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**Guide to the  
Safety, Health and Welfare at Work  
(General Application) Regulations 2007  
Chapter 2 of Part 5: Control of  
Vibration at Work**

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## **Guide to Chapter 2 of Part 5 of the General Application Regulations 2007**

### **Chapter 2 of Part 5: CONTROL OF VIBRATION AT WORK**

#### **Introduction**

This Guide is aimed at safety and health practitioners, employers, managers, employees, safety representatives and others to give guidance on Chapter 2 of Part 5 and Schedule 6 to the Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007) as amended by the Safety, Health and Welfare at Work (General Application)(Amendment) Regulations 2007 (S.I. No. 732 of 2007) relating to the control of vibration at work. The objective of the Guide is to give practical guidance aimed at the prevention of occupational accidents or ill health. It is not intended as a legal interpretation of the legislation.

The Regulations retranspose Directive 2002/44/EC of the European Parliament and of the Council of 25 June 2002 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration).

From 1 November 2007, Chapter 2 of Part 5 of the General Application Regulations 2007 replaces the Safety, Health and Welfare at Work (Control of Vibration at Work) Regulations 2006 (S.I. No. 370 of 2006), which are revoked from that date.

In this Guide the text of the Regulations is shown in italics.

The General Application Regulations 2007 are made under the Safety, Health and Welfare at Work Act 2005 (No. 10 of 2005) referred to elsewhere in this Guide as “the Act”.

The Regulations come into effect from 1 November 2007, other than, in accordance with Article 9 of Directive 2002/44/EC –

(i) Regulation 139 applies on and after 6 July 2010, but not until then, where work equipment is used which—

(a) was first provided to employees before 6 July 2007 by an employer, and

(b) does not permit compliance with the exposure limit values.

(ii) Regulation 139 applies on and after 6 July 2014, but not until then, in respect of work equipment, which is used in the agriculture and forestry sectors only, and—

(a) was first provided to employees before 6 July 2007 by an employer, and

(b) does not permit compliance with the exposure limit values.

(iii) In using work equipment described in paragraph (1) or (2), an employer shall take into account the latest technical advances and the organisational measures taken in accordance with Regulation 137.

### **General Background Information**

Mechanical vibrations at work can expose workers to hand-arm vibration (HAV) and/or whole-body vibration (WBV).

HAV is caused by the use of work equipment and work processes that transmit vibration into the hands and arms of employees. It can be caused by hand-held power tools such as hammer drills, sanders, grinders, concrete breakers, hand-guided equipment such as powered lawnmowers, chainsaws, hedge trimmers or by holding materials being processed by machines such as bench-mounted grinders, pedestal grinders etc.

Long term, regular exposure to HAV is known to lead to potentially permanent and debilitating health effects known as hand-arm vibration syndrome (HAVS) such as vibration white finger and carpal tunnel syndrome.

HAVS affects the nerves, blood vessels, muscles and joints of the hand, wrist and arm. It can become severely disabling if ignored. Carpal tunnel syndrome is a disorder of the nerves in the wrist which may involve pain, tingling, numbness and weakness of the hand/wrist and, while it can occur naturally, it is associated with exposure to vibration as one of its causes.

The early signs of a problem include tingling and numbness, not being able to feel things with your fingers, a loss of strength in your hands and in the cold and wet your fingers turn white and then red accompanied by pain when recovering. If you continue to use high-vibration tools these symptoms may become more frequent and prolonged until permanent. You may be unable to pick up objects. Vibration white finger is extremely painful and debilitating and can spread thus affecting more fingers if exposure to vibration continues.

Those likely to be more sensitive to HAV include pregnant workers, workers with diseases of the hands, arms, wrists or shoulders and workers with diseases affecting blood circulation, e.g. diabetes. Industries associated with HAV include general and heavy engineering,, construction and civil engineering, forestry and horticulture.

WBV is caused by vibration transmitted through the seat or the feet by workplace machines and vehicles. It can be caused by off-road vehicles, such as tractors, when driven over rough surfaces, by excavators when excavating difficult ground and by standing close to powerful, fixed machines.

Regular, long term exposure to high levels of WBV is linked to lower back pain. Those likely to be more sensitive to WBV include pregnant workers, people with neck or back problems, young people (whose bones and muscles are not fully developed) and people who have recently undergone any form of surgery. Industries associated with WBV include mining, construction and agriculture.

Exposure to vibration is quantified in terms of the acceleration of the surface in contact with exposed person. The acceleration of the surface is normally expressed in units of metres per second squared ( $m/s^2$ ). The body is more vulnerable to vibration at certain frequencies. Low-frequency motion, from about 5 to 20 Hertz (cycles per second) is thought to be potentially more damaging than higher frequency motion. Vibration at frequencies below 2 Hz and above 1,500 Hz is thought to be less damaging. To allow for this frequency dependence, a frequency weighting is applied to measurements of vibration magnitude.

Vibration is measured using an accelerometer, a device which attaches to the vibrating surface and produces an output proportional to the acceleration. The average magnitude of the vibration is indicated after the frequency weighting has been applied.

The damage caused by vibration is related to the total vibration exposure a person is exposed to during the working day. This is referred to as the daily vibration exposure. To assess the daily vibration exposure, the 8 hour equivalent acceleration is determined. This quantity accounts for both the vibration magnitude and the time over which the exposure takes place.

A person's daily vibration exposure is, like the vibration magnitude, expressed in acceleration units of  $m/s^2$ . The daily exposure can be thought of as the average vibration spread over a standard working day of eight hours, adjusted to take account of the actual total exposure time (i.e. contact time or trigger time). To avoid confusion with vibration magnitudes, it is conventional to add "A (8)" after the units when quoting a daily vibration exposure, for example " $5m/s^2$  A (8)".

If the total exposure time happens to be exactly eight hours then the daily vibration exposure has the same value as the average vibration magnitude. For example, if someone is exposed to vibration at  $3m/s^2$  for a total of eight hours in a day, their daily exposure will be  $3 m/s^2$  A(8). If the exposure time is less than eight hours their exposure is less than  $3 m/s^2$  A(8). If an employee's daily exposure time is more than eight hours (rare in practice, but possible if long shifts are worked) then their exposure is greater than  $3 m/s^2$  A (8).

If a piece of equipment has a vibration magnitude of  $2 m/s^2$  it can be used for 8 hours before reaching the exposure action value, if it has a vibration magnitude of  $3.5 m/s^2$  it can be used for 4 hours before reaching the exposure action value and if it has a vibration magnitude of  $10 m/s^2$  it can only be used for 30 minutes before reaching the exposure action value.

Typical vibration magnitudes for equipment used at work are as follows:

**For HAV.**

Chainsaw:  $6 m/s^2$

Sander:  $8 m/s^2$ .

Hammer drill:  $9 m/s^2$ .

Road breaker: 12 m/s<sup>2</sup>.

**For WBV.**

Car: 0.4 m/s<sup>2</sup>.

Lorry: 0.7 m/s<sup>2</sup>.

Tractor: 1.0 m/s<sup>2</sup>.

Quarry dumper: 1.2 m/s<sup>2</sup>.

**Purpose of the Regulations**

The Regulations are aimed at protecting workers from the risks arising from vibrations, in particular muscular/bone structure, neurological and vascular disorders.

The Regulations include requirements for an employer to:

- assess the vibration risk to their employees;
- decide if they are exposed above the daily exposure limit value (ELV); and if so take immediate action to reduce their exposure below the ELV;
- decide if they are exposed above the daily exposure action value (EAV) and if so -
  - introduce a programme of controls to eliminate or reduce their daily exposure so far as is reasonably practicable;
  - provide appropriate health surveillance to employees who continue to be exposed above the EAV;
- provide information and training to employees on health risks and controls to employees at risk;
- keep a record of their risk assessment and control actions;
- review and update their risk assessment regularly.

## **Regulation 133 – Interpretation**

133. *In this Chapter*

*“exposure action value” means the level of daily vibration exposure for any employee which, if exceeded, requires specified action to be taken to reduce risk;*

*“exposure limit value” means the level of daily vibration exposure for any employee which must not be exceeded, save as set out in Regulation 142(2);*

*“hand-arm vibration” means mechanical vibration that, when transmitted to the human hand-arm system, entails risks to the safety and health of employees, in particular vascular, bone or joint, neurological or muscular disorders;*

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

*“whole-body vibration” means the mechanical vibration that, when transmitted to the whole body, entails risks to the safety and health of employees, in particular lower-back morbidity and trauma of the spine.*

## **Regulation 134 - Transitional periods.**

134. (1) *Subject to paragraph (2), Regulation 139 applies on and after 6 July 2010, but not until then, where work equipment is used which—*

*(a) was first provided to employees before 6 July 2007 by an employer, and*

*(b) does not permit compliance with the exposure limit values.*

(2) *Regulation 139 applies on and after 6 July 2014, but not until then, in respect of work equipment, which is used in the agriculture and forestry sectors only, and—*

*(a) was first provided to employees before 6 July 2007 by an employer, and*

*(b) does not permit compliance with the exposure limit values.*

(3) *In using work equipment described in paragraph (1) or (2), an employer shall take into account the latest technical advances and the organisational measures taken in accordance with Regulation 137.*

Regulations 133 (Interpretation) and 134 (Transitional periods are self-explanatory.

### **Regulation 135 – Exposure Limit Values and Action Values.**

135. (1) *For hand-arm vibration—*

*(a) the daily exposure limit value standardised to an eight-hour reference period shall be  $5\text{m/s}^2$ ,*

*(b) the daily exposure action value standardised to an eight-hour reference period shall be  $2.5\text{ m/s}^2$ , and*

*(c) exposure shall be assessed or measured on the basis set out in Part A of Schedule 6.*

(2) *For whole-body vibration—*

*(a) the daily exposure limit value standardised to an eight-hour reference period shall be  $1.15\text{ m/s}^2$ ,*

*(b) the daily exposure action value standardised to an eight-hour reference period shall be  $0.5\text{ m/s}^2$ , and*

*(c) exposure shall be assessed or measured on the basis set out in Part B of Schedule 6.*

The exposure limit value (ELV) is the maximum daily level of vibration an employee may be exposed to.

For HAV it is a daily exposure of  $5\text{ m/s}^2$  and for WBV it is a daily exposure of  $1.15\text{ m/s}^2$ .

The exposure action value is the level of daily exposure to vibration for any employee which, if exceeded, requires employers to take action to reduce risk.

For HAV it is a daily exposure of  $2.5\text{ m/s}^2$  and for WBV it is a daily exposure of  $0.5\text{ m/s}^2$ .

### **Regulation 136 – Determination and Assessment of Risks**

136. *An employer shall*

*(a) without prejudice to sections 19 and 20 of the Act, where employees are or are likely to be exposed to risks to their safety or health arising from exposure to mechanical vibration during their work, make a suitable and appropriate*

*assessment of the risk arising from such exposure;*

*(b) in carrying out the risk assessment referred to in paragraph (a), assess daily exposure to mechanical vibration by means of—*

*(i) observation of specific working practices,*

*(ii) reference to relevant information on the probable level of the vibration corresponding to the equipment or the types of equipment used in the particular working conditions, and*

*(iii) if necessary, measurement of the magnitude of mechanical vibration to which the employer's employees are liable to be exposed, and carry out any such measurement on the basis set out in Schedule 6,*

*(c) ensure that the assessment referred to in paragraphs (a) and (b) are planned and carried out by a competent person at suitable intervals,*

*(d) in carrying out the risk assessment under this Regulation, give particular attention to—*

*(i) the level, type and duration of exposure, including any exposure to intermittent vibration or repeated shocks,*

*(ii) the exposure limit values and the exposure action values specified in Regulation 135,*

*(iii) the effects of exposure to vibration on employees whose safety or health is at particular risk from such exposure,*

*(iv) any indirect effects on employee safety or health resulting from interactions between mechanical vibration and the place of work or other work equipment,*

*(v) any information provided by the manufacturers of work equipment in compliance with section 16 of the Act,*

*(vi) the existence of replacement equipment designed to reduce exposure to mechanical vibration,*

*(vii) the extension of exposure to whole-body vibration beyond normal working hours under the employer's responsibility,*

*(viii) specific working conditions such as low temperatures, and*

*(ix) appropriate information obtained from health surveillance including, where possible, published information,*

*(e) record in the safety statement drawn up pursuant to section 20 of the Act—*

*(i) the findings of the risk assessment as soon as it is practicable after it is made, and*

*(ii) the steps which the employer has taken to comply with Regulations 137 to 141, and*

*(f) review the assessment and, if necessary, the measurement referred to in paragraph (b) at suitable intervals and, in particular, where either of the conditions specified in section 19(3)(a) and (b), of the Act are met.*

The level of exposure to mechanical vibration may be assessed by means of observation of specific working practices and reference to relevant information on the equipment used in the particular conditions of use, including such information provided by the manufacturer of the equipment.

A sensible approach to vibration assessment is to first obtain details on the machinery/vehicles used and the usage time. Data on the likely vibration levels should then be obtained from one or more of the available data sources. Reputable machinery/vehicle manufacturers will usually be able to provide details about their products' vibration level and regulatory agencies can often provide generic data about the vibration levels expected from common equipment and processes. Comprehensive databases, which contain information on vibration, are accessible on the internet.

Although some caution needs to be exercised when interpreting this data, in many cases the information can be used to estimate the likely exposure of workers using machinery/vehicles. Decisions can then be made on whether the equipment is suitable for the job and, if it is, what length of time it can be used for before the relevant exposure limits are reached. If the information is not available, if it is questionable, or the estimated exposure looks like it might be above the exposure limit value, consideration should be given to undertaking exposure measurements.

Manufacturers of tools and machines are required by the European Machinery Directive (98/37/EC) to

- design and construct equipment which reduces vibration to the minimum that can be achieved;
- provide information on the safe use of the equipment in its intended application;
- provide vibration emissions information;
- supply maintenance procedures to maintain the performance of vibration reduction features.

Employees whose safety or health is at particular risk from exposure to mechanical vibration include -

- those with existing HAVS or other diseases of the hands, arms, wrists or shoulders;
- those with diseases affecting blood circulation, e.g. diabetes, or nerve disorders affecting the hands or arms, e.g. carpal tunnel syndrome;
- young people whose muscles and bones are still developing;
- pregnant workers;
- people with neck or back problems;
- people who have recently undergone any form of surgery and those people with internal or external prosthetic devices (not including dentures).

Section 19(3) of the Act states that the risk assessment shall be reviewed by the employer where-

- (a) there has been a significant change in matters to which it relates, or
- (b) there is another reason to believe that it is no longer valid,

and, following the review, the employer shall amend the risk assessment as appropriate.

This means that the employer should review the risk assessment whenever he or she identifies any changes in availability or suitability of equipment or in work processes likely to offer reduced vibration exposure, or if they have any doubt about the effectiveness of the controls implemented.

In any case, the employer should review the risk assessment at least every three years, but may wish to review it sooner if, the level of risk is high, there is doubt that the control measures are remaining effective or there is a likelihood of better work methods or equipment becoming available.

### **Regulation 137 – Provisions aimed at Avoiding or Reducing Exposure**

137. *An employer shall—*

*(a) having regard to the general principles of prevention in Schedule 3 to the Act, ensure, so far as is reasonably practicable, that risk from the exposure of the employer's employees to mechanical vibration is either eliminated at source or reduced to a minimum, and*

*(b) adapt any measure taken in compliance with this Chapter to take account of any employee who is at particular risk from mechanical vibration.*

### **Regulation 138 – Application of exposure action values.**

*138. If the risk assessment carried out under Regulation 136 indicates that an exposure action value is exceeded, an employer shall comply with the duty to reduce exposure to mechanical vibration and attendant risks to a minimum under Regulation 137 by establishing and implementing a programme of technical or organisational measures, or both, appropriate to the activity and consistent with the risk assessment, taking into account in particular—*

- (a) other methods of work which reduce exposure to mechanical vibration,*
- (b) the 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, such as seats that effectively reduce whole-body vibration and handles which reduce the vibration transmitted to the hand-arm system,*
- (d) appropriate maintenance programmes for work equipment, the places of work, workstations and systems of work,*
- (e) the design and layout of places of work and workstations,*
- (f) adequate information and training to instruct employees to use work equipment correctly, safely and without risk to health in order to reduce their exposure to mechanical vibration to a minimum,*
- (g) limitation of the duration and intensity of exposure to mechanical vibration,*
- (h) appropriate work schedules with adequate rest periods, and*
- (i) provision of clothing to protect employees exposed to cold and damp.*

### **Regulation 139 – Application of exposure limit value.**

*139. Subject to Regulations 134 and 142, an employer shall ensure that—*

- (a) the employer's employees are not exposed to mechanical vibration above the relevant exposure limit value, and*
- (b) if, despite the measures taken to comply with this Chapter, the exposure limit value is exceeded,*

*(i) take action to reduce exposure to mechanical vibration to below the exposure limit value,*

*(ii) identify the reason for that limit being exceeded, and*

*(iii) amend the technical and organisational measures taken in accordance with Regulation 138 to prevent it being exceeded again.*

Actions for controlling HAV risks could include:

(a) Substitution.

- Look for alternative work methods which eliminate or reduce exposure to vibration.
- Mechanise or automate the work.

(b) Equipment selection.

- Make sure that equipment selected or allocated for tasks is suitable and can do the work efficiently.
- Limit the use of high vibration tools wherever possible.
- Use suitable low-vibration tools wherever possible.

The efficiency of the tool is important; a tool which takes a long time to do a job could result in a higher vibration exposure than a more efficient tool with greater vibration emission. Tools may be too powerful for the job, and this too could result in exposure to unnecessarily high vibration levels.

Advances in material and manufacturing technology have brought about improved designs of hand-held and hand guided machines with lower levels of vibration emission. However, simply buying newer power tools may not eliminate or minimise the vibration exposure. There may still be a residual risk from exposure to vibration which must be managed, and if the tool chosen is not suitable for the job it could increase the risk.

Generally, power tools manufactured for professional use can be recognised from their design, appearance and performance. Tools intended for the domestic (DIY) market, where less use is expected, may have greater vibration emissions. All tools on sale in the European Union should meet the relevant safety requirements and carry the “CE” mark. Employers should take care to avoid simply buying the cheapest tools as these may be of a relatively poor standard, unsafe for use and with higher vibration emission.

(c) Maintenance.

- Introduce appropriate maintenance programmes for your equipment to prevent avoidable increases in vibration.

- Sharpen and replace regularly items such as chisels and abrasive discs so that equipment is efficient and keeps employees exposure time to the minimum possible.

(d) Work schedules.

- Limit the time of your employees' exposure to vibration.
- Plan work to avoid employees being exposed to vibration for long, continuous periods – several shorter periods are preferable.

(e) Clothing.

- Provide your employees with protective clothing when necessary to keep them warm and dry. This will encourage good blood circulation which should help protect them from developing vibration-related diseases.

“Anti-vibration” gloves, which aim to isolate the wearer’s hands from the effects of vibration, are available commercially. There are several different types but they are not particularly effective at reducing the frequency-weighted vibration associated with risk of HAVS and they can increase the vibration at some frequencies. It is not possible to assess the vibration reduction provided in use by “anti-vibration” gloves, so they should not generally be relied on to provide protection from vibration. However, gloves and other warm clothing can be useful to protect vibration-exposed workers from cold, helping to maintain circulation.

Actions for controlling WBV risks could include:

(a) Training and instructing operators and drivers to:

- Adjust vehicle speed to suit ground conditions.
- Adjust suspension seats and controls correctly.
- Follow work site routes that minimise WBV risks.
- Operate attached equipment smoothly.

(b) Choosing machinery that is suitable for the job.

(c) Maintaining machinery and roadways to an adequate standard by:

- Making sure that site roadways are well maintained, e.g. potholes filled in, ridges levelled, debris removed.
- Maintaining vehicle suspension systems correctly, e.g. wheel, cab, tyre pressures and seat suspension.

## **Regulation 140 - Employee Information and Training**

*140. Without prejudice to sections 9 and 10 of the Act, where employees are exposed to risk from mechanical vibration, an employer shall provide those employees or their representative, or both, with suitable and sufficient information, instruction and training, including—*

*(a) the technical and organisational measures taken in order to comply with this Chapter,*

*(b) the exposure limit values and the exposure action values,*

*(c) the results of the risk assessment and measurement of the mechanical vibration carried out in accordance with Regulation 136 and the potential injury arising from the work equipment in use,*

*(d) why and how to detect and report signs of injury,*

*(e) the circumstances in which health surveillance is made available to employees and its purpose, in accordance with Regulation 141, and*

*(f) safe working practices to minimise exposure to mechanical vibration.*

Employers should ensure employees fully understand the level of risk they may be exposed to, how it is caused and the possible health effects, i.e.:

- How their personal daily exposures compare with the exposure action and limit values,
- What control measures are planned to reduce risks,
- What training is planned for operators, supervisors and managers in their respective roles to ensure control of exposure, e.g. through correct selection, use and maintenance of equipment or restriction of exposure times,
- What symptoms of ill health they should look out for, to whom they should report them and how they should report them,
- What health surveillance will be provided and why it is important.

**Regulation 141 - Health surveillance, records and effects.** as amended by the Safety, Health and Welfare at Work (General Application)(Amendment) Regulations 2007 (S.I. No. 732 of 2007)

*141. (1) Without prejudice to section 22 of the Act, an employer shall ensure that appropriate health surveillance is made available to those employees for whom a risk assessment referred to in Regulation 136 reveals a risk to their health, including employees exposed to mechanical vibration in excess of an exposure action value.*

*(2) The purpose of health surveillance referred to in this Regulation is to prevent or diagnose rapidly any disorder linked with exposure to mechanical vibration, and shall be regarded as being appropriate, when—*

*(a) the exposure of an employee to mechanical vibration is such that an identifiable illness or adverse health effect may be related to the exposure,*

*(b) there is a reasonable likelihood that the illness or effect may occur under the particular conditions of his or her work, and*

*(c) there are valid low risk tested techniques available to the employee for detecting indications of the illness or the effect.*

*(3) An employer shall ensure that—*

*(a) the results of health surveillance carried out in compliance with section 22 of the Act are taken into account in the application of preventive measures at a particular place of work,*

*(b) a health record in respect of each of the employer's employees who undergoes health surveillance in accordance with paragraph (1) is made and maintained,*

*(c) the health record referred to in paragraph (b) or a copy of the record is kept available in a suitable form so as to permit appropriate access at a later date, taking into account any confidentiality concerns,*

*(d) on request, an employee is allowed access to his or her personal health record,*

*(e) the Authority is provided with copies of such health records as it may require, and*

*(f) if the employer ceases to trade, the Authority is notified forthwith in*

*writing and all health records kept by the employer in accordance with this Regulation are made available to the Authority.*

*(4) A registered medical practitioner under whose responsibility an employee receives health surveillance under this Regulation shall—*

*(a) keep an individual confidential medical record containing the results of the health surveillance and, where appropriate, medical examination carried out,*

*(b) ensure that such record or a copy thereof is kept in a suitable form for an appropriate time from the date of the last entry made in it,*

*(c) propose any protective or preventive measures necessary in respect of any individual employee,*

*(d) give access to an employee, upon request by that employee, to his or her own health surveillance records, and*

*(e) allow access to individual confidential medical records to a person who is designated under section 63(1) of the Act.*

*(5) Where, arising from health surveillance in accordance with this Regulation, an employee is found to have an identifiable illness or adverse health effect which, in the opinion of a registered medical practitioner, is the result of exposure at work to mechanical vibration, the registered medical practitioner shall inform —*

*(a) the employee of the opinion and the reasons for that opinion, and*

*(b) the employer of the opinion but not of the reasons.*

*(6) In informing an employee as set out in paragraph (5), the registered medical practitioner must include information and advice regarding the health surveillance which the employee should undergo following the end of the exposure.*

*(7) An employer shall, where as a result of health surveillance in accordance with this Regulation, an employee is found to have an identifiable illness or adverse health effect which, in the opinion of a registered medical practitioner, is the result of exposure at work to mechanical vibration—*

*(a) review the risk assessment made under Regulation 136,*

*(b) review the measures provided to eliminate or reduce the risk under*

*Regulations 137 and 138,*

*(c) take account of the advice of the registered medical practitioner or a relevant competent person, or an inspector, in implementing any measures required to eliminate or reduce risk in accordance with Regulations 137 and 138, including the possibility of assigning the affected employee to alternative work where there is no risk of further exposure,*

*(d) arrange continued health surveillance and provide for a review of the health status of any employee who has been similarly exposed, and*

*(e) take account of the recommendations of the registered medical practitioner or a relevant competent person regarding further medical examination.*

(as amended by the Safety, Health and Welfare at Work (General Application)(Amendment) Regulations 2007)

Health surveillance is about having procedures to detect work-related ill health at an early stage and acting on the results. The main aims are to safeguard the health of employees (including identifying and protecting people at increased risk), and also to check the long-term effectiveness of control measures.

In the case of whole-body vibration there are no reliable and reproducible methods of determining the early effects of back problems that may be related to vibration. Back pain is common among the general population and there is no consistent difference between back pain related to vibration and that occurring independently. However, valuable information could be obtained from simple health surveillance measures such as self reporting, questionnaires, monitoring and investigation of symptoms. It is good practice to put in place this type of system to allow employees to make early reports of low back pain. Health surveillance in this form does not lead to a diagnosis. However, it allows information to be collected from employees and, when reviewed, this may help to identify potential problems in the workplace.

There is currently no place for the routine use, in screening, of tests such as x-rays, scans or indeed medical examinations. These should be reserved for the investigation of individuals brought to light from self reporting of symptoms or questionnaires as determined by a competent occupational health professional.

Health surveillance could play an important part in the overall strategy to manage the risks of developing back pain in the workplace.

A risk assessment should indicate whether or not there is likely to be a problem with back pain in those operating mobile machinery. It should also identify high risk groups. Young workers may be particularly susceptible to the risk factors for back pain and those with previous back problems would also be considered to be at higher risk. Those identified through the risk assessment as being at higher risk should be subject to health surveillance.

A health surveillance regime for low back pain should involve a structured system for self-reporting of symptoms and, where appropriate, questionnaires. This system should allow the individual to describe the symptoms that they are suffering from or have suffered in the past.

Where possible, any health surveillance should be under the responsibility of a competent occupational healthcare professional. An employer can implement a simple annual questionnaire for all those operators of mobile machinery identified as being at high risk without any other support. This questionnaire should be administered annually as part of an ongoing programme to monitor reported employee symptoms. However, if not administered by a health professional, these questionnaires must not include medical details such as previous medical history. In most cases where significant symptoms of back pain are reported this will require further investigation by referral to an occupational healthcare professional. This is unless the pain reported was mild and intermittent or can be explained by a specific occurrence outside of work or, if within work, an isolated incident with no long-term impact. If in doubt the employee should be referred on for further advice from a healthcare professional. In certain cases the employer may need to approach an occupational healthcare professional in order to obtain an opinion on the employee's continuing fitness for work. The employer should not himself or herself attempt to gauge fitness for work without medical advice.

In the case of hand-arm vibration, one of the specific aims is to prevent employees developing an advanced stage of hand-arm vibration syndrome (HAVS) associated with disabling loss of hand function. There are three components to Hand Arm Vibration Syndrome (HAVS)

**(i) Vascular.** This refers to impaired blood circulation and blanching of affected parts of the hand/fingers. This component is often known as Vibration White Finger (VWF.) Extreme cases have resulted in gangrene setting in; however, this is quite rare as earlier symptoms generally cause sufferers to abandon use of work involving high-vibration equipment.

**(ii) Neurological.** This often manifests initially as numbness and tingling sensations but can progress to more severe loss of dexterity and other problems. These symptoms cause considerable discomfort and loss of manual dexterity, resulting in clumsiness and reduced grip.

**(iii) Musculoskeletal .** This is associated with pain and stiffness in the hands, wrists and other parts of the upper limb. As well as being associated with joint changes, vibration has been associated with exacerbation of other conditions such as Carpal Tunnel Syndrome.

HAVS usually arises from regular and long term exposure to hand transmitted vibration. The early symptoms of HAVS are often tingling, numbness in the fingers during and immediately after working with such things as hand held tools. Continuing exposure to Hand Arm Vibration (HAV) may lead to development of susceptibility to finger blanching attacks. The blanching attacks are triggered at least in early stages by drops in ambient temperature and do not necessarily occur whilst using the tool,

unless working in cold or wet conditions. Health surveillance should be provided for hand-arm vibration-exposed employees who:

- Are likely to be regularly exposed above the action value;
- Are likely to be exposed occasionally above the action value and where the risk assessment identifies that the frequency and severity of exposure may pose a risk to health; or
- Have a diagnosis of HAVS (even when exposed below the action value).

Where the action level is exceeded health surveillance should be carried out at a pre-employment (baseline) stage, 6 months later and, thereafter, regularly, usually annually unless the risk assessment suggests a more frequent schedule is warranted. Workers who are more sensitive may have more frequent surveillance. Information should be given to those exposed on the risks, symptoms and rationale for health surveillance.

Health Surveillance at its simplest level will involve creation of a health record and encouraging self-reporting of symptoms. Self-reporting presupposes a knowledge of what symptoms should be reported. This in turn will require education and training.

The next step is regular completion of questionnaires. This involves employees being asked to fill in a questionnaire which will include questions about the person's medical history and is, therefore, a medical document and confidentiality should be ensured. It should be returned to an occupational health professional. It should include details on vibration exposure. Records of health surveillance should include identification details, history of HAV exposure, previous fitness for work details and symptoms questionnaires where non-confidential information is recorded but no personal medical information. Anonymised information can be used to check on effectiveness of control measures.

Medical records are required and these are confidential relating to individuals. Workers should be informed of the results of each assessment and any implications of the findings, such as the likely effects if they continue to work with equipment likely to cause hand-arm vibration.

Those with symptoms suggestive of hand-arm vibration syndrome (HAVS), for example tingling and/or numbness in the fingers, loss of sensation and manual dexterity, finger blanching and aching digits and limbs, or other circulatory conditions, should be referred for assessment by an occupational health professional with relevant training and experience. An occupational health professional can make an informed assessment of the nature of reported symptoms. However a formal diagnosis of hand-arm vibration syndrome should only be made by a doctor with occupational health experience and preferably experience of hand arm vibration syndrome.

There is a need to ensure that workers are aware that the results of their health surveillance, with respect to fitness for work, will be disclosed to their employer, but

no clinical information can be given to anyone other than the employee without their consent.

If there is doubt over continuing exposure to HAV, it might be prudent to have standardised tests performed.

### **Standardised tests:**

The two tests which are most useful in health surveillance are the Vibrotactile Thresholds (VTT) and the Thermal Aesthesiometry (TA). Both require subject co-operation to be valuable. The results, to be considered reliable, should be consistent with the reported history and show reasonably narrow standard deviations in results. An experienced tester and clinician can often identify when the subject is not co-operating for what ever reason. Results of the test earn a score. The scoring system is provided by the manufacturer of the testing equipment. In general the higher the score the more significant the result.

### **Regulation 142 - Exemptions**

*142. (1) Subject to paragraphs (3) and (4), the Authority, by a certificate in writing, may exempt any person or class of persons from Regulation 139 in duly justified circumstances in respect of whole-body vibration only in the case of sea and air transport, where the latest technical advances and the specific characteristics of the place of work do not permit compliance with the exposure limit value despite the technical and organisational measures taken.*

*(2) Subject to paragraphs (3) and (4), the Authority, by a certificate in writing, may exempt any person or class of persons from Regulation 139 where the exposure of an employee to mechanical 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 mechanical vibration averaged over 40 hours in any one week is less than the exposure limit value, and*

*(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.*

*(3) The Authority shall not grant any exemptions under this Regulation unless—*

*(a) the Authority consults the employers and the employees concerned or their representatives, or both,*

*(b) it applies conditions to any such exemption, taking into account*

*the special circumstances, to ensure that the resulting risks are reduced to a minimum, and*

*(c) appropriate health surveillance is available to the employees concerned.*

*(4) Any exemption granted by the Authority under this Regulation shall be—*

*(a) reviewed by the Authority at least once every 4 years, and*

*(b) revoked by the Authority, by a certificate in writing, at any time as soon as the justifying circumstances no longer obtain.*

Regulation 142(2) permits weekly averaging of daily exposure for occasional daily exposures above the exposure limit value. However, there are stringent conditions for its use. Regulations 137 and 138 still apply and it will often be reasonably practicable to spread the exposure over more than one day to keep each day's exposure below the exposure limit value. Also, to qualify for weekly averaging, exposures must be usually (i.e. on most days) below the exposure action value. Where weekly averaging is used, employers should also increase the health surveillance of employees. Weekly averaging is most likely to apply in cases of emergency work, e.g. involving the rescue services or intensive urgent work, for example, using chainsaws to clear fallen trees following a storm etc.

The formula for calculating weekly exposure is as defined by international standard ISO 5349-2:2001 (Annex B.2).

For example, for hand-arm vibration, the weekly averaging scheme would permit a maximum exposure on any one day of  $11 \text{ m/s}^2 \text{ A (8)}$  when exposure on the remaining days of the week is zero, or  $10 \text{ m/s}^2 \text{ A (8)}$  when exposure on each of the other four days of the week is just below  $2.5 \text{ m/s}^2 \text{ A (8)}$  – the exposure action level.

## Appendix 1

### SCHEDULE 6

Regulations 135, 136

#### HAND-ARM VIBRATION AND WHOLE-BODY VIBRATION

##### Part A — Hand-arm vibration

###### 1. Assessment of exposure

(a) The assessment of the level of exposure to hand-arm vibration is based on the calculation of the daily exposure value normalised to an eight-hour reference period A(8), expressed as the square root of the sum of the squares (rms) (total value) of the frequency-weighted acceleration values, determined on orthogonal axes ahwx, ahwy, ahwz as defined in Chapters 4 and 5 and Annex A to ISO (International Organization for Standardization) Standard 5349-1 (2001).

(b) The assessment of the level of exposure may be carried out on the basis of an estimate based on information provided by the manufacturers concerning the level of emission from the work equipment used and based on the observation of specific work practices or on measurement.

###### 2. Measurement

When measurement is employed in accordance with Regulation 136—

(a) the methods used may include sampling, which must be representative of the personal exposure of an employee to the mechanical vibration in question, with the methods and apparatus used adapted to the particular characteristics of the mechanical vibration to be measured, to ambient factors and to the characteristics of the measuring apparatus in accordance with ISO Standard 5349-2(2001), and

(b) in the case of devices which need to be held with both hands—

(i) measurement shall be made on each hand,

(ii) the exposure shall be determined by reference to the higher value of the 2, and

(iii) information for the other hand shall also be given.

###### 3. Interference

Regulation 136 applies, in particular, where the mechanical vibration interferes with the proper handling of controls or reading of indicators.

#### 4. Indirect risks

Regulation 136 applies, in particular, when the mechanical vibration interferes with the stability of structures or the security of joints.

#### 5. Individual protectors

Personal protective equipment against hand-arm vibration may contribute to the programme of measures referred to in Regulation 138.

### **Part B — Whole-body vibration**

#### 1. Assessment of exposure

(a) The assessment of the level of exposure to mechanical vibration is based on the calculation of the daily exposure  $A(8)$  expressed as equivalent continuous acceleration over an eight-hour period, calculated as the highest (rms) value, determined on three orthogonal axes ( $1,4a_{wx}$ ,  $1,4a_{wy}$ ,  $a_{wz}$  for a seated or standing employee), in accordance with Chapters 5, 6 and 7, Annex A and Annex B to ISO Standard 263 1-1(1997).

(b) The assessment of the level of exposure may be carried out on the basis of an estimate based on information provided by the manufacturers concerning the level of emission from the work equipment used and based on observation of specific work practices or on measurement.

(c) In the case of maritime shipping, only vibrations exceeding a frequency of 1 Hz need to be considered.

#### 2. Measurement

When measurement is carried out under Regulation 136, the methods used may include sampling, which must be representative of the personal exposure of an employee to the mechanical vibration in question with the methods and apparatus used adapted to the particular characteristics of the mechanical vibration to be measured, to ambient factors and to the characteristics of the measuring apparatus in accordance with ISO Standard 2631-1(1997).

### 3. Interference

Regulation 136 applies, in particular, where the mechanical vibration interferes with the proper handling of controls or reading of indicators.

### 4. Indirect risks

Regulation 136 applies, in particular, when the mechanical vibration interferes with the stability of structures or the security of joints.

### 5. Extension of exposure

Regulation 136 applies where, owing to the nature of the activity, an employee benefits from the use of rest facilities supervised by the employer, on condition that exposure to whole-body vibration in those facilities is reduced to a level compatible with their purpose and conditions of use, except in cases of “force majeure”.

## Appendix 2

### Health Surveillance Sample Screening Questionnaire

#### Screening Questionnaire for Workers with Exposure to Whole Body Vibration

<b>Date of assessment:</b>
<b>Name:</b>
<b>Date of Birth:</b>
<b>Job:</b>
<b>Employee No. / Works reference:</b>
<b>Have you suffered any back/neck/shoulder pain in the last 12 months?</b>  <b>YES:</b> Describe -  <b>No:</b> Tick <input type="checkbox"/>
<b>Is there currently any movement or activity that causes you pain in your back/neck/shoulder?</b>  <b>YES:</b> Describe -  <b>No:</b> Tick <input type="checkbox"/>
<b>If yes, have you noticed any relationship to your work?</b>
<b>Has this back/neck/shoulder pain kept you from your usual activities?</b> Tick:  <b>YES</b> <input type="checkbox"/>  or  <b>No</b> <input type="checkbox"/>
<b>Are you aware of any factors which may have contributed to this pain?</b>  <b>YES:</b> Describe -  <b>No:</b> Tick <input type="checkbox"/>

## **Sources of Further Information and Bibliography**

The Regulations may be purchased directly from -

Government Publications Office,  
Sun Alliance House,  
Molesworth Street,  
Dublin 2

or by mail order from

Government Publications,  
Postal Trade Section,  
51 St. Stephen's Green,  
Dublin 2

(Tel: 01 6476834/35/36/37; Fax 01 6476843)

The unofficial text of the Regulations may also be accessed on the Health and Safety Authority website, [www.hsa.ie](http://www.hsa.ie)

International standard ISO 5349-1 (2001) defines the means of calculation of human exposure to hand-arm vibration

International standard ISO 5349-2 (2001) defines the means of measurement of human exposure to hand-arm vibration

International standard ISO 2631-1 (1997) defines the means of calculation and measurement of human exposure to whole-body vibration

The Health and Safety Executive in the U.K provides comprehensive information on vibration on its web site at [www.hse.gov.uk](http://www.hse.gov.uk)