and sufficient assessment of the risk. You will need to ensure that a competent person is appointed to do this. This Appendix gives advice on what you should be looking for in a competent person and what training they should receive.

What is required of a competent person?

2 Your competent person will need to be capable of bringing together and presenting information about the vibration exposures. They should also be able to help you take the necessary steps to comply with regulations 5, 6 and 8 of the Vibration Regulations (ie to manage the risks from WBV), and to advise on whether you need additional specialist help. Knowledge alone will not be sufficient; the person should also possess experience and skills appropriate to the situations to be handled, including:

- the purpose of risk assessment;
- a good basic understanding of what information needs to be obtained;
- an appreciation of their own limitations, whether of knowledge, experience, facilities or resources;
- competence in measurement (if this is to be undertaken);
- how to record results, analyse and explain them to others;
- how to interpret information provided by others, eg information provided by the manufacturer about the vibration emitted by the machine when in use;
- familiarity with good practice in your industry and knowledge of the work processes involving vibration.

3 The competent person does not necessarily need an advanced knowledge of vibration or mechanical engineering, but will need enough understanding of the subject to tell the employer when other further specialist assistance may be required. This means they may need an outline appreciation of further advanced topics and an understanding of their own limitations.

Appointing a competent person from your workforce

4 It is possible that someone in your workforce (possibly yourself) already possesses the skills, knowledge and experience necessary to undertake a vibration assessment in your workplace. The ability to understand and apply this guidance in making an adequate assessment may be more important than formal qualifications. Many engineers, scientists and other technical staff may have gained sufficient skill to carry out a competent assessment. Some will, however, need further training.

This may be available through short courses provided by technical colleges and other institutions.

Appointing a consultant as a competent person

5 You may decide that the appropriate expertise to advise you on WBV is not available in-house. If you choose to appoint a consultant as your competent person you will need to ensure that they have undergone training or have otherwise obtained the skills, knowledge and expertise described in this section.

6 HSE has produced a booklet (*Need help on health and safety? INDG322*)²⁷ to help you select a consultant to carry out many of the tasks required by legislation. This booklet advises you when to use a consultant, what a consultancy can provide, how to choose the right consultancy and how you can judge the services they provide.

Appendix 2

Examples of WBV measurements

1 The examples below illustrate the wide range in exposure values likely to be found for operation of many types of off-road machine. The examples given are for use of agricultural tractors for activities known to cause high vibration exposure, and for a selection of quarrying activities using several types of earth moving machine. Exposures in most of industry are likely to be much lower than the examples given here.

2 The examples from agriculture are for four-wheel-drive tractors in the 90 – 125 kW engine power range, incorporating examples of WBV reduction technology. The data was gathered over a sampling period of about half a day. Available machinery on a range of farms for ploughing, spraying, cultivating and trailer work was put to normal use. Exposures during trailer transport work are very close to the exposure limit value and exposures during cultivation work can exceed the exposure limit value. Higher levels of WBV exposure should be expected for use of older designs and smaller tractors.

3 The examples from quarry work are for various types of articulated dump truck, rigid dump truck and loading shovel measured over two hours of normal use. Exposures are above the exposure action value but below the exposure limit value. The highest reading for a machine is shown in bold.

4 More detailed examples of exposures are expected to become available during the first few years of the Vibration Regulations.

Table 1 Example exposures in agriculture

<i>Machine</i>	<i>Daily exposure ranges in the three directions of vibration</i>		
	<i>X (fore and aft vibration)</i>	<i>Y (side-to-side vibration)</i>	<i>Z (vertical vibration)</i>
Agricultural tractor – ploughing	0.3 – 0.6 m/s ² A(8)	0.5 – 0.9 m/s² A(8)	0.3 – 0.5 m/s ² A(8)
Agricultural tractor – cultivating	0.3 – 0.9 m/s ² A(8)	0.5 – 1.4 m/s² A(8)	0.3 – 0.7 m/s ² A(8)
Agricultural tractor – spraying	0.3 – 0.5 m/s ² A(8)	0.4 – 0.8 m/s² A(8)	0.3 – 0.4 m/s ² A(8)
Agricultural tractor – trailer work	0.5 – 1.1 m/s² A(8)	0.4 – 0.9 m/s ² A(8)	0.3 – 0.5 m/s ² A(8)

Table 2 Example exposures in quarrying

<i>Machine</i>	<i>Daily exposure ranges in the three directions of vibration</i>		
	<i>X (fore and aft vibration)</i>	<i>Y (side-to-side vibration)</i>	<i>Z (vertical vibration)</i>
Hauling – articulated dump trucks	0.4 – 0.6 m/s ² A(8)	0.6 – 0.8 m/s² A(8)	0.5 – 0.7 m/s ² A(8)
Hauling – rigid dump trucks	~0.4 m/s ² A(8)	~ 0.4 m/s ² A(8)	0.4 – 0.6 m/s² A(8)
Loading – wheeled loaders	0.6 – 0.9 m/s² A(8)	0.5 – 0.7 m/s ² A(8)	0.3 – 0.5 m/s ² A(8)

Appendix 3

Sample health monitoring questionnaire

Date of assessment:.....Employee No/Payroll No:.....

Name:.....

Date of birth:.....

Job title:.....

Any change in duties/hours since last questionnaire?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Recent experience

Is there **currently** any movement or activity that causes you pain in your back?

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Have you suffered any back/neck/shoulder pain **in the last 12 months?**

Yes	No
<input type="checkbox"/>	<input type="checkbox"/>

Please describe the severity of the pain experienced:

No pain

Pain as bad as it could be

0 1 2 3 4 5 6 7 8 9 10

*Note: If severity above 5 indicated, refer on for further advice. However, if rank less than 5, but for three consecutive assessments, then refer for further advice.**

Have you had to take any medication to deal with the pain experienced?

Yes *	No
<input type="checkbox"/>	<input type="checkbox"/>

Have you had to seek medical advice regarding this pain?

Yes *	No
<input type="checkbox"/>	<input type="checkbox"/>

Has this back/neck/shoulder pain resulted in time off from work?

Yes *	No
<input type="checkbox"/>	<input type="checkbox"/>

Have you had any accidents or injury to the back in the last two years?

Yes *	No
<input type="checkbox"/>	<input type="checkbox"/>

Action/advice

Referral for further advice?

Other advice provided?

** Further advice should be sought from an occupational health professional or GP in these cases*

This is an example of a questionnaire may be used by employers for health monitoring.

References

- 1 *Control of Vibration at Work Regulations 2005* SI 2005/1093 The Stationery Office 2005 ISBN 0 11 0727673
- 2 *Hand-arm vibration. The Control of Vibration at Work Regulations 2005. Guidance on Regulations* L140 HSE Books 2005 ISBN 0 7176 6125 3
- 3 Directive 2002/44/EC of the European Parliament and of the Council of 6 July 2002 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration)
- 4 *Health and Safety at Work etc Act 1974 Ch37* The Stationery Office 1974 ISBN 0 10 543774 3
- 5 *Control back-pain risks from whole-body vibration: Advice for employers on the Control of Vibration at Work Regulations 2005* Leaflet INDG242(rev1) HSE Books 2005 (single copy free or priced packs of 10 ISBN 0 7176 6119 9)
- 6 *Drive away bad backs: Advice for mobile machine operators and drivers* Pocket card INDG404 HSE Books 2005 (single copy free or priced packs of 25 ISBN 0 7176 6420 2)
- 7 *Construction (Design and Management) Regulations 1994* SI 1994/3140 The Stationery Office 1994 ISBN 0 11 043845 0, as amended
- 8 *Health and Safety (Training for Employment) Regulations 1990* SI 1990/1380 The Stationery Office 1990 ISBN 0 11 004380 4
- 9 *Supply of Machinery (Safety) Regulations 1992* SI 1992/3073 The Stationery Office 1992 ISBN 0 11 025719 7, as amended by *Supply of Machinery (Safety) (Amendment) Regulations 1994* SI 1994/2063 The Stationery Office 1994 ISBN 0 11 045063 9
- 10 *Management of Health and Safety at Work Regulations 1999* SI 1999/3242 The Stationery Office 1999 ISBN 0 11 085625 2
- 11 *Safety Representative and Safety Committees Regulations 1977* SI 1977/500 The Stationery Office 1977
- 12 *Safety representatives and safety committees* L87 (Third edition) HSE Books 1996 ISBN 0 7176 1220 1
- 13 *Offshore Installations (Safety Representatives and Safety Committees) Regulations 1989* SI 1989/971 The Stationery Office 1989 ISBN 0 11 096971 5
- 14 *Quarries Regulations 1999* SI 1999/2024 The Stationery Office 1999 ISBN 0 11 082955 7
- 15 *Health and Safety (Consultation with Employees) Regulations 1996* SI 1996/1513 The Stationery Office 1996 ISBN 0 11 054839 6
- 16 *A guide to the Health and Safety (Consultation with Employees) Regulations 1996. Guidance on Regulations* L95 HSE Books 1996 ISBN 0 7176 1234 1
- 17 *Manual Handling Operations Regulations 1992* SI 1992/2793 The Stationery Office 1992 ISBN 0 11 025920 3

18 *Manual handling. Manual Handling Operations Regulations 1992 (as amended). Guidance on Regulations L23* (Third edition) HSE Books 2004 ISBN 0 7176 2823 X

19 *Getting to grips with manual handling: A short guide* Leaflet INDG143(rev2) HSE Books 2004 (single copy free or priced packs of 15 ISBN 0 7176 2828 0)

20 Directive 98/37/EC of the European Parliament and of the Council of 22 June 1998 on the approximation of the laws of the Member States relating to machinery

21 *Machinery: guidance notes on UK Regulations* URN 95/650 Department of Trade and Industry 1995

22 BS EN ISO 12096: 1997 *Mechanical vibration. Declaration and verification of vibration emission values* British Standards Institution

23 BS EN 1032: 2003 *Mechanical vibration. Testing of mobile machinery in order to determine the vibration emission value* British Standards Institution

24 BS EN 13490: 2002 *Mechanical vibration. Industrial trucks. Laboratory evaluation and specification of operator seat vibration* British Standards Institution

25 ISO 2631-1: 1997 *Mechanical vibration and shock. Evaluation of human exposure to whole-body vibration. Part 1: General requirements* International Organization for Standardization

26 *Provision and Use of Work Equipment Regulations 1998* SI 1998/2306 The Stationery Office 1998 ISBN 0 11 079599 7, as amended

27 *Need help on health and safety? Guidance for employers on when and how to get advice on health and safety* Leaflet INDG322 HSE Books 2000 (single copy free or priced packs of 10 ISBN 0 7176 1790 4)

Further reading

Whole-body vibration on agricultural vehicles: Evaluation of emission and estimated exposure levels RR321 HSE Books 2005 ISBN 0 7176 2970 8 (available online at www.hse.gov.uk/research/rrpdf/rr321.pdf)

Evaluation of whole-body vibration exposures in British industry RR377 HSE Books 2005 ISBN 0 7176 6155 5 (available online at www.hse.gov.uk/research/rrpdf/rr377.pdf)

As new publications on WBV become available, they will be reviewed and listed on HSE's vibration website www.hse.gov.uk/vibration.

Further information

For information about health and safety ring HSE's Infoline Tel: 0845 345 0055
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