Ergonomics in the workplace: Vibration

OHS information for employers, supervisors and workers

This publication provides information about the hazards posed by vibration in the workplace, along with related OHS requirements. It is part of the "Ergonomics in the workplace" series, which focuses on applying ergonomics principles to reduce illness and injury, while meeting Alberta's occupational health and safety (OHS) requirements.

KEY INFORMATION

- Vibration caused by equipment, tools and vehicles can be a workplace hazard.
  - This vibration can affect the hands, arms or body and cause health problems.
- Employers must identify any work site hazards associated with vibration exposure and ensure it's eliminated or controlled.
- Employers must provide training to workers who may develop musculoskeletal injuries from vibration.

Vibration can be a workplace hazard

Many types of workplace equipment, tools, and vehicles can vibrate when in use. When the energy causing a vibration is transferred to a worker's body through physical contact, the vibration can become a workplace hazard because of its potential health effects.

Vibration can negatively affect worker health in different ways, depending on the type of vibration the worker experiences (see the **Types of vibration** section in this bulletin). These effects can be temporary or permanent. Additionally, health effects associated with vibration can become more pronounced as a result of:

- Intense vibration.
- Prolonged exposure.
- Colder temperatures.
- Awkward body posture.

The first health effect workers typically notice as a result of vibration exposure is pain, which can potentially indicate the onset of a musculoskeletal injury (MSI). Alberta's Occupational Health and Safety Code (OHS Code) defines an MSI as an injury to "the muscles, tendons, ligaments, joints, nerves, blood vessels or related soft tissues that are caused or aggravated by work, including overexertion injuries and overuse injuries."

REPORTING VIBRATION SYMPTOMS

Workers who believe they are experiencing work-related symptoms of an MSI, including symptoms they believe are due to vibration, should report it to their employer. The employer must promptly review the worker's activities and take corrective measures, as required by Section 211 of Alberta's OHS Code. Early detection and correction of the vibration concerns can help stop the associated progression of injury or disease. (Note that sensitivity to vibration varies among individuals, so some workers may report symptoms sooner or later than other workers doing the same task.)

Types of vibration

In the context of a workplace, there are two main types of vibration: "hand-arm vibration" and "whole-body vibration."

Hand-arm vibration

When someone holds a vibrating tool or machine, the vibration can transfer from the tool to the person's hands and arms. Examples of items that can cause hand-arm vibration include hand-held and bench grinders, drills, chainsaws, jackhammers, hedge trimmers, powered lawn mowers and power washers.

Health effects

Hand-arm vibration can damage blood vessels, which affects blood flow and can result in damage to the skin, nerves and muscle.

Symptoms associated with hand-arm vibration include:

- Pain in the hands, elbows and shoulders.
- Limited mobility.
- Whitening of fingers, especially in wet or cold conditions.
- Tingling and numbness in the fingers.
- Reduced or lack of sensation with light touch (impedes fine dexterity).
- Loss of grip strength.

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For example, workers who use handheld tools that vibrate can develop an occupational disease known as Hand-arm vibration syndromel (HAVS). HAVS is an overarching term applied to a number of different medical conditions that can lead to numbness and muscle weakness in the fingers and hands. One such condition is “vibration white finger,” which can cause fingers to turn white in addition to experiencing numbness, weakness and other effects.

The chance of developing HAVS increases with exposure to vibration (especially in combination with other risk factors such as cold exposure and smoking, as these reduce the flow of blood to the hands).

Whole-body vibration

Whole body vibration occurs when a person sits or stands on a vibrating vehicle, machine or surface. Examples of tasks that may expose workers to whole-body vibration include truck driving, operating heavy equipment, standing on industrial catwalk floors, and riding sit-on or stand-on lawnmower equipment.

Health effects

Whole-body vibration can contribute to MSIs, including low back problems, neck problems and muscle fatigue.

Whole-body vibration can also cause symptoms such as:

- Fatigue.
- Stomach problems.
- Headache.
- Loss of balance.
- Feelings of shakiness shortly after or during exposure.

OHS requirements

Hazard assessment and control

Part 2 of the OHS Code requires employers to identify existing and potential hazards (including hazards associated with vibration exposure), and to take steps to eliminate or control those hazards.

Identifying vibration hazards

Vibration exposure hazards can be identified in a variety of ways. Some examples include:

- Equipment selection: When purchasing tools or equipment, employers can consider whether it would create a vibration hazard, and use that information to select safer options (such as tools or equipment that minimize vibration and/or have vibration dampening features).
- Worker feedback: Workers can provide feedback about how tools or equipment function when being used. They can also provide feedback about how they feel (signs and symptoms) during and after using vibrating equipment.
- Work site inspections: A work site inspection must include observations of equipment and the work environment to see if vibration could be present. Manufacturer specifications for the equipment may provide additional information regarding potential vibration hazards.
- Taking measurements: Vibration in tools or equipment at the work site can be measured using accelerometers. The findings may be able to be used to quantify risk and identify suitable controls. (The person doing the measurements and analyses must have the qualifications, training, and experience to carry out this specialized and technically complex work. Employers may want to consult a qualified professional such as an ergonomics or occupational hygiene consultant. For more information, see Tips on selecting an OHS consultant.)

Eliminating and controlling vibration hazards

Once workplace hazards have been identified, they must be eliminated or controlled. Since the methods to do so can differ depending on the work site and the nature of the work, employers will need to find methods that are suitable for their specific work and work site.

For example, in terms of vibration hazards, employers could explore whether there are any industry best practices pertaining to reducing tool or equipment vibration. If so, employers may be able to implement these in their work procedures and work sites.

Also, some ergonomics principles may be applicable to eliminate or control vibration hazards. Examples of such principles include:

- Designing and selecting equipment that reduces vibration.
- Adjusting seating to encourage healthy neutral sitting postures.
- Rotating jobs to reduce vibration exposure.

Additional examples of potential controls for vibration hazards are provided in Table 1 at the end of this publication.

Training requirements

Employers must ensure workers who may be exposed to the possibility of an MSI (including from the hazard of hand-arm or whole-body vibration) are trained in specific measures to eliminate or reduce that possibility. For more information, see Ergonomics in the workplace: MSI prevention training.

Other potential OHS requirements

Depending on the circumstances, other OHS requirements may also apply to vibration in the workplace. The following are only some of the more common ones that may apply; make sure you are familiar with all OHS requirements that apply to you in relation to vibration.

Equipment maintenance

Under Section 12(b) of the OHS Code, employers must ensure equipment at a work site is maintained in a condition that won't compromise the health or safety of workers using or transporting it. Poorly maintained equipment will tend to vibrate more than equipment that is well maintained, and this vibration could increase the health risk to workers.

Powered mobile equipment – inspection and maintenance

Under Section 260 of the OHS Code, employers must ensure powered mobile equipment is inspected by a competent worker for defects and conditions that are hazardous or may create a hazard. If the powered mobile equipment could vibrate, the inspection must consider whether the vibration is or would be a workplace hazard, and any defects must be addressed in accordance with the additional requirements specified in Section 260.

Powered mobile equipment – seats

Under Section 266(c) of the OHS Code, employers must ensure powered mobile equipment has seats that keep the operator and other workers in or on the equipment safe while it's in motion. Because of this requirement, the powered mobile equipment seats will need to be of a design that protects workers from vibration if it's significant enough to be a hazard.

Noise

Vibrating surfaces, especially for larger items of equipment, can generate noise. Requirements related to excessive noise are specified in Part 16 of the OHS Code. For details, see Noise at the work site.

TABLE 1: EXAMPLES OF POTENTIAL HAZARD CONTROLS RELATED TO VIBRATION

Type of hazard control	Hand-arm vibration controls	Whole-body vibration controls
Elimination (remove the hazard)	• Alter the design of the equipment or environment to eliminate the vibration. • Remove the worker from the vibration source.	
Engineering (control the hazard at its source)	• Purchase equipment with lower vibration emissions and ergonomic design for neutral postures. • Maintain tools properly. Tools that are worn, blunt or misaligned vibrate more. • Design workstations to allow for neutral body postures and optimal manual handling heights.	• Purchase equipment with lower vibration emissions and ergonomic design for neutral postures. • Maintain equipment properly (e.g., maintenance of vehicle engine, suspension, tire pressure). Smooth operating equipment generates less vibration. • Air-ride suspension seats. • Truck cab suspension systems that incorporate vibration control. • Adjustable seating to support the body and healthy neutral postures. • Maintain driving surfaces to be as smooth as possible (e.g., roadways, floor surfaces).
Administrative (change the way people work)	• Limit the duration of exposure. • Alternate work tasks between the use of vibrating and non-vibrating tools. • Use a relaxed or lighter grip on hand tools. • Rest tools on a support as much as possible. • Train workers to recognize and report early signs and symptoms of vibration exposure.	• Limit the total duration of exposure per shift. • Reduce consecutive hours of exposure. • Alternate work tasks between those with whole-body vibration exposure and no exposure. • Reduce or limit driving speed for ride-on equipment and vehicles. • Workers should make small adjustments to their sitting posture throughout each shift. • Workers should walk and move for a few minutes after exiting a vehicle, before doing any lifting or heavy physical work. • If workers are standing on equipment or vehicles during use, they should have a relaxed standing posture with knees slightly bent. • Train workers to recognize and report early signs and symptoms of vibration exposure.
Personal protective equipment (PPE)	• Anti-vibration full-fingered gloves.	• Anti-vibration footwear. • Anti-vibration pads.

Contact us

OHS Contact Centre

Alberta toll-free

- 1-866-415-8690

Edmonton region

- 780-415-8690

Deaf or hard of hearing (TTY)

- 1-800-232-7215 (Alberta toll-free)
- 780-427-9999 (Edmonton region)

Notify OHS of health and safety concerns

alberta.ca/file-complaint-online.aspx

> Call the OHS Contact Centre if you have concerns that involve immediate danger to a person on a work site.

Report a workplace incident to OHS

alberta.ca/ohs-complaints-incidents.aspx

Website

alberta.ca/ohs

Get copies of the OHS Act, Regulation and Code

Alberta King's Printer

alberta.ca/alberta-kings-printer.aspx

OHS

alberta.ca/ohs-act-regulation-code.aspx

For more information

Ergonomics in the workplace: Identifying and controlling MSI hazards (ERG045)
ohs-pubstore.labour.alberta.ca/erg045

Ergonomics in the workplace: Identifying and controlling manual handling hazards (ERG043)
ohs-pubstore.labour.alberta.ca/erg043

Ergonomics in the workplace: MSI prevention training (ERG044)
ohs-pubstore.labour.alberta.ca/erg044

Hazard assessment and control: a handbook for Alberta employers and workers (BP018)
ohs-pubstore.labour.alberta.ca/bp018

Noise at the work site (HS003)
ohs-pubstore.labour.alberta.ca/hs003

Tips for selecting an OHS consultant (GS009)
ohs-pubstore.labour.alberta.ca/gs009